

Joan Robinson's Economics

A Centennial Celebration

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Introduction

Bill Gibson¹

If radical politics is the province of exuberant youth, she seemed to live her life in reverse. At 20, Joan Violet Robinson, the daughter of an upper middle class military officer, was hardly a radical, but by age 40 she had finished her book on Marx and adopted increasingly progressive positions throughout the rest of her life. As a probable consequence, she was denied a Nobel and while beloved by young radical economists worldwide, Columbia University even refused to honor a speaking engagement because her talk would conflict with a faculty meeting. As Geoff Harcourt notes in the first chapter, she gazed on China and other regimes of excessive enthusiasm with “starry eyes.” On the other hand, Robinson did not tolerate the foolishness or apologia in which orthodox theory seemed to be immersed. Her wit, often laced with sarcasm, evoked patient tolerance in many of her adversaries (hear Samuelson’s remark that the distance between me and Joan Robinson is *less* than between her and me). But ultimately, to the profession as a whole, her work was unconvincing.

The close blend of politics with her economics was one reason, but mathematics may have been another. *The Accumulation of Capital*, her magnum opus published in 1956, was about dynamic systems but employed no mathematics, no differential equations. As the chapters below by Amitava Dutt, Peter Skott and Donald Harris, demonstrate, it is therefore possible to ask, a half-century later, what she *really meant*. Her distrust of mathematics and its use in economics obviously did not resonate. Indeed, the opposite has occurred, even among her closest followers. It is safe to say that *no one* writes on Robinson’s growth theory in the same way she did, that is, without significant mathematical formalization. Her ability to describe complex processes in words alone is not her lasting legacy.

So why a book on Joan Robinson on her 100th birthday? It is simply because despite her shortcomings, she was one of the most original minds

of twentieth-century economics. To say that her work was unconstrained is an understatement. And while it is easy to show the ways in which her politics colored her economics, it never truly got in the way. What she said about capitalism and the way it functions was cold, rational and piercing, unemotional at the core. While she may have professed to flavor her economics with ideology and claimed that her adversaries were up to the same, the reality of her writing is quite different. She knew that she and her colleagues were up against something real, a worldwide system that had demonstrated a tendency toward catastrophic failure. Keynes had turned theory upside down, reversing the logic of the use of scarce resources for competing ends, not as an exercise but because now real world conditions demanded intervention. It was this sense of realism, of the need for theory that described how capitalism actually functioned that separated her from Marshall, and even, as Cristina Marcuzzo argues below, from Sraffa.

As the reader confronts the formal mathematical machinery of many of the chapters to follow, he or she should keep in mind that Robinson’s first priority was not theoretical perfection. Robinson did not look at theory with an electron microscope, as did, for example, Sraffa. Arcane debates that had little practical relevance became increasingly tedious to her (and possibly explains her aversion to mathematics). Her hero was Maynard Keynes, who was more interested in getting things done than producing air-tight theory. The imperative of the nineteenth century, inscribed on Marx’s tomb in Highgate Cemetery, that philosophers have only interpreted the world while the point is to change it, resonated into the first part of the twentieth. But now, in the twenty-first century with a taller wall between science and ideology, it is ever less acceptable to substitute partisan argument for illumination. The slightest evidence of bias is enough to dismiss an entire project, whether it is research in molecular biology funded by tobacco companies, or an analysis by the Congressional Budget Office, which concludes that the deficit is too big, or, indeed, too small.

Moreover, radical economists of the 1970s and 1980s have been all but superseded by world events. Economics no longer entertains non-neoclassical economics as a subdiscipline, or takes alternative paradigms as seriously as it once did. One reason is that the orthodoxy itself has lost its coherence, a coherence that in the 1970s was centered about the Walrasian model. As a result, much of non-orthodox economics, Robinson included, has been absorbed into a broader methodological effort that now characterizes economics generally.

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The quest for the Holy Grail of microfoundations of macroeconomics has ended, largely in failure, as shown by Sonnenschein, Mantel and Debreu (SMD). Now it is clear from SMD that we can expect no well-behaved aggregate excess demand function from an underlying Walrasian system. This finding was obtained at a fairly high level of mathematical sophistication, but in some ways it applies to every aggregative system. When agents and their behavior are added up, some information is lost; vectors (whether a heterogeneous list of capital goods or individual agents demand curves) cannot be adequately represented by scalar or functional summation. The underlying data can move in ways that produce paradoxical outcomes for the aggregate. This negative result, which ultimately undid the microfoundations project, was also at the core of the capital controversy.

The failure to solve “the aggregation problem” at many levels was an episode of pure creative destruction, to borrow Schumpeter’s now stylish term. The paradigm had begun to shift, cracks were everywhere, and new and chaotic forms of theory emerged, everything from experimental, to chaos theory itself, agent-based simulations and other forms of computer modeling to evolutionary game theory. Now no argument can be turned away simply because it is insufficiently Walrasian. With the former Soviet Union gone and Communist China leading the capitalist world in growth in income per capita, there can be no reason to subvert a research agenda to a defunct political one. Economics is now freer to pursue truth than it has been in the recent past.

Robinson would have been amazed, although not necessarily approving. Much of what is now challenging the former dominance of the Walrasian systems is heavily mathematical and relates to individuals, rational or boundedly so, as well as complex and, often, contradictory institutions. It is no longer about the classical roles of workers and capitalists, as in Robinson’s own models, but rather how and why “classes” (read coalitions) form, reform and disappear with waves of dynamic comparative advantage.

But it does not really matter, of course, what she would have thought. The point is that much of the direction of current theory is the same as what Robinson was striving toward in the last century. She was just a bit ahead of the rest of us. The chapter by Dutt demonstrates this point most convincingly; it is not that Robinson’s distinction between *history* and *equilibrium* can be modeled most accurately by one or another method, but rather that so much of the development of techniques,

since she died, has been oriented toward solving the same kinds of problems that interested her; namely, making what we write on paper and computer screens more real, truer to the actual economy.

From the perspective of the twenty-first century, however, her work is of renewed value and this is what occupies the chapters of this volume. Robinson’s ideas were ahead of her time and beyond her methodological competence. But in the end, most were correct. Her core contention, advanced from the earliest days against the Marshallian paradigm through to the end of her life, as she attacked the Arrow-Debreu model of general competitive equilibrium, is widely, if not universally, accepted: Theories must be realistic in order to gain the confidence of those who use them.

Robinson’s life would have been easier had she more carefully reflected on Kuhn’s *The Structure of Scientific Revolution* (1962), rather than the real-world revolutions of China, Cuba, Korea, Vietnam and Nicaragua. She was part of a scientific revolution, on a cusp, and playing an essential role that she herself could not possibly see. She was in the opposition, but ultimately the *loyal opposition*. Erstwhile radical economists are not likely to want to hear this, but Robinson, whatever affinity she had for cultural iconoclasm, was not a radical with respect to *theory*. She demanded from it what science must: accuracy and realism. She never worked backwards from politically inspired conclusions and never employed fatuous conceptual devices to close arguments, such as “false consciousness” or “capital logic,” or the rest. Indeed, Claudio Sardonì argues below that Robinson never truly understood Marx; perhaps she didn’t and we may wonder if we are not better off for it.

The point was rather that Robinson was too embedded in a larger theoretical project to be sidetracked. She rejected orthodox Marxism for the same lack of realism that she saw in neoclassical theory. Both sides seemed to argue in reverse from their forgone conclusions and both programs certainly failed, as seen in Kuhnian perspective based on what graduate students now select as valid dissertation topics. Much of the point of this volume is that it was Robinson who succeeded. Modern theory is much more eclectic and realistic than Robinson would have ever imagined, not only because of the work of Robinson, but also because of the nature of progression of scientific thought of which she was a part.

It can be a rough ride. Science defines a problem of interest and when it cannot be solved properly, searches for a problem that it can solve and argues that the two are not that different. The difficulty for Robinson was in this second step (and indeed, the arguments in economics can become wildly implausible). She simply did not believe that the rarefied world of Walrasian agents had anything to do with the actual capitalism

that seemed to have a death grip on Western civilization at the time. Neoclassical theory beatified the Walrasian program because of its purity and the beauty of its internal logic. The lack of realism of neoclassicism, and Marxism as well, led Robinson to her central critique: equilibrium models were ahistorical and therefore fundamentally inadequate. Dynamic models were better, but if they converged to a predetermined equilibrium, the improvement was minor. What Robinson called for is what many theorists are still searching for today: realistic models in which the path to equilibrium matters. As in Jack Kerouac's *On the Road* (1957), many interesting things happen on the way to equilibrium, some that can change the eventual destination or postpone reaching it indefinitely.

Robinson did not travel the road to more realistic theory alone, but this volume emphasizes her unique contributions. **Geoff Harcourt** opens with a tribute to her life and intellectual development. Harcourt shows how she, initially dissatisfied with Marshallian theory, sought to replace it with something more realistic. This led to the theory of monopolistic competition, which some would argue, is a lasting contribution. Later, Robinson rejected her own theoretical contribution as inadequate, "a shameless fudge" notes Harcourt, in its lack of explicit dynamics. The self-criticism is telling. Analyzing "change" through "difference" was at the core of the problem with modern theory and that theme would resonate throughout her life's work. Robinson's main project was to extend Keynesian theory to "the long period," a "sea change" in Harcourt's words that was only a proto-realistic "flexing intellectual muscles, learning to walk before running, getting concepts and definitions precise but not yet directly describing the world as such." To get things done required a "pragmatic, gradualist, trial and error, mix of the market, openness and central control," as China is doing now, says Harcourt. As Harcourt observes, her pages are "filled with a mixture of acute analysis, usually well chosen empirical examples, a feel for what ought to be done coupled often with realistic analysis."

Cristina Marcuzzo, in Chapter 2, argues that much of Robinson's critique of "equilibrium" in favor of history is due to Marx, not her Cambridge colleagues. Marcuzzo's chapter concludes that, despite her pivotal role in the critique of marginalist theory, Robinson could not join Sraffa in his fundamental rejection of Marshallian theory. She instead began to develop a second, independent strand of Cantabrigian theory, one that would ultimately owe much more to Keynes than to Sraffa. Although she had great respect for and at times felt slightly intimidated by Sraffa, his influence on Robinson was limited to "his heading me off from

errors; he would never say anything *positive*." One major exception lay in the rate of profit, set forth in Sraffa's (1951) *Introduction* to Ricardo's *Principles* (1821). *Production of Commodities* (1960) was limited, offering "a purely logical structure—an elaborate thought experiment," that employed a long-run equilibrium as opposed to historical analysis. Here again she was a realist, more interested in making theory fit reality than the finer issues of logic. While Keynes could take investment as an independent variable in his model, investment in the long period had to be determined by something. She would relate investment to the rate of profit, but without a clear understanding of what profit was, there would be a hole, or fundamental inadequacy in the project. Using archival evidence, Marcuzzo documents the early influence of Sraffa and finds that Robinson lost interest in his critique of Marshallian theory in favor of Marx's more immediate concern with "history." Ultimately, Sraffa had presented an "equilibrium" system in which time played no essential role. Marcuzzo traces the break with Sraffa and her alignment with Keynes.

Chapter 3 by **Claudio Sardonì**, addresses the (dis)connection to Marx more specifically. Sardonì notes that while Keynes was not a fan of Marx's *Capital* (1867-1895) ("dreary, out-of-date...its contemporary *economic value...is nil*"), Robinson nonetheless employed Marx's schemes of reproduction as the key to *The Accumulation of Capital*, (1956). Marx did not have a fully worked out distinction between savings and investment, a theory that would take another eight decades to emerge. Sardonì concludes that Robinson "failed to understand the importance of some fundamental aspects of his theory" and as a result, "Marx's analysis of effective demand and his critique of Say's Law emerge impoverished from her reconstruction." Marx was short changed, in Sardonì's view, deserving much more credit for anticipating Keynes.

Prue Kerr in Chapter 4, addresses the fascinating question of the extent to which Robinson could be considered a popular economist. Nineteenth-century writers Jane Marcet or Harriet Martineau serve as the model against which Robinson is compared. Both wanted to bring the results of scientific inquiry to a wider audience. Sexism and tradition kept Marcet and Martineau out of academics, but not Robinson (although as Harcourt observes, women could not be admitted to a degree at Cambridge until 1948). This would give Robinson a significant advantage, but did it mean that her popular books would remain too academic? Kerr examines *Economic Philosophy* (1962b), *Economics: An Awkward Corner* (1966b) and *Freedom and Necessity* (1970a) and concludes that Robinson *did* demand much of her readers. This was in part because economics itself had taken a turn for the abstract, a-historical

and largely irrelevant analysis. This was not a problem with which the earlier popularizers of economics had to contend, so that “knowledge without pain” in Kerr’s words had become impossible.

The second part of the volume addresses more specifically Robinson’s work on capital theory and dynamical systems. Both **Donald Harris** and **Harvey Gram** take the position that Robinson saw the capital controversy as linked to her critique of equilibrium methods generally. There is a source of possible confusion here, however: While Harris refers to the conclusions of capital controversy as essentially “negative,” Gram follows Robinson’s own assessment of the debate as a positive contribution, cleaning up, so to speak, some logical untidiness in the orthodox account. The more fundamental use of timeless equilibrium models, however, could not as easily be patched up and thus “history” versus “equilibrium” conveyed, ultimately, a negative message.

Harris summarizes Robinson’s contributions perfectly:

To be properly understood, this endeavor has to be seen...as subsidiary to a larger and more positively oriented effort. That is: her “long struggle to escape” from the confines of the (neoclassical) intellectual tradition of Marshall, Wicksell and Walras, in order to advance the project of the Keynesian revolution, with the aid of insights gained from a critical reading of Marx, towards a “theory of the dynamic development of capitalism.” She took seriously, and as a life-long commitment, the task of carrying on this effort, readily acknowledged the analytical difficulties involved, and offered significant clues on how to proceed.

Gram argues persuasively that Robinson split her critique into two self-contained parts. In his beautifully constructed chapter, he makes the case against “low brow” neoclassical theory and the irrelevance of “high brow” (the intertemporal Walrasian model) theory based on a “profound type of instability” that afflicts its models. While the formal critique was beyond Robinson’s competence, she sensed the inadequacy: “For my part, I have never been able to make that theory stand up long enough to knock it down” and as Gram notes, “[h]er dismissive remark was mathematically cogent—getting an economy to follow a convergent saddle-path to a position of long run equilibrium *is* rather like trying to stand an egg on its head!”

The message of these two chapters nicely frames a central question of the volume. Harris characterizes post-Robinsonian theory in terms of criteria of directionality and relative speeds of adjustment, information and expectations, the nature of capital, investment and technical change,

how finance affects the evolution of technology and growth. He notes the “recent trend towards dynamic analysis of ‘complex’ systems based on nonlinearity and evolutionary principles, that capture explicitly the role of initial conditions, increasing returns, learning, cumulative feedback effects, inertia, hysteresis, natural selection, and other properties of ‘historical time’ that are deeply relevant to an understanding of the real economy in motion...The rich variety of dynamic paths and outcomes found in these analytical studies is definitely consistent with and supportive of the patterns of economic dynamics that Robinson sketched out or suggested in her work.” On the other hand, Gram is less optimistic about an emerging, Robinson-inspired eclecticism. He sees mainstream textbooks embracing precisely the kind of dynamic modeling that Robinson rejected, a predetermined equilibrium and the path to it so unconvincingly “chosen” by free market forces, as to make the theory little more than a magician’s trick. In this view, Robinson’s “negative” work is far from complete.

Amitava Dutt’s remarkable chapter demonstrates most clearly the central theme of this introduction, that Robinson’s concerns could and would be addressed by theorists who followed her. Not all shared her ideological inclination, but that hardly matters. Dutt’s chapter poses the following question: Is it possible to include “history” in formal systems in a way that would satisfy Robinson? The quest for an answer leads Dutt on a comprehensive review of possible mathematical solutions. The clear implication of this chapter is that Robinson was ahead of her time in that she called for what many have since delivered: a theory in which what happens to us over time determines where the economy ultimately comes to rest. The conclusion of his critical appraisal of different ways in which equilibrium analysis has tried to make more room for history is that models in which hysteresis deprives the dynamical system of unique equilibria would mostly likely meet with Robinson’s approval. Dutt concludes “all of [these models] make important contributions to incorporating the role of history in economic theory and can be treated as complementary.” While Robinson lacked the mathematical background to introduce history explicitly, Dutt makes the case that she anticipated several of the approaches in the modern literature.

Peter Skott’s chapter takes on two issues, the notion of equilibrium and mathematical formulation *per se*. Skott effectively does an end run around the debate about equilibrium, arguing that what ultimately matters is the nature of the model itself. Post-modernism holds that methodology is part of and embedded in the discourse of science as a whole and therefore cannot stand in a privileged position relative

to the rest. Skott is no post-modernist, but he nonetheless argues that Robinson's attack on equilibrium models effectively elevates her methodological claims above ordinary processing of data and logical argument. He concludes that sweeping methodological "strictures" can do little to solve more substantive issues, such as the inherent realism of an approach. In other words, the proof of the pudding is always in the eating. For Skott, the mathematics is not the issue. To demonstrate, he provides a dynamic model that illustrates how real world "complications" called for by Robinson can be inserted into a formal framework.

Amit Bhaduri continues along the same lines in his contribution. Bhaduri shows how the results of one of the most well-known papers in recent decades, namely, his 1990 paper, with Marglin, on "exhilarationist" and "stagnationist" growth models in the *Cambridge Journal of Economics*, can enrich Robinson's model. Standard stability criteria imply the effect of rising capacity utilization on investment must not be so strong that the level of savings is unable to keep up. But in a model in which both profitability *and* capacity utilization enter into the investment function, they may respond to a rise in wages in opposite directions. This expands the parameter range of stability in the model, at least when it can be characterized as wage-led or "stagnationist" and the rather "implausible notion of 'forced saving' by workers, on which Robinson relied," is not formally necessary to keep the model from exploding.

Tom Palley draws further implications from the Bhaduri and Marglin approach. In his chapter, he expands the Kaleckian Cambridge post-Keynesian (CPK) model so that it more realistically distinguishes between workers and managers. The latter earn wages and workers share in profits through dividends on their savings. Palley then shows how the model allows for dual stagnationist-exhilarationist outcomes. Redistributing the wage bill to workers always raises aggregate demand, but lowering the profit share can retard activity by lowering investment spending. He concludes that progressive policy should focus on altering the distribution of the wage bill, rather than the profit share as has been the traditional focus.

James Lovinsky and **Bill Gibson** take Palley's approach a step further and argue that once real world complications preclude analytical results and various "cases" have to be examined, there is no reason why "history" cannot be introduced via computerized simulations. One can only wonder if Robinson would have approved of this methodology. The answer to this question would have to trade off her distrust of mathematical approaches with her desire for a more realistic approach.

Lovinsky and Gibson calibrate a neoclassical growth model, almost exactly as discussed in the chapter by Harris, and a Robinsonian model to the same social accounting matrix for Argentina. The chapter then simulates growth in the post-war period and finds that only when "history" is substituted into the model in the form of the historically recorded fiscal and foreign deficits, is it possible to replicate the observed behavior of the economy. The long-run steady-state plays no role in the project. It is shown that the stochastic model has hysteresis and thus there is no "spooky force" drawing the model to any particular destination.

Luigi Pasinetti addresses a crucial problem in endogenous growth theory: the public good character of accumulated knowledge. He argues that knowledge, as a good, falls into a special category of its own. Knowledge for Pasinetti is *immaterial* and requires a reformulation of economic theory of capitalism and its associated institutions. The efficiency of the free market mechanism is based on the principle of private property, but that hardly applies to knowledge as a transferrable "factor" of production. Lawyers earn large fees in the effort to protect property rights and these costs must be netted out from the benefits of innovation. The diffusion of knowledge to developing economies is retarded by legal fees, royalties and other rent, which can in no way be justified.

Louis-Philippe Rochon contends that Robinson was a monetary economist in that she understood deeply the importance of the non-neutrality of money and, above all, its endogeneity. Post-Keynesian economists, he argues, have therefore ignored an important source, as a matter of the history of economic thought, of many of the insights they now claim. Why is this? One reason is that her contributions are both limited and scattered throughout her writing. Moreover, the meaning of money in Robinson's work evolved through time.

Edward Nell's chapter follows the lead of Rochon's work and goes on to show that Robinson's theory of accumulation can and should be supplemented by an account of the circulation of money, one that shows how all transactions can be "monetized." Her own discussion of money provides the basis for this. The resulting theory then can be interpreted (or developed) as the long-run setting for a short-run theory of effective demand that is both realistic and policy-oriented. This is an extension of Robinson's work, although surely not the only way it could be extended.

Robert A. Blecker's chapter reviews the central ideas of Robinson on international economics, from her earliest work on exchange rates, the trade balance, and employment, through her mid-career critique of the theories of international adjustment and comparative advantage, to her later writings on the "new mercantilism" and uneven development.

An emergent theme in her work was a rejection of the conventional bifurcation of international economics into separate trade (micro) and finance (macro/monetary) parts, which rests on the classical assumption of monetary neutrality. Many of her arguments are based on interactions between trade and finance. The chapter discusses new developments in international economics that have responded to her criticisms as well as the relevance of her ideas to contemporary international policy issues. Again, Robinson has made a difference in the direction of development of the field.

The contributions in this volume may not add up to anything more than a tribute to one of the great thinkers of the twentieth century. Taken as a whole, they certainly do not, as Donald Harris notes, constitute “an adequate theory of accumulation.” We, rather, celebrate here the freedom to think and write, adhering only to the constraints of reasonableness and realism that Robinson called for throughout her life. There certainly appears to be no unified field visible on the horizon of economics and much of the profession has given up the “search for grand general laws” in favor of trying to “enquire how things happen.” The methodology is not the issue; it is not about equilibrium, static or dynamic, as Peter Skott says, or ideology or even mathematics, but whether the arguments are, in the end, convincing. As in *Back to the Future*, some things in the past had to be the way they were for the present to unfold properly. The life and work of Joan Robinson were, in this regard, essential.

1. Joan Robinson and her Circle

G. C. Harcourt¹

1. INTRODUCTION

The major influences on Joan Robinson as an economist include Alfred Marshall, A. C. Pigou, Maynard Keynes, Gerald Shove, Austin Robinson, Richard Kahn, Piero Sraffa, Michal Kalecki and Nicholas Kaldor. (I omit people who are still alive, most notably Luigi Pasinetti, Amit Bhaduri, John Eatwell and Donald Harris.) She came up to Cambridge in 1922, to Girton College, to read economics; she read history as a schoolgirl at St. Paul’s Girls School in London, and, at one remove, was privy to history in the making during World War I. Her father, a professional soldier, was at the centre of a major scandal concerning the conduct of the war by Lloyd George’s government. Though it effectively ended his military career, he was in fact vindicated for his whistle-blowing actions (as we would say now). He showed the sort of integrity and courageous, if quixotic, behavior for which Robinson herself was to become famous. Robinson told me that until as a 15-year-old school child she became known as the daughter of Major General Sir Frederick Maurice of the infamous Maurice debates, her life in her mind was more real to her than life in reality. She did a switch (not a re-switch) at this juncture. I suspect that her childhood fantasy life may be one clue as to why she was such a powerful theorist and remorselessly logical writer. But enough of speculative psycho-babble.

She read economics because she wanted to find out why poverty and unemployment abounded. She did not think her teachers gave satisfactory answers. She learnt Marshall through Pigou, Austin Robinson, Dennis Robertson and Gerald Shove as well as from reading him and, no doubt, talking to Mary Paley Marshall. Her delightful spoof, “Beauty and the Beast,” written with Dorothea Morison when Joan was still an undergraduate, shows how well she had absorbed his ideas and his prissy

¹Jesus College, Cambridge, CB5 8BL, United Kingdom. E-mail: fellows-secretary@jesus.cam.ac.uk. This chapter incorporates views previously set out in Harcourt (2001, 1998). I am much indebted to the incisive studies by Pervez Tahir (1990, 1990a) of Joan Robinson’s views on development. I am, of course, alone responsible for the views expressed in the chapter.

Victorian way of putting them (Robinson, *Collected Economic Papers*, vol. I, 1951).

2. EARLY LIFE

Soon after graduating (she could not be admitted to a degree, for that women at Cambridge shamefully had to wait until 1948), she married Austin Robinson and they went to India for two idyllic years in Gwalior where Austin was tutor to the young Maharajah of Gwalior. Their stay began their life-long love affair with the sub-continent and interest in development problems. When they returned to Cambridge, Piero Sraffa had come from Italy, pushed by Mussolini, pulled by Keynes and the Faculty of Economics and Politics, and was giving his startling lectures which, amongst many other things, were extremely critical of Marshall, following on from his devastating criticisms in 1925 and 1926. (It was Edgeworth's admiration for the 1925 article that led to the 1926 article and the invitation to Sraffa to join the Faculty.)

Robinson (1933a) picked up his "pregnant suggestion" (xiii) that since Marshallian/Pigovian partial equilibrium analysis was not able logically to analyze freely competitive situations (except in very special circumstances, most unlikely to be found in reality), perhaps monopoly was the way to go: each firm its own little monopoly in a competitive environment so that the average revenue (AR) curve sloped downwards and the marginal revenue (MR) curve came into focus. Sraffa told me in the 1960s that he only put these particular parts in the 1926 article because he thought that the Brits were so pragmatic that they would need some down-to-earth, real world stuff (my words) to dilute the heavy continental doses of refined logic and methodology that were the core substances of the articles.

Be that as it may, Robinson proceeded to put together ideas that were then much in the air in Cambridge, London and Oxford, as Keynes, the reader for Macmillan of the manuscript of *The Economics of Imperfect Competition* (1933a), was to write to Harold Macmillan (Harcourt, 1993, p. 7). In doing so she and Richard Kahn used the MR curve as the organizing concept—the concept itself came to them through Austin's very bright pupil, Charles Gifford (Harcourt, 1995, p. 1230).

Kahn himself, as we now know, had developed many of the ideas beforehand in his 1929-30 Fellowship Dissertation for King's, *The Economics of the Short Period* (it was only published in English in 1989). Shove had been lecturing in his value lectures and writing on similar themes. Austin Robinson had been developing them, too, for his early classics, *The Structure of Competitive Industry* (1931) and *Monopoly* (1941) as

well as in an examination script early in the 1920s decade (Robinson, 1933a, p. 163, n.1)

As far as Marshall's influence on the structure and approach of *The Economics of Imperfect Competition* was concerned, it came through Pigou and the equilibrium firm rather than through Marshall's representative firm, which had taken such hard knocks from Sraffa in the 1930 *Economic Journal* symposium, despite Robertson's and Shove's efforts to defend it against Sraffa's remorseless criticism. Robinson regarded writing the book as "her nightmare." Looking back after World War II she was extremely scathing about it because its method was a "shameless fudge"—it supposed that demand curves of individual firms would stay put while entrepreneurs groped in real life for their equilibrium prices (Robinson, 1969a, pp. vi-viii). That is to say, it was supposed that it was legitimate to apply an analysis based on a difference to a process of change, something that Sraffa had refuted in 1926. (In 1934 Kaldor published in the *Review of Economic Studies* (1934a) what must have been one of the first papers in the modern era on path-dependent equilibria. Marshall was well aware of the phenomenon but chose to hide rather than highlight it, as Robinson pointed out in her 1953 lecture by a Cambridge economist at Oxford.)

She also claimed that one of her most disquieting findings was that, in an imperfectly competitive setting, the wage no longer measured the marginal product of labor, a knockdown blow for the ideology of the orthodox economists. The excess capacity result was also disquieting for them. She argued that Marshall and Pigou predicted that in a slump, firms either operated at full capacity or closed down—at odds with the facts of the time.

3. CAMBRIDGE

But, of course, while finishing *The Economics of Imperfect Competition*, Robinson was already with Kahn, James Meade, Austin Robinson and Sraffa, deeply involved in the critique of Keynes's *A Treatise on Money* (1930) in the Cambridge "circus," attending Keynes's lectures, writing progress reports (1933b, 1933c) and comments on Keynes's emerging findings as Keynes moved from the long period of *A Treatise on Money* to the short period of *The General Theory* (1936a) and overthrew the quantity theory of money framework of *A Treatise on Money*. This allowed him to develop the revolutionary new framework of *The General Theory*. Joan's progress reports were sometimes set in both the old and the new world, for example that Keynes had established a *long-period* theory of underemployment equilibrium. There was a backwards and

forwards process between Keynes and Robinson, Robinson and Kahn and Kahn and Keynes.

When *The General Theory* was published, Robinson wrote two major books about it. One was her “told-to-the-children” introduction (1937a), the other was her very adult essays on the theory of employment (1947). The former is noted for its clarity and, sometimes, its conservatism as far as the use of the Marshallian framework, concepts and method is concerned. (Keynes too was conservative in method, changing emphasis and classifications but still feeling that operating in a supply and demand framework was the way to proceed and having no trouble—well not much—in using the Marshallian/Pigovian theory of value and distribution; he did, of course, extend Marshall by his method of shifting equilibrium (Kregel, 1976).)

Perhaps the most important part of her *Essays* was the application of Keynes’s theory to the long period, to see whether the new results, for example, involuntary unemployment, the paradox of thrift, went through in a long-period setting. In doing so she was still happy to use a version of the marginal productivity theory of distribution and the then new and fashionable concept of the elasticity of substitution, to develop a long-period consumption and saving function in which the distribution of income played a key role as the marginal propensities to save from profits and wages were assumed to differ. In all this, one of Kahn’s roles was to caution, to criticize, to define, to provide the technical back-up to the superb logical intuition of both Keynes and Robinson. (I have discussed elsewhere, Harcourt, 1994, what I consider to be the nature of Kahn’s contributions to the making of *The General Theory*.) Kaldor, then at the London School of Economics (LSE), took critical swipes at seemingly robust definitions and concepts in *The Economics of Imperfect Competition*—what is an industry, what is a firm, what is its equilibrium? Sraffa evidently was on the sidelines making uncomfortable remarks about capital theory and the incoherence of supply curves, which were, in his view, a blockage to the development of Keynes’s new theory (not to mention the comparable link between liquidity preference and utility). Kahn and Robinson wanted to put these puzzles aside for another day because of the importance of the issues associated with the core of *The General Theory*. Austin Robinson preferred to put them aside forever.

4. SEA CHANGE

After 1936 a sea change started to occur in Robinson’s thought. She had her first acquaintance with Marx through reviewing John Strachey’s 1935 book, *The Nature of Capitalist Crisis*, (Robinson, 1936), and she met

Michal Kalecki for the first time. It was the beginning of a close intellectual friendship, one that started with amazement that he understood, often better than its originators, the “new” theory (and its jokes) and turned quickly to enduring admiration for his contributions, courage and character. As she became more familiar with Marx’s writings, she recognised that Kalecki’s starting point for his independent discovery of the principal propositions of *The General Theory*—Marx’s schemas of reproduction—was the logical way to tackle the issues of *The General Theory* and beyond. It led directly to a macroeconomic theory of employment and distribution, and from there, to a theory of cyclical growth in which the classical and Marxian preoccupations with accumulation and embodied technical progress could be fitted, if not exactly, certainly naturally. It also allowed the links between the sphere of production on the one hand and the sphere of distribution and exchange on the other to be made explicit (Harris 1978b).

Reading and writing on Marx during the early years of World War II, introducing in 1951 the English translation of Rosa Luxemburg’s *The Accumulation of Capital*, after the war and taking on board Roy Harrod’s pre-war essay (1939) and post-war lectures at the LSE (1948) mark the next stage. After the war her circle was joined in person by Kaldor who had been in Cambridge for part of the war when the LSE moved there and who joined King’s and the Cambridge Faculty soon after the end of the war. Close friends but even fiercer rivals, they were to work on parallel issues in the 1950s and 1960s, not always in harmony, it must be said: Robinson was more the conciliator, Kaldor, the offended, and Kahn, more often than not, the stirrer.

Sraffa was again on the fringes, going on walks, climbing mountains and joining in discussions but usually only revealing what he had going on when it actually entered the public domain—the Ricardo volumes 1951–55 (which eventually saw the light mainly because of the selfless efforts of Maurice Dobb) and then *Production of Commodities* in 1960. There were, of course, prior hints, for example, his October 1936 letter to Robinson about the meaning and measurement of capital in neoclassical theory and his request that she ask her gardener about it (Bradford and Harcourt, 1997, pp. 130–31). But the full force of his probings and questions really only hit home in the post-war period. From my observations I would say that Robinson had more respect for Sraffa’s critical mind and was more scared of his criticisms than she was of anyone else’s. She and Kahn bickered as only long-established friends on an equal footing can; and though she had huge respect for Keynes, she was able to argue with him, judging from their exchanges in the *Collected*

Works, in ways she found not possible with Sraffa. Sometimes she was obtuse—I do not think she took on board, perhaps she chose to ignore it?—that Keynes might have been slightly miffed by her decision to write the told-to-the-children version of *The General Theory*. I imagine that much the same is true of her arguments with Kalecki—fierce, tough, but on an equal footing.

Shove was critical of Robinson’s understanding of neoclassical economics (read Marshall) in his 1944 review article of her 1942 book on Marx (he thought she was generally OK on Marx, not a view with which orthodox Marxists were ever to concur). Nevertheless, at the time she wrote her book on Marx, I think she was still critical but in a Marshallian methodological framework in her analysis and presentations, even of Keynes’s new theory. All this was to change as she responded to Harrod’s challenges and, along with Kahn and Kaldor as contemporaries and Sraffa again an enigmatic onlooker, moved to generalize *The General Theory* to the long period. Even though when Keynes was dying and he was looking more kindly on the long-period forces he associated with Adam Smith, he nevertheless had become sceptical of a role for a long-period equilibrium, or even a long period as such, within the confines of his own theory in *The General Theory*.

There is some evidence that Robinson agreed with him on this. With hindsight, we may see the signposts in her early post-war writings: the 1951 introduction to Rosa Luxemburg’s book, the tract for students, *On Re-reading Marx* (1953b), especially her Cambridge lecture at Oxford to which I referred above, her explicit methodological complaints about neoclassical methodological practices in her *Review of Economic Studies* (1953a) paper on the production function and the theory of capital, and the definition of a golden age in *The Accumulation of Capital*, (1956a) as a mythical situation, clearly defined in her attack on Harry Johnson in “*The General Theory* after twenty-five years” (Robinson, 1962c). Thus much of the analysis in *The Accumulation of Capital*, fitted Kahn’s description of flexing intellectual muscles, learning to walk before running, getting concepts and definitions precise but not yet directly describing the world as such.² There she agreed with Marx and disagreed with Kaldor who, as ever, impatient, wanted his models from alternative theories of distribution to actually apply to the world. Robinson (1949a; *Collected Economic Papers*, I, 1951 p. 169), though, in telling Harrod he had rediscovered the schemas of reproduction of Volume II of *Capital*,

²Sometimes, though, her language was ambiguous—this, I think, was one cause of the intense irritation experienced by Abba Lerner in his review of the book (Lerner, 1957).

also suggested that they were necessary conditions for overall and compositional balance of aggregate demand and supply, not a description of capitalism as such. Quite the opposite: they showed how unlikely it was that decision-makers in capitalism, left to themselves, would ever bring about such balances, which led to speculation about the nature of the crises their non-attainment would spawn. This viewpoint was to become more and more explicit in her writings as the post-war period moved on, climaxing in “History versus equilibrium” in 1974 and leading, almost, to nihilism in “Spring cleaning” in 1980 (1980f): scrap the lot and start again, economic theory had come to pieces in her hands, she no longer believed in it.

Though Robinson sometimes assumed full employment in these exercises, she was most critical of Kaldor’s argument that this was a real world situation when growth was occurring. This was a source of their sometimes bitter disagreements. (When she read a draft of my 1963 critique of Kaldor on this issue, she wrote to me that I was the first to really nail the significance of Kaldor’s assumption and its implications.) In effect she was not willing to jump one step on in the solution of Harrod’s problem by finding conditions for the growth rate of wages, g_w , to equal the growth of the labor force, g_n , as Kaldor had in his macro model of distribution. (He assumed that investment share of full-employment output, I/Y_f , was such as, if achieved, to allow growth at g_n .) It is clear in the banana diagram of her 1962 *Essays in the Theory of Economic Growth* (Robinson, 1962a), how g_w might be attained, though she thought it most unlikely in practice; or even *if* it were, that it would remain a sustainable position, not least because of the nature of capitalism whereby accumulators might achieve their plans but wage-earners would not, so that attainment of g_w did not imply attainment of g_n . This in itself could set up signals that took the economy away from g_w , even though it was a Bastard Golden Age. In any event, the very process of time and events would carry with them concrete changes in the factors defining the positions of the two skins of the banana and their consequent intersections.

5. ACCUMULATION OF CAPITAL

As she prepared to write her *magnum opus*, she turned to the neoclassical literature, Knut Wicksell in particular, for guidance on the choice of technique at the level of the economy as a whole, a secondary but most difficult technical task, she always argued. It was this search plus her musings about the origin and determination of the rate of profits

in capitalism that came to fruition in her 1953 paper. It was a criticism of the neoclassical theory of the rate of profits and concept of capital and of neoclassical methodology. She felt she had in Sraffa's introduction to volume one of the Ricardo volumes, the clue to an alternative and more satisfying theory of the rate of profits—the classical concept of the surplus already familiar to her from reading Marx but tightened up and made more precise without any metaphysical overtones of the labor theory of value (in her view!) in Sraffa's exposition. This, together with her understanding of Kalecki's theory of profits and her critique and amendment of Keynes's theory of accumulation, which, together, showed how in the sphere of distribution and exchange the potential surplus available for profits might be realized, was to become the basis of her approach to value, distribution and growth from then on: sometimes with confidence and optimism, sometimes with despair and pessimism. Virtually her final statement was her 1980 paper with Amit Bhaduri in the *Cambridge Journal of Economics*. It showed how ultimately she came to see the niche for Sraffa's contributions and the role for the Marx/Keynes/Kalecki understanding of capitalism.

The point is that Robinson always looked behind the formal structures of theories to see what sorts of society—their history, “rules of the game,” sociological make-ups—were implied. Many times she referred to the implicit societies of Walras, Marshall and Wicksell and, of course, of Marx, Keynes and Kalecki in her ongoing arguments with Paul Samuelson and Bob Solow. (All gave up the other in the end as tiresome and impossible.)

As she became more dissatisfied with what she saw as the misleading method of neoclassical economics—using differences to analyze changes—so she read these insights more and more into Keynes and his emphasis on the role of an inescapable environment of uncertainty and the conventions that it built into decision-makers' behavior. She increasingly suppressed his and her former dependence on Marshallian analysis and concepts as her understanding became deeper and deeper.³ Already in the 1950s she (1952a) and Kahn (1954) were discussing this aspect of Keynes in their extensions of his liquidity preference analysis to stock markets and banking, the financial side to investment and saving in a capitalist economy.

³To be fair to Keynes, though in reply to Ralph Hawtrey's criticisms he distinguished between existence and stability problems he did develop the concept of shifting equilibrium as the most sophisticated method to arise from his new theory (*Collected Works*, XIV, 1973 p. 181).

6. CHINA

In the post-war years, Joan started on her many visits to mainland China and to India (in later life she spent part of each year in Kerala State at an economics institute directed by Professor K. N. Raj). Her post-war work on growth and distribution theory, inspired initially as we have seen by her friendship with Kalecki, her wartime writings on Marx and by Harrod's pre- and post-war contributions, spilt over into her concern about the terrible problems of the Third World, the plight of the wretched of the earth. But, as Pervez Tahir (1990a, pp. 93-4) points out, she may also be credited with being the first to use the phrase “disguised unemployment” (in 1936) though it was its occurrence and causes in advanced capitalist economies that she analyzed. (She did analyze it in the same year, 1943, as the year in which Rosenstein-Rodan named disguised unemployment in less developed countries.) Joan more literally and accurately referred to the phenomenon as surplus labor, pointing out that the persons involved could, if there were the employment opportunities available, take them up without any adverse effects on current levels of production. She allied this insight with a discussion of Marxian unemployment—persons without productive jobs because inadequate rates of accumulation meant that there were not the complementary supplies of capital goods for them to work with. In the context of advanced economies, she had argued that the cause was different—a lack of effective demand overall so that persons were forced to do things that with free choice and adequate demand they would not have needed to do.

7. GENERAL THEORY

Joan always said she went to China to learn, not to teach but she was not always true to herself! In her papers in the King's Archives there are the notes of three lectures that she gave in China in the 1950s. They are remarkable in that they contain in skeleton outline the policies that broadly the Chinese authorities are implementing now—a pragmatic, gradualist, trial and error, mix of the market, openness and central control (see Tahir, Harcourt and Kerr, 2002). Much of the flesh was put on the skeleton in her 1960 *Exercises in Economic Analysis* (1960d), a do-it-yourself manual for students and teachers alike. The first lecture of the 1950s trio was concerned with interdepartmental flows, that planners in less developed countries would need to have at the back of their heads—and the forefronts of their minds. The inspiration for these came, I suspect, from Marx's schemas of reproduction through Kalecki's influence—he used Marx's schemas when he independently established the

principal propositions of Keynes's *General Theory*. The sectoral flows concern both monetary and real productive flows and the conditions for balance between sectors and between the totals and compositions of broad demands and supplies.

The organization is classical as the surplus, its creation, extraction, distribution and use, is the core concept of the analysis. The analysis was brought up to date by the use of the national accounting framework associated with the development of Keynesian analysis, but the classical Marxian emphasis on the sphere of production where work and production are organized and occur is never lost sight of. And when discussing the process of accumulation itself she always stresses the difference between finance and the real process of accumulation, on the one hand, and finance and the process of saving, on the other—a principal lesson she derived from the capital theory debates of the 1950s and 1960s and that she thought had been lost sight of in the neoclassical approach to growth and accumulation. In the light of the resurgence of saving determines investment models in recent years, especially in the discussion of international accumulation, she may not have been that far off the mark now (though I am also sure that Bob Solow and Trevor Swan were well aware of the distinction she was making).

The second lecture is concerned with the choice of techniques of production to be embodied in accumulation in a labor-abundant, less-developed country. The analysis here reflects two strands. One was her then preoccupation with Wicksell's account of the choice of technique to which she had returned in the context of her precipitation of the capital theory debates at about this time and of her writings on growth theory where, she argued as we saw above (see p. 21) these were the most difficult but not the most important issues she needed to deal with. The other strand was the debate associated with Maurice Dobb (1954), Walter Galenson and Harvey Leibenstein (1955) and Amartya Sen (1960) on this issue in less developed countries. Here she felt that Dobb and Sen were inclined to rationalize a Stalinist emphasis on heavy industry even at the expense of employment-creation and gently rising standards of living for citizens in the present. She argued for a compromise, a middle way, which allowed something to be done for both employment and current living standards even if it meant that the surplus extracted for accumulation was less overall and the degree of mechanization in embodiment less than in the Dobb-Sen analysis. Here and elsewhere, she always stressed the central role of the size of the real wage (or its equivalent in non-wage societies)—how it helped to determine how many people a given surplus of commodities would employ and also how it

affected the sort of investment goods it was best for them to make at any moment of time.

In the same set of lectures she discussed the role of the price mechanism in developing countries. Her published views on this are in her difficult but profound essay, "The philosophy of prices" (*Collected Economic Papers*, vol. II, 1960a pp. 27-48). As we saw, Robinson consistently argued that to understand an economy we must start from its history, institutions and "rules of the game," especially when we are trying to influence the forms the last two should take. Here, however, she grappled with the inescapable facts of life of *any* society in which commodities are exchanged, having been produced by labor and commodities, and a price mechanism rules: that there is a two-way interchange between incomes and prices and that the appropriate price structure for the desired development of the economy may not throw up for significant sections of the population incomes that are consistent with society's perception of what is a decent, acceptable and humane standard of life. This problem is made even more complicated by the fact that in one form of (pure) price system, incomes arise from prices that are related to commodities produced by specific factors, while in the other form of pure price system she identifies, factors are not specific, can operate in any sector.

She also touched on the thorny problem of population, its role and its control. Though in later writings she was to argue that generalizations about the relationship between population growth and potential prosperity were pretty wonky propositions, she did argue that in the case of China some systematic measures to reduce family size were needed. Indeed she was most consistent on this, arguing that population was a variable that any enlightened society would try to influence, otherwise so much of current accumulation would have to be taken up in the process of merely standing still. As Tahir (1990a, p. 103) has pointed out, her views date from observing the effects of overpopulation in India in the 1920s; this even led her to argue against Harrod for a declining population independently of stages of development or the particular form of economic and social system, a view that, she also pointed out, was neither that of the pioneering development economists nor that of the Marxists "who have always brushed overpopulation aside as a capitalist bogey" (Robinson, 1949a p. 64).⁴ She added that now Communism was

⁴Tahir (1990a, pp. 102-3) refers to an exchange of letters between Joan and Harrod on the imminent decline in the British population. (Harrod's letters, 12-17 January 1938, may be found in Joan Robinson's papers in King's College Modern Archives.) Harrod was concerned about the Brits being outbred, see, for example, while Joan was concerned to relate population policy to the need to establish and support "decent

about to commence in a country with potentially Malthusian problems, how its rulers reacted to the issue could prove decisive!

8. DEVELOPMENT

The general principles that she drew on here continued to guide her for the rest of her life. In 1979 she published a book on *Aspects of Development and Underdevelopment* in which she spelt out in detail the approach she developed in the 1950s and earlier. One of her colleagues tried to dissuade her from publishing it for fear of what it would do to her reputation; in fact it has stood the test of time remarkably well. She is as usual too starry-eyed about how the Chinese (and the North Koreans) do particular things and too harsh on how the Americans do things at home and abroad. (She always said that as Empires go—the British Empire was not all that bad; she is highly critical of certain episodes in British history but she is nevertheless more kindly disposed towards its performance than that associated with American hegemony in the post-war period.) She also argued that accumulation would inevitably be faster, if not more efficient, in a planned economy regime than in capitalism, a judgement that has not stood the test of time, though the legacy from the 1980s of unused office blocks in down-town areas of many advanced capitalist countries is not an index of rationality in accumulation decisions either.⁵ Generally, the pages are filled with a mixture of acute analysis, usually well chosen empirical examples, a feel for what ought to be done, coupled often with realistic analysis containing *realpolitik* but also influenced by her growing pessimism about what was likely to happen. At the end she concludes:

While population is still growing, though at a slightly decelerating rate, the arms race is continuing at an accelerating rate [this was a major reason for her pessimism in later life] and the spread of commercialism is destroying human values

living standards everywhere” (Tahir, 1990a, p. 103), see, for example, Robinson (*CEP*, II, 1960b, pp. 107-13).

⁵It has been pointed out to me that she was “then well past the age of youthful naïveté, [that] [s]he had a settled ideological position which led her to put the best possible construction on what she saw...to believe what she was told by the representative of the regimes.” I think this attributes far too much sense of *realpolitik* to Joan; she lacked judgment, she had little tactical sense or guile, and she never developed an acute sense of orders of magnitude. But her utopian idealism, a search, as Paul Samuelson (1989, p. 136) put it, for that “‘true socialism’ [which] was her first and ever love, not the pretenders who took its name in vain”, was a life-long constant in her psychological make-up. Samuelson added: “Who is to say that her value judgements were wrong, or other than noble?” Certainly not this writer.

everywhere, it is not easy to take an optimistic view of the situation of the Third World today. All that economic analysis can hope to contribute is to remove some illusions and to help whoever is willing to look to see what their situation really is (Robinson, 1979b p. 143).

As we noted earlier, the structure of her thought increasingly came from Marx’s schemas of reproduction through Kalecki to her own interpretation of them. The latter was set out most perceptively in her tribute to Kalecki in the Memorial Issue of the *Bulletin of the Oxford Institute of Economics and Statistics* for Kalecki (Robinson, 1977c). There, she divided the economy into two sectors, the wage goods sector and the investment goods sector. She showed how activity, employment and distribution in the short term were determined by the rate of accumulation, the differing saving behavior of the wage-earners and profit-receivers and the pricing policies of the wage goods (more generally, consumption goods) sector. Employment would tend to settle at a level where there were sufficient consumption goods produced to provide the wages of wage-earners in the investment goods sector as well as those of wage-earners in the consumption goods sector itself. Given the rate of investment and the employment required for the production of capital goods to meet it, the prices of consumption goods, the money-wage rate, and the productivity of the wage-earners in the consumption goods sector between them would determine the surplus per person in the consumption goods sector available for wages in the investment goods sector, and so the required level of employment overall. (For simplicity, we abstract from rentier consumption and wage-earner saving.)

This framework led naturally in the context of development to a discussion of the sorts of land reform that would best serve to raise productivity and therefore the potential surplus in the agricultural sector. In the late 1970s, Joan was still uncritical of Chinese experience. Having pointed out that the drawback of small holdings was that each family had to produce a range of products so that land would not be specialized to its best use, she argued that the then Chinese system of large communes divided into small teams combined the advantage of intensive use of labor with control over the use of land in large units. She felt that this provided a strong incentive for teams to put in extra work to improve their land in schemes organized on an appropriate scale because they collectively shared in any improved income that resulted (Robinson, 1979b pp. 52-3). She comments wryly on land reform in parts of Latin America, that was “intended to save the peasants from exploitation” but had “been turned into a more efficient, because less brutal, method of

exploiting them” by making them wage-laborers on commercial farms (1979b, p. 54).

For capitalist systems it was easy to show in this framework that full employment was unlikely to occur. But this was not inevitable in the context of development, which also would have to take into account foreign exchange constraints associated with trade and lending and borrowing and the Kaleckian view that the workers must have some extra jam today rather than wait for a tomorrow, which, in reality, often never came. It was within such a framework that Joan commented on different institutional forms, actual and ideal, the roles and limitations of government, and what behavior could and would be expected of citizens at work and in their own community.

9. RETURN TO MARX

The most balanced way to end therefore is, I believe, with the Bhaduri and Robinson (1980) paper; “Spring Cleaning” is too pessimistic and nihilistic. (I chaired the session at the Eastern Economic Association Meeting in Montreal in 1980 at which Robinson gave this paper. No one was game to respond to her challenge despite my scolding of them for timidity (Robinson, 1980f).) In the former paper, Sraffa provides a classical *cum* Marxist framework of the sphere of production, on the one hand, and of the sphere of distribution and exchange, on the other. Keynes and Kalecki (via Marx) provide the dynamics, the realization or not of the potential surplus, short period by short period, culminating in a theory of cyclical growth. Robinson was especially influenced by Kalecki’s version, but Richard Goodwin’s contributions belong to the same tradition. And he always pointed out that he owed much to Robinson in the development of his eclectic approach to modelling the cyclical growth of modern capitalism. See, for example, Goodwin and Punzo (1987). It is no accident that, for the 30 years he taught at Cambridge, he had a prominent role in Robinson’s circle.

In Joan Robinson the profession has been well served by the provision of a role model. She was often difficult to work with; but she also had that combination of first-class intelligence, keen powers of observation, a passionate desire to know how things worked and how to make them work better, especially for those least able to defend themselves, and that ability to structure and communicate in a clear and intelligible way a usable system of thought that characterizes the greatest members of our trade.

2. Robinson and Sraffa

M. C. Marcuzzo¹

1. INTRODUCTION

In this chapter I follow the evolution of Joan Robinson’s appreciation of Sraffa’s “critique of economic theory” over the years.² My purpose is twofold: first, to construct a narrative based also on the archival findings; second, to shed some light on certain dividing issues, as we shall see in the final section, that impinged on the fortunes of the “Cambridge school,” in search of a clue to explain its “fall from grace” (Desai, 1985). The main conclusion of this chapter is that despite her participation in and continual reference to the critique of marginalist theory in her life, Robinson never adopted the Sraffian apparatus as her own and at least in one respect she misunderstood Sraffa’s point.³

The chapter is organized as follows: Section 2 considers the archival evidence of the early influence of Sraffa and finds that Robinson did not accept his rejection of Marshallian theory. Section 3 follows the evolution of her independent trajectory, noting the influence of Marx on her view of “history v. equilibrium.” Section 4 shows that Robinson’s escape from Sraffa could not endure since she needed a theory of profit as a foundation of her own contribution. But as Section 5 shows, Robinson demanded early on, that *time* be built into Sraffa’s critique in a way that it was not intended. The penultimate section probes the depth of the break with Sraffa and her alignment with Keynes in his emphasis of history. A concluding section sums up.

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²This chapter draws on Marcuzzo 2001a, 2001b, 2003, and Marcuzzo and Sardoni, 2004. The abbreviations used in the text are: LLK: Lydia Lopokova Keynes; JMK: John Maynard Keynes; JVR: Joan Robinson; RFK: Richard Kahn; PS: Piero Sraffa. The papers of JMK, JVR and RFK are kept in King’s College Modern Archives, Cambridge while those of PS are in Trinity College, Cambridge. References are given according to their respective catalogue numbers. Permission to quote from unpublished material is gratefully acknowledged to the Provost and the Fellows of King’s College and to P. Garegnani.

³See also Harcourt (1986, p. 97): “towards the end of their lives they were to part on what was most damaging to their shared opponents, as Joan Robinson shifted the emphasis of her attack to one of methods rather than particular results, while Sraffa, or at least, the Sraffians, concentrated on the results obtained within a particular methodology.”

2. THE ANALYTICAL OPTIMIST

We do not have archival findings on Robinson's attendance of the lectures on *Advanced Theory of Value*, which Sraffa gave in Cambridge between 1928 and 1931, but indirect evidence only, namely:

1. a letter to Kahn where she mentioned it: "I owe in fact far more to Piero's lectures and private conversations than I owe to any of Gerald [Shove] outside his published works";⁴
2. a reference in one of her published works: "When I returned to Cambridge in 1929 and began teaching, Mr. Sraffa's lectures were penetrating our insularity" (Robinson, 1951a, p. vii);
3. E. A. G. Robinson's account: "Joan had got to know [Kahn] as a fellow participant in Piero Sraffa's very unorthodox lecture course" (E. A. G. Robinson, 1994, p. 7).

In Sraffa's lectures, the outline of the research project, albeit only the *destruens part*, that would occupy him for the following 30 years was clearly laid down; his main point was that there were two distinct theories of distribution, classical and marginalist; the latter alone was the foundation of demand and supply analysis. See, for instance, the following passage:

For Marshall wages, interest and profits, are simply shares in the product; they are co-ordinate quantities, that can be regarded as acting upon the value of the product in the same way. It is not necessary for the actual goods which compose real wages and profits to be in existence at the beginning of the process of production—the hope, or the promise of these goods is equally effective as an inducement....Petty and all the classics, on the contrary, take the opposite view. They don't regard at all wages as an inducement; they regard them as a necessary means of enabling the worker to perform his work.⁵

Although both his 1925 and 1926 articles are often referred to, the scope of Sraffa's lectures is much wider, reflecting the extensive work in which Sraffa had been engaged, probably since summer of 1927, which would become the core of *Production of Commodities*.⁶

⁴Letter from JVR to RFK, 7 April 1933 in RFK papers 13/90/1/221-4.

⁵PS papers: D2/4 3 (22-3). See Marcuzzo (2001a, p. 82).

⁶Garegnani locates in the winter, 1927-28: "an initial (and decisive) turning point...and led to an examination of the classical economists with consequent abandonment of the Marshallian interpretation of them that had been behind the articles 1925-26" (Garegnani, 1998, p. 152). For a full account see Garegnani (2004).

It is clear that Sraffa's lectures had no impact on Robinson, nor on any other pupils, for that matter, thus fulfilling Keynes's prophecy, contained in a letter to Lydia: "On Saturday I had a long talk with Sraffa about his work. It is very interesting and *original*—but I wonder if his class will understand it when he lectures."⁷

Her first two books (Robinson, 1932, 1969b) were a response to Sraffa's 1926 article alone, and in the extant correspondence with him, from 1931 to 1933, during the making of the *Economics of Imperfect Competition*, she made no attempt to address those wider issues that she must have been exposed to, attending his lectures.

The letters exchanged between Robinson and Sraffa during that period deal with Sraffa's critique of the Marshallian value theory; we get a glimpse of the gulf existing between their positions in the comment by Sraffa accompanying the corrected proofs of the *Economics of Imperfect Competition*: "I have avoided raising broad issues—it would be of no use to you at this stage, or indeed at any stage."⁸

She attempted to bring Sraffa round to her view, defended methodologically in her 1932 pamphlet, that there are cases "which made Sraffa's critique of Marshallian theory less forcible" (Rosselli, 2001). In that pamphlet, while Sraffa was cast as a "fundamental pessimist," she would label herself, together with Kahn and E. A. G. Robinson, as an "analytical optimistic," one who will make hypotheses known to be heroic, in order to be able to give formal treatment to an economic problem (Robinson, 1932; Harcourt, 1990).

On the plane of the theory, in her major book she sought to demonstrate that, if either factor heterogeneity or factor specialization were allowed for, the supply curve for a single industry—contrary to Sraffa's claim—could be rising. In the 1926 article, Sraffa's point was that factor supply, although fixed in the system as a whole, may be considered infinitely elastic for an industry, since increasing costs are confined to the rare case of an industry in which there is a specialized factor employed exclusively by that industry. Robinson set out to find cases in which an industry uses a specialized factor and provided a classification of these cases. Her argument was, since *a priori* intermediate cases between perfectly elastic and perfectly inelastic supply of a factor cannot be ruled out, and since they may effectively be found in reality, there was no reason why they should be dismissed as irrelevant. Her approach is neatly summed up in the following passage from her letter to Sraffa: "I am not

⁷Letter from JMK to LLK, 28 November 1927 in JMK papers: PP/45/190/3/268-9. See Marcuzzo (2001a).

⁸Letter from PS to JVR, 12 January 1933 in JVR papers: p. vii/431/8.

trying to defend Marshall and his knife handles. I do not mind how few the cases of I[ncreasing] R[eturns] there are as long as there are some on which I can use an ingenious analysis of monopoly under I[ncreasing] R[eturns].”⁹

Sraffa’s reaction was, as usual, much to the point: “Your subdivision of the ‘specialized factor’ cases into groups is an interesting piece of analysis, but it does not in the least help to increase their number.”¹⁰ Against Sraffa, who had questioned the validity of deriving the supply curve for an individual commodity from the equilibrium of a firm in a given industry, in her *Economics of Imperfect Competition* Robinson argued that providing perfect competition and the independence of demand from costs are assumed, a supply curve can be derived: i) in the short run and quasi-long run, on the basis that for all firms, marginal cost equals price and price equals marginal revenue; and ii) in the long-run, on the assumption that a normal profit can be defined at which average cost equals average revenue. If competition is not perfect, there is no supply curve for the firm and very special assumptions are needed to derive the industry supply curve, namely that changes in the demand curve of the industry do not affect the individual demand curves facing each firm. She concluded that:

The essential distinctions are not between rising and falling supply price, but between perfect competition and imperfect competition, and between an analysis in which time factors are admitted and an analysis in which they are ignored. (Robinson, 1969b, p. 129)

Sraffa had questioned the Marshallian assumption of perfect competition in the presence of increasing returns and the asserted independence of demand and supply schedules. Robinson did not take these points on board either. We conclude, then, that Robinson could not join Sraffa in his fundamental rejection of Marshallian theory; she rather looked for an apparatus that could be made consistent with Marshall, employing *ad hoc* assumptions to smooth the way. In this effort, Robinson began to develop a second, independent strand of Cantabrigian theory, one that would ultimately owe much more to Keynes than to Sraffa.

⁹Letter from JVR to PS, 1931 in PS papers: D1/86/2.

¹⁰Letter from PS to JVR, 31 May 1931 in JVR papers: p. vii/431/1-3. See Rosselli (2004).

3. BEYOND THE SHORT PERIOD

After 1934 Robinson sidelined the issues addressed in the *Economics of Imperfect Competition*. In 1953, she openly disowned them, throwing herself entirely into the Keynesian Revolution.¹¹ This she began by assisting Keynes in the transition from the *Treatise* to the *General Theory* and then set about “elaborating, popularizing and defending” its message.¹²

In doing so she relied on the apparatus she had devised with Richard Kahn and whimsically christened the “Trumpington Street School.”¹³ One key concept was the elasticity of substitution between factors, defined as the proportionate change in the ratio of the quantities of factors employed divided by the proportionate change in the ratio of their prices (see Robinson, 1969b).

In her first attempt to extend the *General Theory* to the long-period article, she employed the elasticity of substitution to show that in the long-period, the amount of employment is the result of “the contrary pulls of increased total output and increased output per head” (Robinson, 1937a, p. 87) as measured by the elasticity of substitution of labour for capital and the elasticity of demand for output as a whole. The elasticity of substitution measures the change in the distribution of income, while the elasticity of demand for output as a whole measures the effects of the distribution of income on the propensity to save and therefore on the multiplier.

In the same article she also analyzed the effects of inventions on the distribution of income, that is, whether innovation reduces the share of labor (reducing the equilibrium level of income by increasing thriftiness) or increases it (increasing the equilibrium level of income by decreasing thriftiness). She developed her analysis of inventions (Robinson,

¹¹“The assumptions which were adequate (or which I hoped were adequate) for dealing with such questions [comparison of a price and output of a commodity under conditions of monopoly and of competition, demand and costs being given] are by no means a suitable basis for an analysis of the problems of prices, production and distribution which present themselves in reality” (Robinson, 1960b, p. 22).

¹²Preface to the German translation of the *Accumulation of Capital*; PS papers: I 101/5-6.

¹³From the address where Joan and Austin Robinson lived in Cambridge and where Richard Kahn was a frequent visitor. The “Trumpington Street School” was in fact how Kahn, Austin and Joan Robinson signed the 1932 Manifesto arguing in favor of the “method of supply and demand” (Keynes, 1979, p. 43), to prove Keynes’s proposition that variation in investment had the same sign as variation in output. See Marcuzzo (2002).

1937a, p. 95n) on the basis of a classification structured on the distinction between neutral, capital-saving and capital using technical change.¹⁴ Harrod challenged Robinson's definitions and Keynes sided with Harrod (Keynes, 1973, p. 174).¹⁵ Keynes criticized her "elasticity substitution method" as ambiguous, without the provision of a precise measure of the volume of capital. In fact, the "elasticity of substitution method" is based on the assumption that the proportions between capital and labor are always such that the ratio between their marginal productivities reflects the ratio between their prices. It implies that the quantity of capital can be measured unambiguously, so that there is no difficulty in measuring its marginal productivity.

In an article she sent to Keynes to defend her position against Harrod she boldly claimed:

For our present purpose capital must be conceived in physical terms, that is, as a stock of capital goods, and it is most conveniently measured in terms of cost units. Two stocks of capital are said to be equal if they cost the same sum to produce at a given date, in a given state of knowledge. (Robinson, 1938, p. 139)

Keynes was not persuaded. In correspondence he made clear to her that "a great deal of difficulty arises" in her use of cost units to measure capital.¹⁶ She retorted that as far as the measurement of capital was concerned she was not "any worse than the others," adding that "Piero is devoting his life to the question, and we cannot expect an answer quickly."¹⁷

A year earlier Robinson had had an exchange with Sraffa on the issue of the measurement of capital and she had been warned: "If one measures labour and land by heads or acres the result has a definite meaning subject to a margin of error: the margin is wide, but it is a question of

¹⁴In equilibrium, neutral technical change multiplier leaves capital per unit of product and the relative shares of labor and capital in a given output unchanged, while capital-saving and capital-using inventions reduce/increase capital per unit of product and reduce/increase the relative shares of capital. The reason is that capital-saving technical progress increases efficiency in producing capital goods more than in producing final goods, while the opposite occurs in the case of capital using- innovation.

¹⁵This occasioned an exchange between Harrod and Robinson, which went on between May and June 1937 (Besomi, 2001).

¹⁶Letter from JMK to JVR, 27 September 1937 in JMK papers: CO/8/228-31.

¹⁷Letter from JVR to JMK, 28 September 1937 in JMK papers: CO/8/232-5. See Marcuzzo and Sardonì (2004).

degree. On the other hand if you measure capital in tons the result is purely and simply nonsense."¹⁸

For the second time Robinson was trying to escape Sraffa's criticism since he seemed unable to provide an alternative to what her "analytical optimism" would naturally lead her to. A new factor came in when, in 1940, she began to read Marx.¹⁹ Later she claimed that she "began to read *Capital*, just as one reads any book, to see what was in it" (Robinson, 1966a, p. vi). M. Dobb was one of her tutors, but Kalecki was the main influence.²⁰ She wrote that Piero Sraffa used to tease her, saying that she "treated Marx as a little-known forerunner of Kalecki" (Robinson, 1966a, p. vi).

By December 1941 "Marx on Unemployment" had already appeared in the *Economic Journal*, but her most substantial work on the subject, the *Essay on Marxian Economics*, came out in 1942. The lesson drawn from the study of Marx in those years was later summed up by Robinson with the sentence: "For me, the main message of Marx was the need to think in terms of history, not of equilibrium" (Robinson, 1973b, p. x). The influence of Marx appears very clearly in the review of Harrod's *Towards a Dynamic Economics*, published in 1949 in the *Economic Journal*, where she maintained that: "When you turn to the *General Theory* in the long period you have to start with Marx's schema for expanded reproduction" (Robinson, 1973b, p. 253).

Thus, by the end of the 1940s, for Robinson, developing a long-run analysis of accumulation meant developing an analysis "which has freed

¹⁸Letter from PS to JVR, 27 October 1936 in JVR papers: p. vii/431/14-15; see Rosselli (2004).

¹⁹In fact she had already expressed in print her opinion on Marx in reviewing a book by J. Strachey in 1936, with no direct knowledge of the original texts. Among her papers, there is an unpublished note in which she recounts the episode: "In 1936 I published a review of a book by John Strachey (brother of the more famous Lytton) who had set up as a popularizer of Marx – *The Nature of Capitalist Crisis* – I accused him of presenting the labour theory of value in terms of Say's Law, ignoring Keynes and treating Hayek as the representative of academic economics. He replied that it was absurd for someone who had never read Marx to talk about him. We each felt that the other had made a fair point. He began to read Keynes and I read Marx." (JVR papers: p. i/10.1). When writing her Strachey review, she was obviously anxious not to make a *faux pas* while the *General Theory* was not yet published, as we can infer from a letter by Keynes to her: "The point about Marx and Ricardo is, I assume, common knowledge; and I don't think there's anything in my book you need wait for before reviewing Strachey" (JMK to JVR, 15 September 1935, JMK papers: GTE/1/280-81; see Marcuzzo, 2001b).

²⁰See the exchange of letters between January and May 1941 in JVR papers: p. vii.

itself from the need to assume conditions of static equilibrium” (Robinson, 1980b, p. 105). It is noteworthy that she was looking into the classical tradition, in Marx rather than in Marshall, for a thread to follow.²¹ She had evidently concluded there was little in Marshall that would be of use to her in this project. My question is: what made her change her mind?

4. THE STUMBLING BLOCK

According to her later reconstruction, when she had been trying to extend the Keynesian analysis to the long period, the stumbling block in the dynamic analysis consisted in “the lack of an adequate conception of the rate of profit” (Robinson, 1980b, p. 107). On the basis of short-run analysis, which Keynes was persuaded to adopt in the aftermath of the discussions within the Circus, there is no need for the notion of a normal rate of profit. She wrote:

If, as Kahn argued, there is a supply curve of output as a whole (given money wage rates) in a short period situation with fixed total productive capacity, then, corresponding to any given state of demand, there is a particular amount of employment, level of prices and flow of gross profits. There is no one level of profits that is more “normal” than any other (Robinson, 1978b, p. xiii).

On the contrary, to determine the *rate* of profit it is necessary to define the value of the stock of capital, but that at the time, she observed, “no one seemed able to do” (Robinson, 1978b, p. xvi). She remarked that she

had innumerable discussions with Piero Sraffa but they always consisted in his heading me off from errors; he would never say anything positive. Thus it was not till I found the “corn economy” in his Introduction to Ricardo’s *Principles* that I saw a gleam of light on the question of the rate of profit on capital. (Robinson, 1978b, p. xvii)²²

²¹In her 1951 introduction to R. Luxemburg’s *Accumulation of Capital* the need to return to the classical approach is clearly stated: “Academic economists have recently returned from the elaboration of static equilibrium to the classical research for a dynamic model of a developing economy” (Robinson, 1960c, p. 59).

²²Sraffa appears to have sent a copy of the first proofs of his *Introduction* to the *Principles*, marked 15 November 1950, to Sergio Steve and Nicholas Kaldor, but not to Joan Robinson. In the Draft of the General Preface written in early December, the names of Joan Robinson and Richard Kahn appear as deleted in the acknowledgements. However, in the page-proofs, marked 7

What exactly did the “corn economy” reveal to Robinson? This is a question that has puzzled some commentators, to answer which it may be useful to present Sraffa’s reconstruction of Ricardo’s argument.²³

The corn-ratio theory, which Sraffa identified as “the rational foundation of [Ricardo’s] principle of the determining role of the profits of agriculture,” makes it possible to determine profits “by the difference between product and capital advanced.” Since in agriculture, by assumption, corn is both the capital (the subsistence necessary for workers) and the product, the determination of the *rate* of profit, the ratio of profit to capital, “is done directly between quantities of corn without any question of valuation” (Sraffa, 1951, p. xxxi).

In the *Principles*, Ricardo substituted the labor theory of value for the corn-ratio theory, allowing for the determination of the rate of profits on similar lines, “by the ratio of the total labour of the country to the labour required to produce the necessaries for that labour” (Sraffa, 1951, p. xxxii). However, as Sraffa has argued, a problem arises with Ricardo’s theory of profit because any change in distribution between wages and profits alters the relative values of commodities, including those produced with the same quantity of labor; thus unless a measure of value is found that would be invariant to changes in distribution, it becomes impossible “to measure changes in the magnitude of aggregates of commodities of different kinds or, what is even more important, to ascertain its constancy” (Sraffa, 1951, p. xlix).

Ricardo was not able to resolve the problem of the invariant measure of value, but thanks to his corn-ratio theory he was successful, albeit “at the cost of considerable simplification” in rendering distribution independent of value (Sraffa, 1951, p. xxxii).

5. MISUNDERSTANDINGS

By the time Sraffa’s *Introduction* to Ricardo’s *Principles* came out, Robinson was ready for it. As we have seen since 1940 she had been studying Marx and even earlier she had praised Kalecki’s approach to

March 1951, Sraffa first re-inserted the names and then deleted them a second time. According to his Diary entry of 20 March 1951 he had reached the decision after having consulted her: “Phoned Joan. (Says better *not* mention in Preface.)” (PS papers: E 23). See Gehrke (2003).

²³See for instance Gilibert, 1996, p. 123): “[The corn-economy model] is highly suggestive, and certainly shows extremely clearly the working of a surplus theory of profits, as contrasted with the usual equilibrium theory. However, it is difficult to see how it could lead to the arguments used by Robinson to question the possibility of finding a suitable unit for measuring capital, this being made of a heterogeneous collection of goods.”

effective demand, which had been suggested by Marx's reproduction Schemes.²⁴ The first evidence that Marshall's equilibrium arguments were becoming increasingly irrelevant to her project is a collection of three short essays, *On Re-reading Marx*, which she said were "written in a hilarious mood after reading Piero Sraffa's *Introduction* to Ricardo's *Principles* that caused me to see that the concept of the rate of profit on capital is essentially the same in Ricardo, Marx, Marshall and Keynes" (Robinson, 1973b, p. 247).

In fact, far from being in a hilarious mood, Robinson was in the midst of one of her manic-depressive crises, for which she was hospitalized for several weeks, when she wrote these essays. She explained to Kahn, who tried to persuade her not to publish them: "I want to have the family joke about Piero. I cannot pinch 20 years of his life's work without acknowledgement and acknowledgement in a joke is the only way I can do it."²⁵

In these essays she made two main points; the first is that, unlike the short period, in the long period capital changes and the question "what is the quantity of capital" cannot be avoided; the second is the inadequacy of supply and demand analysis in dealing with the passage of time—which is irreversible—as if it were a movement in space limited to only one direction.

The second piece of evidence of the change in her approach is her famous 1953 article, which is widely regarded as the starting point of the capital theory controversies. Since the question of Robinson's priority in the criticism of neoclassical capital theory was raised, it may be helpful to quote what she wrote to Kahn in 1975: "It is true that I anticipated Piero's publication but only because I had more or less worked it out for myself from his *Introduction* to Ricardo's *Principles*—the corn economy."²⁶

My next question is: what exactly did she work out?

In this article, the starting point is that, since in the long period we need to explain why a particular technique is chosen and the rate at which the stock of capital is altered, we must know how capital is measured. The neoclassical explanation is based on the postulate that the prices of factors of production are such that all their available quantities

²⁴In a 1948 article she had written: "What divides Marx's theory from others is not at all the question of relative prices of commodities but the question of the *total* supply of capital and the rate of profit on capital *as a whole*" (Robinson, 1951a, p. 139).

²⁵Letter from JVR to RFK, 28 October, 1952, in RFK papers: 13/90/5/381; see Marcuzzo (2003).

²⁶Letter of 25 February 1975 in RFK papers: 13/90/10/191-2.

are employed. At a given wage rate that technique is chosen that maximizes the rate of profit; then the total amount of capital and the chosen technique determine the level of employment. However, she wrote:

the condition that the given amount of capital employs the given amount of labour...entails a particular rate of profit. But the value of the stock of concrete capital goods is affected by this rate of profit and the amount of "capital" that we started with cannot be defined independently of it (Robinson, 1978c, pp. 87-8).

Thus she pointed out the neoclassical failure to distinguish between changes in the conditions of producing a given output, when the quantity of capital is altered, from changes in the value of that capital, due to variations in wages and profits. The implication is that "different factor ratios cannot be used to analyse changes in the factor ratio taking place through time," because in time the *value* of the quantity of capital may change as a consequence of a change in distribution and we will not be comparing the same quantities. She concluded that "it is impossible to discuss changes (as opposed to differences) in neo-classical terms" (Robinson, 1978c, p. 89).

Her approach is reminiscent of Sraffa's interpretation of Ricardo's failure to distinguish between *differences* in the value of a given output due to conditions of production and *changes* in the value of a given output due to variation in distribution. However, Sraffa refers to "the two points of view of difference and of change" (Sraffa, 1951, p. xlix) to clarify two different effects on the relative value of two commodities of different proportions or durabilities of capital employed in their production: "First, that of occasioning a *difference* in the relative values of two commodities that are produced by equal quantities of labour. Second, that of the effect that a rise of wages has in producing a *change* in their relative value" (Sraffa, 1951, p. xlvi).

Thus in the *Introduction*, Sraffa takes the question of measurement of the quantity of capital to pertain only to the question of measuring "the magnitude of aggregate of commodities." Since the prices of commodities depend on the rate of profit, there *seems* to be a change in the quantity of output to be distributed whenever there is a change in its value due to a change either in wages or in profits. Sraffa does not take it to pertain to the question of comparing two different aggregates of commodities at two different points in time, as Robinson seems to interpret it.

Robinson interpreted the "points of view of difference and of change" as pertaining to the question of comparison between two equilibria, with different amounts of capital; since variations in the quantity of capital

cannot be ascertained independently from changes in the rate of profit, she drew the conclusions that equilibrium positions could only be compared as *differences* and never described as *changes* from one to another.

6. DIVIDING ISSUES

There is some archival evidence that Sraffa perceived Robinson's interpretation of his message as misleading in some respects. We have for instance a letter in which she refers to his objection to an issue raised in her *Accumulation of Capital*, and a letter in which she openly declares her debt to him:²⁷

Dear Piero: all the work that I have been doing the last 10 years has been much influenced by you—both our conversations in the old days and by your Preface. When I went off my head I thought that the idea that I had seen in a blinding flash was yours, because it came to me in terms of Ricardo's corn economy; but it was connected with TIME and it now appears is very much alien to your point of view (though to me it seems to fit perfectly well). Since, quite apart from worldly success, I have a lot of fun. I have a very deep feeling of gratitude to you. The fact that you reject it doesn't affect the case at all. Yours, Joan.²⁸

For many years she championed his approach and was indeed one of the most belligerent players in the capital controversy. However, she always defended the branch of neoclassical school that derived from Marshall, because unlike the branch that derives from Walras, it maintains “a sense of time” (Robinson, 1965a, p. 101). This became the ground of disagreement with some of her allies in the battle against neoclassical economics. One point in particular became central in the discussion, that is, the maintenance of a concept of a long-run equilibrium in the context of historical analysis:

I concede that we might imagine that we could detect the ghost of a long-run rate of profit that would correspond to the momentary actual situation if it were permanent (though it is necessarily in the course of changing)... But there are

²⁷“Now I see the point. We are a case of pot and kettle. The effects of differences in the rate of profit on value of capital in terms of a unit of surplus depend on: A. Differences in time patterns of different commodities; B. Differences in labour embodied. In my big book I played down A and put all the emphasis in B, which caused you to dismiss it as absurd” (JVR to PS, August 1967, PS papers: G7).

²⁸Letter from JVR to PS, 18 June 1960 in PS papers: D3/12/111/ 340-41; see Marcuzzo (2004).

so many indeterminacies in such a calculation that probably anyone who attempted it would only get an answer corresponding to his preconceptions, whatever they might be. Meanwhile, it is the expectation of profits, at any moment, that is the operative force... The very description of equilibrium implies that correct decisions were made in the past (Robinson, 1980c, p. 128).

Thus, it is the critique of the concept of equilibrium itself, and not only of neoclassical equilibrium, which she sees as the legacy from Keynes. The main line of attack on the neoclassical theory lies for her in the distinction between historical time and logical time (Robinson, 1979c, p. xiv), not between two alternative explanations of prices and distribution.²⁹

In this respect she found that Sraffa's language in *Production of Commodities* is limited, because “there is no causation and no change” [and] “the argument is conducted strictly in terms of comparisons of logically possible positions” (Robinson, 1980e, p. 132). She felt it to be more promising to rely on Keynes who, “at the opposite extreme to Sraffa, discusses only events” (Robinson, 1980d, p. 139) and discusses them “in terms of processes taking place in actual history” (Robinson, 1979c, p. xiv).

7. CONCLUSION

It seems to me that the two strands in Cambridge economics, one stemming from Keynes and one from Sraffa, were never fully integrated in the work of Joan Robinson. And indeed, the question is open as to whether in fact they can and should be integrated (see Pasinetti, 2003). Robinson attempted at least three times—with imperfect competition, the theory of employment in the long period and with a post-Keynesian analysis—to integrate Sraffa's points within a Marshallian and Keynesian

²⁹Garegnani retorted that the assumption of irreversibility in time is implicit only in the method of supply and demand analysis, whereby the tendency towards equilibrium is described as movements along those curves, while the same assumption is not made when comparing two long-run equilibrium positions determined by a “classical” theory of prices and distribution (Garegnani, 1979). Others have disputed his claim, because of the unwarranted assumption of the “gravitation” of market prices towards natural prices (for a review of the issue, see Schefold, 1997, pp. 386-97).

framework.³⁰ Twice she discarded her previous attempts as unsatisfactory, and finally fully endorsed Sraffa's criticism of neoclassical capital theory. She unsuccessfully tried to convince Kahn that the gulf between Keynes and Sraffa could be bridged: "Cannot we agree on Piero's prices for the long run and on Keynes's prices for the short run and leave it at that?"³¹ Similarly, she unsuccessfully tried to convince the "Sraffians" that there was no incompatibility with Keynes's theory. She never drew the inference, that the others were drawing, that this integration simply cannot be done. Thus, we may perhaps conclude that notwithstanding her bleak moments, she remained at heart an analytical optimist.

³⁰ "The classical tradition, revived by Sraffa, which flows from Ricardo through Marx, diluted by Marshall and enriched by the analysis of effective demand of Keynes and Kalecki" (Robinson, 1973d, p. xii).

³¹ Letter from JVR to RFK, 25 May 1961 in RFK papers: 13/90.

3. Robinson on Marx

Claudio Sardonì¹

I have Marx in my bones and you have him in your mouth. Do not for heaven's sake bring Hegel into it.
 –Robinson (1953b)

1. INTRODUCTION

Relations between Keynesian and Marxist economists have never been too friendly. An obvious reason for their reciprocal mistrust is certainly their different political and ideological stances. Whereas most Keynesians express moderate to reformist liberal positions, Marxists' politics range from radical reformism to revolutionary. But political and ideological differences do not explain entirely the tension between the two groups. Marxists generally look at Keynes's theory with the same degree of aversion as with any other branch of "bourgeois" economics, considered little more than an apologetic defense of capitalism. Most Keynesians, following Keynes himself, regard Marx's economics as a radical version of Ricardian economics, marred by contradictions and theoretical weaknesses.

Among Keynesians there has been, however, an important exception. Joan Robinson, one of the Cambridge economists closest to Keynes, took Marx's economics seriously and tried to connect it to the Keynesian revolution. Although Robinson took political positions that were more progressive and radical than those of most Keynesians, her interest in Marx did not mean that she embraced Marxist political positions. On the other hand, she never regarded Marx's economic analysis as a coherent theoretical body, to be uncritically accepted in its entirety. It was with such an undogmatic attitude that Robinson set out to examine the analytical relationship between the economics of Marx and Keynes.

Robinson dealt with several aspects of Marx's economic analysis, but she devoted her attention in particular to the labor theory of value and to the theory of effective demand. While Robinson firmly rejected Marx's

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labor theory of value, she held that there were significant points of contact between Marx's and Keynes's approaches to effective demand. This chapter concentrates on this second topic.²

This chapter is organized as follows. After a brief exposition of Keynes's opinion of Marx, which influenced other Keynesians (section 2), the paper turns to examine Robinson's interpretation of Marx's theory of effective demand (section 3). In the light of some aspects of Marx's contribution that Robinson overlooked or underestimated, section 4 offers an alternative interpretation of Marx's theory of effective demand. Section 5 draws some conclusions.

2. ROBINSON, MARX AND KEYNES

Robinson regarded both classical political economy and Keynes's theory as alternative to neoclassical economics. Her effort to establish a link between Marx and Keynes can be viewed as part of a more general effort to establish an analytical as well as methodological link between Keynesian economics and classical political economy. Any attempt to establish an analytical relation between these two traditions cannot avoid dealing with the problem of effective demand and it is in this respect that Marx is of particular relevance. While Marx retained fundamental features of classical political economy, at the same time he distanced himself from that tradition by questioning and rejecting Say's Law.

On several occasions, Robinson stated that Marx and Keynes had dealt with the problem of effective demand in ways that were not only compatible but also similar in several respects. However, when one looks at her more analytical works on Marx's economics, a rather different picture emerges. Her interpretation of Marx's analysis seems to lead to the conclusion that, after all, the differences from Keynes are predominant. Her interpretation suggests that Marx essentially failed to provide a satisfactory critique of Say's Law. Robinson's interpretation of Marx cannot, therefore, be regarded as fully satisfactory. Although she grasped some important aspects of Marx's analysis, she failed, in particular, to understand the importance of his theory of money in relation to the problem of effective demand.

²Recently, Baragar (2003) has published an article on Joan Robinson on Marx, in which more attention is paid to other theoretical issues like the labor theory of value and technical change.

Keynes was not a scholar of Marx. He probably "looked into" Marx's *Capital* only once³ and his knowledge of Marx's economics was mainly based on secondary literature. This, however, did not prevent him from issuing trenchant judgments on Marx's economics both in *The General Theory* and before and after its publication.

In *The General Theory*, the book that was to "knock away" Marxism,⁴ Keynes quoted Marx only three times. The first quotation, in a footnote (Keynes, 1936a, p. 3n), is concerned with the definition of "classical economics," the other two quotations are more relevant but neither is very flattering to Marx. In criticizing his predecessors for having ignored the principle of effective demand, Keynes noted that the "great puzzle of Effective Demand" had vanished from economics since Malthus and only kept on living furtively in the "underworlds" of Marx, Gesell and Major Douglas (Keynes, 1936a, p. 32). In chapter 23, Keynes expressed his conviction that the future will learn more from Gesell than Marx.⁵ Gesell, in fact, had the merit to have rejected the classical inheritance accepted by Marx and had anticipated some aspects of Keynes's analysis (Keynes, 1936a, pp. 355-6).

These opinions are consistent with others expressed by Keynes both before and after *The General Theory*. He always held that Marx's economic doctrine was flawed by serious logical contradictions although, sometimes, it may have contained interesting intuitions. In 1925, he wrote that Marx's *Capital*, the bible of Communism, was an "obsolete economic textbook," that was "not only scientifically erroneous but without interest or application for the modern world" (Keynes, 1925, p. 258). In 1934, Keynes wrote to George Bernard Shaw that his feelings about Marx's *Capital* were the same as his feelings about the *Koran*; its "dreary, out-of-date, academic controversialising" was "extraordinarily unsuitable" to give inspiration to so many people and "its contemporary

³See Keynes's letter to George Bernard Shaw of 2 December 1934 (Keynes, 1982, p. 38). For a more extensive analysis of the analytical relationship between Keynes and Marx, see Sardoni (1997).

⁴In another letter to G. B. Shaw of 1 January 1935, Keynes wrote: "To understand my state of mind...you have to know that I believe myself to be writing a book on economic theory, which will largely revolutionise...the way the world thinks about economic problems. When my theory has been duly assimilated and mixed with politics and feelings and passions, I can't predict what the final upshot will be in its effect on action and affairs. But there will be a great change, and, in particular, the Ricardian foundations of Marxism will be knocked away" (Keynes, 1982, p. 42).

⁵Gesell had tried to establish an "anti-Marxian socialism" based on the rejection of the classical hypotheses that Marx had instead accepted (Keynes, 1936, p. 355).

economic value (apart from occasional but inconstructive and discontinuous flashes of insight) is *nil*" (Keynes, 1982, p. 38). Finally, in 1942, after having read Robinson's *Essay* on Marx's economics (Robinson, 1966a), Keynes expressed to her "the feeling which I had before on less evidence, that he had a penetrating and original flair but was a very poor thinker indeed."⁶

3. CRISES AND EFFECTIVE DEMAND

Keynes's strong aversion to Marx was not enough to prevent Robinson from taking Marx's economics seriously. It was probably Kalecki who was the decisive influence. Robinson first became interested in Marx in the late 1930s, but it was only during World War II that she dealt with Marx's economics more thoroughly. She read Marx's *Capital* "just as one reads any book, to see what was in it." In *Capital* she found "a great deal that neither its followers nor its opponents had prepared me to expect" (Robinson, 1966a, p. vi). The result of her reading of *Capital* was the publication of *An Essay on Marxian Economics* in 1942.⁷ Robinson's views on Marx's economics never changed substantially, even though some changes of emphasis can be detected.

Although published more than ten years after her *Essay*, two useful starting points for understanding Robinson's views on Marx and his relationship with Cambridge economics are a pamphlet published in 1953 (Robinson, 1953b, pp. 247-68)⁸ and a lecture delivered at Delhi in 1955 on Marx, Marshall and Keynes (Robinson, 1955, pp. 1-17). The pamphlet is mostly concerned with general methodological issues, while the lecture deals with analytical topics already considered in the 1942 book.

Robinson's basic idea was that there are significant points of contact between Marx and the Cambridge economic tradition as expressed by Marshall and Keynes. To illustrate her point of view, Robinson used a "parable" of three cuttlefish: one red (Marx), one blue (Marshall) and one pinkish (Keynes): "When I caught the cuttle fish and laid them out in a row...[they] were fine large shiny white objects, and blest if I could tell which was which" (Robinson, 1953b, pp. 249-50). The difficulty to distinguish among the three economists derives from the

⁶From a letter to Robinson of 20 August 1942, quoted in Moggridge (1992, p. 470).

⁷The second edition of the *Essay* was published in 1966, with a new preface by Robinson (1966a).

⁸The pamphlet, which contains a collection of essays, was published by the Students Bookshop in Cambridge, with the title *On Re-Reading Marx*. It was written "in a hilarious mood after reading Piero Sraffa's Introduction to Ricardo's *Principles*" (Robinson, 1953b, p. 247).

fact that "they had all been at school together," Ricardo being their common teacher. The link between Marx and Ricardo is obvious and most evident especially when Ricardo's last essay on absolute value is considered.⁹ As to Marshall and Keynes, "Marshall pored over Ricardo all his life, and Keynes, though not a great reading man, drank Marshall in his mother's milk" (Robinson, 1953b, p. 250).

Ricardo, Marx, Marshall and Keynes, however, had different ideologies. Ricardo was against rents; Marx called Ricardo's rents *surplus* and was against it;¹⁰ Marshall was in favor of quasi-rents (his name for profits); Keynes took an in-between position, noting that quasi-rent "was a good thing in a slump if it promoted investment and a bad thing if it curtailed consumption, and vice-versa in a boom" (Robinson, 1953b, p. 251). All of them, however, inherited Ricardo's method of analysis, the method of taking strong cases: "This means: swing your variable over a wide range and look at the two ends before you look at the middle. But there is an art in doing this, it is not just a mechanical trick" (Robinson, 1953b, p. 251).¹¹

The main object of Robinson's pamphlet was to argue against orthodox Marxists and she carried out the discussion of the relationship among Ricardo, Marx, Marshall and Keynes from this perspective. Robinson did not enter into an analytical discussion of the relationship between Keynes and Marx, even though she briefly touched upon two aspects connected to the problem of effective demand. On the one hand, she expressed her appreciation of Marx's schemes of reproduction and complained that Marxists did not understand their analytical importance in relation to contemporary economics; on the other hand she held that Marx, like Keynes, had shown that Say's Law was inadequate: "Now comes Keynes and proves that Say's Law is nonsense (so did Marx, of course, but my supervisor never drew my attention to Marx's view on the subject)" (Robinson, 1953b, p. 264). These two topics were discussed

⁹For Robinson, reading this essay, "you get the funny feeling: What does this remind me of? And then you say: Of course—Volume I of *Capital* (though two prose styles could not be more different)" (Robinson, 1953b, p. 250). Ricardo's essay had been discovered and published by Sraffa shortly before Robinson's pamphlet.

¹⁰In her 1973 introduction to the essays, Robinson rejected her 1953 interpretation of Marx's attitude toward the surplus: "It was a mistake to identify the nature of surplus in Marx with Ricardo's rent. Marx did not think profits were a bad thing. He thought that exploitation was a necessary part of the process by which capitalism will destroy itself" (Robinson, 1973a, p. 248).

¹¹On the methodological similarities between Keynes and Ricardo, see also Robinson (1978d).

again in the 1955 Delhi lecture. There, however, Robinson's position on Marx's critique of Say's Law was different.

In 1955, Robinson underlined again the importance of Marx's schemes of reproduction and related them directly to Keynes, Kalecki, Harrod and Domar:

[T]he schema for expanding reproduction provide a very simple and quite indispensable approach to the problem of saving and investment and the balance between production of capital goods and demand for consumer goods. It was re-discovered and made the basis for the treatment of Keynes' problem by Kalecki and reinvented by Harrod and Domar as the basis for theory of long-run development. If Marx had been studied as a serious economist, instead of being treated on the one hand as an infallible oracle and on the other as a butt for cheap epigrams, it would have saved us all a great deal of time. (Robinson, 1955, p. 7)

At the same time, however, she implicitly argued that Marx's analysis was based on the acceptance of Say's Law. She stated that, for Marx, capitalists save because they want to invest and, therefore, there is a necessary "automatic" connection between saving and investment. Instead, for Keynes, savings and investment are not automatically connected (Robinson, 1955, p. 3).¹²

It is evident that, if savings are "automatically" invested, Say's Law must hold. Thus, there appears a contradiction between Robinson's interpretation of the schemes of reproduction and her conviction that, for Marx, all savings are necessarily invested. To understand better this question it is necessary to look back at her 1942 *Essay*, where the analysis was carried out at a more detailed level.

In the 1966 preface to the second edition of her *Essay*, Robinson wrote that in *Capital* she had found many "pointers" to a theory of effective demand resembling Keynes's and Kalecki's. It was so much so that "Marx's disciples could have worked it out before Keynes and Kalecki learned it from the brutal teaching of the great slump; but they did not do so" (Robinson, 1966a, p. vi). However, her original presentation of Marx's analysis of effective demand appears quite less favorable. In 1942, she

¹²In Robinson's view, for Marshall, capitalists invest because they want to save and increase their wealth (Robinson, 1955, pp. 2-3). In the lecture, Robinson also argued that Marshall had anticipated Keynes's rejection of the idea that saving is necessarily converted into investment demand. She quoted Marshall's *Principles*, where it is observed that "though men have the power to purchase they may not choose to use it" (Robinson, 1955, p. 16).

had acknowledged that Marx offered several hints to the understanding of effective demand, but had also argued that his analysis was marred by the assumption that capitalist entrepreneurs always invest all they can, regardless of the current and expected rates of profit.

Marx's theory of accumulation, effective demand and economic crises is expounded and criticized in chapters IV, V and VI of the *Essay* (pp. 29-51). Chapter IV, which is concerned with the long-period theory of employment, begins with the following statement:

For the most part, Marx conducts his argument upon the assumption that there is no problem of the inducement to capitalists to invest in real capital...So long as they have some profits to invest, they can be relied upon to invest them, irrespective of the prospect of profit or the rate of interest. (Robinson, 1966a, p. 29)

In such a framework, unemployment is due to the fact that the rate of accumulation is lower than the rate of growth of the labor force. Unemployment, in the form of the industrial reserve army, keeps real wages at their subsistence level. It is possible, however, that there is an excess demand for labor; in such a case, real wages rise, profits diminish and accumulation slows down. As a consequence, unemployment increases and forces wages down again.¹³ In the following chapter V, Robinson criticized the law of the falling rate of profit, which was studied by Marx under the assumption that there is no problem on the demand side: the entire surplus produced is realized in the market.

It is in chapter VI that Robinson dealt directly with Marx's contribution to the theory of effective demand. She based her analysis on Marx's schemes of reproduction in Volume II of *Capital*.¹⁴ Robinson summarized the theory that Marx was trying to develop in the following way:

consumption by the workers is limited by their poverty, while consumption by the capitalists is limited by the greed for capital which causes them to accumulate wealth rather than to enjoy luxury. The demand for consumption goods ... is thus restricted. But if the output of the consumption-good

¹³Moreover, "the capitalist system, which cannot tolerate low profits, reacts by adopting new techniques which economise labour" (Robinson, 1966a, p. 31).

¹⁴She also argued that, using his schemes, Marx tried to lay the bases for a trade cycle theory. In her interpretation, for Marx trade cycles are essentially explained by replacement investment, an idea already suggested by Robertson (Robinson, 1966a, p. 46).

industries is limited by the market, the demand for capital goods...is in turn restricted... Thus the distribution of income, between wages and surplus, is such as to set up a chronic tendency for a lack of balance between the two groups of industries. (Robinson 1966a, p. 49)

Kalecki's influence is evident. The way in which Robinson read Marx's schemes is the same as the way in which Kalecki used them to expound his own theory of effective demand.¹⁵

However, for Robinson, Marx could not fully develop his analysis along the line depicted above because he did not have a proper theory of investment:

To work out a theory on these lines it is necessary to deal with the problem of the inducement to invest. If capitalists were always prepared to invest their surplus in capital goods, without regard to the prospect of profit, the output of capital goods would fill the gap between consumption and maximum potential output. (Robinson, 1966a, p. 50) Investment, in reality, depends on the rate of profit, which, in turn, depends on the economy's consuming power. Marx did not follow this line of analysis, because he had meanwhile worked out his theory of the falling tendency of profit, based on the principle of the rising organic composition of capital. (Robinson, 1966a, p. 50)

This amounts to say that Marx failed to provide a thorough and coherent rejection of Say's Law:

Marx evidently failed to realise how much the orthodox theory stands and falls with Say's Law, and set himself the task of discovering a theory of crises which would apply to a world in which Say's Law was fulfilled, as well as the theory which arises when Say's Law is exploded. This dualism implants confusion in Marx's own argument, and, still more, in the arguments of his successors. (Robinson, 1966a, p. 50)

In the *Essay*, Robinson was far from holding that Marx had provided a satisfactory theory of effective demand, but a few years later she came to regard even this interpretation as too favorable to Marx. In 1948, she wrote that, in the *Essay*, she had overemphasized the similarity between Keynes and Marx and she now concentrated on the differences between the two.

¹⁵On Kalecki's interpretation of Marx's schemes of reproduction, see also Sardoni (1989).

In Keynes's system the clue to crises is found in variations of the *inducement to invest*, which depends primarily upon the prospect of future profit from new investment. Of this there are only scattered hints in Marx, and it is incompatible with his main argument. For in Marx's system the amount of investment is governed by the amount of surplus that the capitalists succeed in extracting from the system, that is to say, it is the rate of saving out of profits that governs the rate of investment. Thus the problem of effective demand does not rise, and though Marx explicitly repudiated Say's Law as childish nonsense, yet he, no more than Mill and Marshall, admits the divorce between decisions to save and decisions to invest, which, in Keynes's system, appears as the root cause of crises and unemployment (Robinson, 1948, pp. 140-41).

On the grounds of the 1942 *Essay*, the 1948 and 1955 works, Robinson's interpretation of Marx can be summarized as follows. Marx, with his schemes of reproduction, provided a powerful analytical tool to deal with the problem of effective demand along Keynesian lines. Unfortunately, Marx himself did not develop such a theory because he failed to provide a satisfactory theory of investment, as distinct from savings, and, hence, to criticize Say's Law in an effectual way.

This picture, however, is made more complicated by the fact that, in other works, Robinson put forward a different interpretation of Marx's position on Say's Law. As we already saw, while in 1953 she held that Marx, like Keynes, had proved that Say's Law is nonsense, in 1952, she had argued that for Marx the law does not hold only during crises:

In Marx's scheme capitalists are subject to a strong pressure to accumulate. Saving is made only for the purpose of investment, and (apart from crises) all savings are invested as they are made. (Robinson, 1952a, p. 79; emphasis added)

Obviously, such statements, though not supported by further analysis denote a different reading and evaluation of Marx's contribution to the theory of effective demand. Thus, on the whole, Robinson's interpretation of Marx's theory of effective demand appears somewhat oscillating from a position decisively critical, which blames Marx for having implicitly accepted Say's Law, to a position according to which he had rejected the validity of the law either altogether or only during economic crises.

If one accepts Robinson's less favorable interpretation of Marx's approach to the problem of effective demand, it seems that one should logically conclude that his analysis did not represent a radical break with the past classical tradition. The capitalist process of growth takes place in an environment in which all savings are transformed into investment. Crises only occur as a result of "over-accumulation," that leads

to excess demand for labor, increases in real wages, a fall in the rate of profit and, hence, the slowing down of accumulation. Although, for Marx, the fluctuation of real wages is not determined by changes in the rate of growth of population but by changes in the rate of unemployment, his position was not essentially different from Ricardo's, who, in his discussion of effective demand with Malthus, argued that the correct way to study the effects of accumulation was to assume that capitalists always invest the entire saved surplus regardless of the level of the rate of profit.¹⁶

If, instead, Robinson's more favorable interpretation of Marx is considered, we find little analytical support. Robinson's position, according to which, for Marx, Say's Law does not apply only during crises, is untenable. Disproving the validity of Say's Law does not require arguing that aggregate demand and supply are always different; it is sufficient to prove that in some situations (crises) they may diverge and that there are forces at work that drive the economy to such situations. In other words, showing that crises are due to an insufficient level of effective demand amounts to a full-fledged critique of Say's Law. Robinson failed to develop her interpretation of Marx in such a direction.

The next section looks at Marx's works to see whether it is possible to find in them an analysis of effective demand and Say's Law more satisfactory and coherent than that suggested by Robinson.

4. MARX'S THEORY OF CRISES

Marx's theory certainly was not fully developed. There is sufficient evidence, however, to argue that he consistently rejected the validity of Say's Law throughout his works. There was no "dual" approach to crises, a theory that applies when Say's Law holds and one that applies when it does not. His rejection of the law is based on the analysis of capitalists' production and investment decisions and on his theory of money.

Marx never analyzed capitalists' behavior in terms of optimizing agents, whose objective is to maximize profits, but there is no doubt that he saw the capitalist economy as driven by the entrepreneurs' objective to realize the largest possible rate of profit. It is this element that constitutes Marx's "theory of investment." When the prospective profit is expected to be low, the incentive to invest weakens significantly and, consequently

¹⁶On Ricardo's analysis of accumulation and effective demand and his discussion with Malthus, see Sardoni (1987, pp. 10-25).

the demand for capital goods and labor decreases. There are several passages in *Capital*, as well as in other works, in which Marx clearly hints at the fact that expectations of a low profit rate induce capitalists not to invest. More precisely, Marx argued that when capitalists do not invest, because of low expected profits, they hoard money:

Surplus-value amassed in the form of money (gold or notes) could only be transformed into capital at a loss. It therefore lies idle as a hoard in the banks or in the form of credit money. Purchase and sale get bogged down and unemployed capital appears in the form of money. (Marx, 1968, p. 494)

There is another passage in which Marx establishes a clear connection between effective demand, crises and money:

the supply of all commodities can be greater than the demand for all commodities, since the demand for the general commodity, money, exchange-value, is greater than the demand for all particular commodities, in other words the motive to turn the commodity into money, to realise its exchange-value, prevails over the motive to transform the commodity again into use-value. (Marx, 1968, p. 505)

In Marx's analysis, the formula ($M-C-M'$) denotes the specific character of capitalist production and circulation. Capitalists invest, produce and sell goods in order to realize the maximum amount of profits in money form. In order that Say's Law holds it is necessary to assume that money is demanded only as a means of circulation and that it is never kept idle in the form of hoards. In Marx's analytical framework, if the capitalists' liquidity preference rises (that is, they increase their money hoards), because of pessimistic expectations about profits, effective demand falls short of aggregate supply and a general overproduction of commodities occurs. Since, for Marx, savings only derive from the capitalists' surplus, holding that the capitalist class can decide to keep part of the surplus idle in money form amounts to saying that not all savings are necessarily invested. Marx's approach to demand and his rejection of Say's Law were fundamentally different from Malthus's, who never rejected the hypothesis that all savings are invested.

To understand Marx's theory of crises, Robinson should have paid more attention to Marx's theory of money. Although she grasped some important elements of Marx's monetary theory, Robinson failed to connect it to his analysis of effective demand. She understood perfectly well Marx's criticism of Ricardo's quantity theory of money; for her, Marx

opposed to the orthodox “Quantity Theory of Money” . . . the view that the quantity of money in circulation is determined by the demand for it, that is by business habits, the state of activity and the level of prices. The difference between the quantity of money in circulation and the quantity in existence is absorbed in “hoards.” (Robinson, 1966a, p. 68)¹⁷

Robinson, however, did not see the analytical relationship between Marx’s critique of the quantity theory of money and his theory of effective demand.

Robinson also held that Marx did not establish any analytical relation between hoarding and the interest rate (Robinson, 1966a, pp. 68-9). In her view, for Marx, the interest rate was “arbitrarily determined by the push and pull of bargaining strength between lenders and borrowers—and he attaches no importance to its reaction upon other factors in economic life” (Robinson, 1966a, p. 69).¹⁸ But her interpretation of Marx’s theory of the interest rate is not completely satisfactory. Marx argued that the interest rate is determined by the demand and supply of loans and defined the demand for loans in such a way to include in it also the demand for money.¹⁹ If this is the case and, as we saw above, the demand for money hoards is related to expected profits, it is evident that there is a significant relation between Marx’s and Keynes’s theories of effective demand, of money and the interest rate.

Marx’s most developed explanation of crises due to a lack of effective demand is in his *Theories of Surplus Value*, which Robinson did not know.²⁰ However, she could have derived a more satisfactory interpretation of Marx’s analysis also from reading Volume II of *Capital*. Although most interpreters of Marx’s reproduction schemes have paid little attention to the monetary aspects of the process of reproduction, Marx himself devoted much attention to this aspect. Elsewhere (Sardoni, 1989) I tried to show that, in the analytical context of Marx’s schemes, the level of effective demand and aggregate profits depend on the propensity to hoard of the capitalist class as a whole: in order to make the realization of the

¹⁷She also wrote to Kahn: “there is a lot of excellent stuff in Marx, e.g. that the quantity of money is determined by prices, not vice versa, but none of the Marxists seem to understand him” (letter of Joan Robinson to Richard Kahn, 3 March 1941).

¹⁸For her, Marx regarded interest “merely as a mechanism by which surplus is shared between the *rentier* and the active capitalist” (Robinson, 1966a, pp. 68-9).

¹⁹Here it is not possible to enter into a detailed discussion of Marx’s theory of the interest rate, but see Sardoni (1987, pp. 26-36, 80-83 and 1998).

²⁰Marx’s *Theories of Surplus Value* was first published in English in 1951, but there is no evidence that Robinson read the book.

surplus possible, capitalists must decide, in each period, to reduce their money hoards; hence a high propensity to hoard implies a low level of effective demand and aggregate profits (Sardoni, 1989, pp. 210-16).

Robinson devoted some attention to the monetary aspects of Marx’s schemes of reproduction, but she arrived at conclusions different from Marx’s.²¹ She observed that the expansion of real aggregate output requires an increase in the stock of money in circulation, even though money prices remain constant. As a consequence, in her view, capitalists “have to devote part of their savings to increasing their holdings of cash (for there is no borrowing). This causes a deficiency of effective demand. But the increase in the quantity of money comes from newly mined gold, and the expenditure of the gold-mining industry upon the other departments just makes up the deficiency in demand” (Robinson, 1951b, pp. 65-6). For Robinson, the additional quantity of money can come only from newly mined gold, but this was not Marx’s position: the additional money required for the circulation of a larger total output does not come from savings but comes from the capitalists’ decision to reduce their money hoards, that is to say, from a decrease in their liquidity preference.²²

5. CONCLUSION

In her attempt to establish an analytical link between the Keynesian revolution and Marx’s economics, Robinson, not surprisingly, paid considerable attention to the problem of effective demand. Marx was the economist who most consistently disputed the classical acceptance of Say’s Law. Keynes was convinced that it was Malthus who went closest to his approach to effective demand; Robinson was not impressed by Keynes’s historical reconstruction of the development of the principle of effective demand and, correctly, concentrated on Marx, while ignoring Malthus. However, Robinson’s interpretation of Marx’s theory of effective demand was not completely satisfactory. She failed to understand the importance of some fundamental aspects of his theory. As a result, Marx’s analysis of effective demand and his critique of Say’s Law emerge impoverished from her reconstruction.

²¹She did so in her introduction to *The Accumulation of Capital* by Rosa Luxemburg (Robinson, 1951b).

²²If the capitalists’ propensity to hoard does not change, the additional money must necessarily come from newly mined gold. The analysis was carried out under the hypothesis that the velocity of circulation of money is constant and that only gold is the medium of exchange.

Robinson's analytical weaknesses in the reconstruction of Marx's theory of effective demand were not the cause of her failure to convince either Keynesians or Marxists to look at the relationship between Keynes and Marx with more interest. On the Keynesian side, Keynes's hostility toward Marx and Marxism has exerted a stronger influence on most of his disciples. Political and ideological differences were strong enough to prevent Keynesians from perceiving the analytical similarities between Keynes and Marx. On the Marxist side, Robinson was not any more successful. Orthodox Marxists could never accept her undogmatic approach to Marx and, at the best, have looked at her as a radical "bourgeois economist," maybe well-intentioned but with no serious theoretical and ideological background. Her critical attitude toward Marx has significantly contributed to her estrangement from those Marxists who cannot tolerate the idea that Marx may have made some mistakes or even that he, as any human being, was influenced by the historical and cultural context of the nineteenth century.

In my view, however, Robinson's undogmatic approach to Marx's theory represents one of the most positive aspects of her attempt to relate it to Keynesian economics. She always rejected a "religious" attitude toward Marx and never refrained from pointing out what she regarded as Marx's errors. From this point of view, her firm rejection of Marx's labor theory of value, which she regarded as wrong and useless for understanding the working of market economies, and of the attempts to defend and save it on the grounds of some sort of Hegelian dialectic is significant.²³ But she also criticized the orthodox Marxist use of the schemes of reproduction: "The modern Marxists, of course, use the model, but as they can only explain it in Hegelese they are no help at all to a monoglot Englishman" (Robinson, 1953b, p. 253). For Robinson, her straightforward approach and her comprehension of Keynes's economics allowed her to understand Marx much better and more deeply than orthodox Marxists. To return to the citation that opened the chapter: "I have Marx in my bones and you have him in your mouth" (Robinson, 1953b, p. 265).

²³For a description of Robinson's approach to the labor theory of value and her criticism of the orthodox approach, see also Lippi (1996). Robinson was particularly annoyed by the Hegelian style of language and dialectics used by Marxists to discuss topics and notions that could be dealt with perfectly well by using ordinary language and logic. For example, the fact that constant capital is an embodiment of labor power exerted in the past, for a Marxist, is "something that has to be proved with a lot of Hegelian stuff and nonsense. Whereas I say (though I do not use such pompous terminology): 'Naturally—what else do you think it could be?'" (Robinson, 1973a, p. 265). In a similar way, she argued against the use of Hegelian language to defend the labor theory of value (Robinson, 1953b, p. 268).

4. Knowledge Without Pain

Prue Kerr¹

The most contemptible of all quacks are those who propose to cure human ignorance without putting the party to pain or effort.
—Empson (1833, p. 3)

1. INTRODUCTION

In economics, there is the "narrative of science" and there is the popular text. The former must meet the standards of the discipline and is often committed to model-building, as many of the chapters of this book; the latter can be more oblique. Joan Robinson is known, and indeed saw herself, as a highly abstract theorist. Yet she made several ventures into popular writing for an audience beyond her colleagues. Jane Marcet and Harriet Martineau were two early women writers on political economy who also employed popular writing to convey their subject. But Robinson took their projects much further. Where they conveyed the established principles of political economy, Robinson contested them. Furthermore, she challenged the nature of that society that those principles had generated and now justified. Like Martineau, she was controversial. While Marcet and Martineau had an integrated conception of political economy, Robinson was dealing with a narrow "scientific" one. But in these three books she confronted that conception and attempted to broaden the scope of economics by trying to understand the relationship between science and values. In *Economic Philosophy* (1962b), she took a narrow Popperian view of science and values and tried to examine orthodox economics within that. In *Economics: An Awkward Corner* (1966b), she uses an argument of contradictions to explain the motion of a society that reflects that orthodox theory and ideology. In *Freedom and Necessity* (1970a), she extends this method to examine the evolutionary nature of societies as their theories and ideologies interact with the society. Her ongoing resolution of these two dimensions to political economy is illustrated in these three books written outside her usual genre. She does not provide knowledge without pain; Robinson demands much from her reader.

¹I would like to thank Bill Gibson, Geoff Harcourt, Ray Petrides and Michael White for their helpful comments on a draft of this chapter.

What then are we to make of her three books that were written for a wider audience (Robinson, 1962b, 1966b, 1970a)? The chapter concludes that for Robinson, there was no “knowledge without pain;” the subject of economics was simply too abstract and the key issues buried too deeply to resort to the over simplification of the previous century.²

The chapter is organized as follows. Section two discusses the works of Marcet and Martineau in the historical context of the early nineteenth century. The following three sections examine Robinson’s three popular texts in light of what these two earlier authors had tried to achieve. The sixth section addresses the evolution of Robinson’s views on science and ideology and concludes that there is evidence of a dialectical progression. A final section sums up the argument.

2. EMPOWERING THE MASSES

The late eighteenth century and first half of the nineteenth were times of immense change intellectually in science and literature and also in humanitarianism. The amateur study of science was hugely popular and tracts to meet this interest abounded. Women, in their own way, also shared in these passions. Writing, in the form of conversations and dialogues, merged genre with gender and pioneered contributions by women to the cultural transmission of science. For the late eighteenth century and first half of the nineteenth the scientific dialogue suited women writers on science, the conversations establishing their authority. Science education was considered to be part of good mothering so that it was the responsibility of young ladies to be educated in these fields. Jane Marcet in 1816 and subsequently Harriet Martineau in 1832 chose to write about political economy, a man’s domain but employing a woman’s genre of conversations and tales.³ Typically the scientific theories these women conveyed were those that had already become accepted. They eschewed the controversial partly to enhance their authority. Their originality lay not in the substance of what they were trying to convey but in their distinctive discourse, which they evolved in the telling of their subject. Popularizations are still too often treated as a defective translation of

²The references to archived material are courtesy of the King’s College Modern Archives. The unpublished writings of Joan Robinson are protected by copyright held by The Provost and Scholars of King’s College Cambridge 2005.

³Empson, in reviewing the two women’s work, commented that “The science, therefore, may properly be recommended to them from its intimate connexion with the protection and comfort of the poor. This recommendation is by no means inconsistent with a horror of the Amazons of politics” (Empson, 1833, p.1).

the primary text. But still today, there is no single public for political economy and each demands its own genre as well as selected content.⁴

Jane Haldimand Marcet was born in London in 1769 to a wealthy merchant, who educated his children in mathematics, astronomy and philosophy irrespective of gender. Her *Conversations on Political Economy in which the elements of that science are familiarly explained* was the most widely read work on a field that was then at the centre of intellectual debate. Marcet was the greatest popularizer of the first half of the nineteenth century and translator of the “radical ideas” of her contemporary thinkers in chemistry, natural philosophy, history, botany and Christianity. *Conversations* illustrates what were the accepted doctrines of the period (1816), just before Ricardo’s *Principles* was published. She was widely read, acknowledging, in later editions (for example, 1839), Adam Smith, Say, Sismondi, Malthus, Ricardo and Senior. Say remarked that the book presented “very sound principles in a very pleasant form,” blandly appropriate for a woman’s foray into the masculine territory of political economy.

The book is in the form of conversations between a young woman, Caroline, and her governess, Mrs. B, questions and answers illustrating the various principles of political economy in practice. “From this living representation of it, we perceive that it is really a positive part of human life” (Empson, 1833, p. 7). For example, there are conversations on Property, on the Division of Labour, on Wages and on Capital, 22 in all. The idea that as long as output was growing, everyone could benefit, pervaded the lessons: “a growing capital is, you know, an increase of subsistence for the poor” (Marcet, 1816, p. 393).

While men wrote treatises, women typically wrote for other women and children. Informal conversation, stories and tales were writing styles considered more accessible to women. Perhaps Marcet’s use of the conversational form can be seen as a defensive move, a tentative, less assertive style, and thereby making her intrusion excusable. Her aim, as a popularizer, was to educate rather than claim intellectual credit for her own. Her book was a tremendous success, with 16 British and two French editions. Marcet’s *Conversations on Political Economy* allowed her to

⁴Keynes, perhaps warning Robinson at the time of a different form of popularization, wrote: “I think that the best popular version may have to be approached along the lines of its own...There is a considerable difference between more or less formal theory, which my existing book purports to be, and something which is meant to be applied to current events without too much qualification by people who do not fully comprehend the theory” (JVR/240/13; 2.12.36).

take on new ground—political economy—while not leaving the respectability of the home and it was equally successful. Marcet defined a forum in which she could take on political economy while still remaining on the domestic terrain granted to women of her upper-middle class. Nevertheless, her conversations were intended as prefatory for the student to attend and understand public lectures on the subject.⁵

The success of *Conversations* inspired a well-educated daughter of a British textile manufacture Harriet Martineau, to publish *Illustrations of Political Economy* in 1832. Both women were the product of tutors who taught “male subjects” to young women. Whereas Marcet had aimed her text at young ladies and women, Martineau’s projected audience were to include the lower and middle classes, of both sexes, the self-improvers. Her narratives did not take the form of conversations, but were more systematic. She hoped for a wider appeal.

Economics at the time was Smith, Malthus, and to a lesser extent for Martineau, Ricardo. Their principles supported the poor laws, transportation, and free trade. The problem that concerned Martineau was how to accommodate the moral requirements for social justice within the ideologically narrow framework of the dominant economic paradigm. Like Robinson, Martineau’s fundamental preoccupation was with the welfare of the under-privileged and Martineau was hoping to enhance their understanding of their plight and so empower them to raise themselves out of their misery. She envisaged bringing about benevolent social change through sharing the power of knowledge. Her tales were highly moralistic, each one illustrating selected principles of the erudite political economy in actual situations, the pertinent principles being helpfully listed at the end of each tale. There were 23 tales, one a month for two years, together with another two series, *Illustrations of the Poor Laws* and *Illustrations of Taxation*, making a total of 36 vignettes.

One of her illustrations is a story about a strike in Manchester, England. Its main protagonist is an earnest factory worker who reluctantly takes on the role of leader of the union in a strike for higher wages. He is frugal, caring of his family, *fair-minded* and the epitome of reason. The employers are variously reasonable and wise and exploitative. The main point of the argument is that wages can only be raised as much as the capitalist has the capital to pay them.⁶ “The proportion of this

⁵At these lectures it was noticed by several observers that the men sat, sleeping or bored, with an air of condescension, while the ladies avidly took notes (Myers, 1997).

⁶This echoed Marcet who had written: “Caroline: ...but what is it that determines the rate of wages? Mrs. B: It depends on the proportion which capital bears to the labouring part of the population of the country” (Marcet, 1816, p. 105).

fund received by individuals must mainly depend on the number among whom the fund is divided...The condition of labourers may best be improved...by adjusting the proportion of population to capital” (Martineau, 1832, pp. 134-5). The story was a polemic about the futility and waste of strikes, both to capital and so to wages and labor. Its characters portrayed exemplary and dissolute behavior. The comment on population reveals one of her favorite and notorious themes and one of her biographers notes her “didactic intensity.”

Martineau was clear about the boundary between science and popularization, between original authors and conduits to a wider public. She saw her role as conveyor of existing science, not creator of new ideas. She was, nevertheless, controversial, broaching subjects that were in the public arena, such as Malthus’s population principle, the wisdom of emigration for the poor, the cruel ironies of injudicious charity. In her tales, she constructs a world of referents; some of these are interpreted as part of the reader’s world while others are purely fictional.

In “Homes Abroad: A Tale,” for example, in *Illustrations of Political Economy No. 10*, she takes up the theme of the mutual benefit to the home country and to the colony of emigration by the poor, capitalists and workers, to the colonies. While she was opposed to penal colonization as too generous to the convicts, she argued that emigration would raise the ratio of capital to labor in the home country and provide labor where it was scarce in the colonies. Her depiction of the pauper life in Kent would have been recognizable to her readers, but her evocation of life in Van Diemen’s Land (the name originally used by the British for Tasmania) was ignorant fantasy.

It is inevitable in such tales that there is interpretation, incompleteness and partiality. But she always concluded each illustration with a list of the principles to be learned from it.

It is perhaps interesting to understand the difficulty Martineau had in finding a publisher for her *Illustrations*. The Society for the Diffusion of Useful Knowledge, notably James Mill and Henry Brougham, disapproved of the project and would not support her. They argued that it was a mistake to wrap sober, instructive fact up in fictional packages. Even her mentor, W. J. Fox, seemed to object to her prospectus and the advertisement that was to appear in the paper. Fox had met Mill who strongly disapproved of the “dismal science,” as Carlyle called it, being treated in a light and fictional manner.

Martineau proposed the project to several societies and booksellers but no one was keen to take the risk. Nevertheless, Fox finally granted her support for the first two tales and if they sold 1000 copies, she

could proceed with the next. Her publisher was exceedingly pessimistic about it and Martineau was desperate with worry, but the first story immediately sold 1000 copies; more were printed and then more and eventually 5000 were sold.

Her audience was not what she had expected. It included the Chancellor of the Exchequer, Cabinet Ministers and Her Royal Highness, Princess Victoria. She was translated into French and offended the French Royal family and the Russian Czar, and was banned as an undesirable in the Austrian and Austrian-Italian and Russian territories for her views on the French Revolution, and the treatment of Polish exiles by Russia, which also implicated Austria. One of her reviewers declared approvingly that “by these means countenance was given to the vulgar horror with which theory is regarded” (Empson, 1833, p. 8). She was publicly and, in a brutally sexist way, ridiculed for her naive *Illustration* of Malthus’s population principle. Political economy was considered hard-hearted, amoral, and masculine. Martineau had added the dimension of morality to it. *Illustrations of Political Economy* were a huge success but not with the targeted audience: it was thought that they were little read by the working poor.

Martineau was horrified at the prospect that she might be “trapping” readers into inadvertently absorbing her lessons while they read her stories; that knowledge was truly without pain (Martineau, 1832, p. xiii). Did Robinson manage to impart knowledge without pain?

3. ECONOMIC PHILOSOPHY

Most readers of *The Accumulation of Capital*, (1969a) and certainly Robinson’s writing on the capital controversy would say “no.” But were academic economists her only audience? In general her audience was assumed to be at least able to share a background in orthodox and Keynesian economics. Although she used non-technical language and avoided jargon, as much as possible, her audience for *Economic Philosophy* (1962b) was probably mostly tertiary educated.

The book was based on public lectures given at the University of Birmingham. The audience was asked to follow a brilliantly constructed and densely-argued journey through the history of economic thought confronting, in particular, some shortcomings of neoclassical economics and the pervasiveness of ideology in all economic theory and policy. These may be soft subjects, perhaps suitable to a woman economist, but pursued unrelentingly. All aspects of neoclassical theory were treated with a piercing sense of irony, which eased the force of her argument to its conclusion.

Nor is Robinson redressing the gendered metaphors of science, theory, reason or knowledge; she operates entirely within these. Perhaps her argument suffers because of these constraints. Whereas for the earlier women, political economy was a moral science, economics is initially presented to Robinson as formally independent of morality. She has to find some way of reintegrating morality into the realm of study. Her own science/ideology divide is, in effect, a rejection of that very conception and a call for the recognition of their necessary integration. This outlook is certainly shared with both Marcet and Martineau.

What issues did she identify in *Economic Philosophy*? *Economic Philosophy* is both a study of theory and a study of methodology. Robinson distinguishes between Popperian science and metaphysics, accepting falsification as the demarcation. But she did not hold that an ideological dimension to proposition or theory necessarily diminished its status. Her major theme was the ideological nature of economic theory and in particular neoclassical economics, which “has always been partly a vehicle for the ruling ideology of each period as well as partly a method of scientific investigation” (Robinson, 1962b, p. 7)⁷ “Any economic system,” she wrote, “requires a set of rules, an ideology to justify them, and a conscience in the individual which makes him strive to carry them out” (Robinson, 1962b, p. 18). It is from the ideology that the questions arise. Taking a particular economic system as given, its technical features can be described in an objective way; but, it is not possible to describe a system itself without moral judgements creeping in. “This theme is illustrated by reference to economic ideas in an attempt to puzzle out the mysterious way that metaphysical statements, without any logical content, can yet be a powerful influence on thought and action” (Robinson, 1962b, p. 25). And so although she maintained a sharp conceptual distinction between science and morality, she argues that in practice both dimensions operate.

Economics could aim to be more scientific if it were only aware of its implicit biases and these are what she intends to identify in the course of the book.⁸ “Scientific” referred to the propensity of the discipline to generate refutable hypotheses. Yet she argued, “Economists have not

⁷The controversial nature of values in economic theory was not new in Joan Robinson’s mind. In 1937, in her *Introduction to the Theory of Employment* (1937a) she included a chapter of reflections on the nature of controversy, concluding the book with the observation that this book was itself free of controversy.

⁸Clarence Ayers wrote to her on 17 October 1963 that “Certain items in your *Economic Philosophy* astonished and dismayed me. In particular...(3) your apparent dismissal of value judgments as having no general intellectual validity...Thus my position...Is that we do in fact make value judgments (of good and bad, right and

yet established an agreed standard for the disproof of an hypothesis. To make matters worse, this introduces a personal element into economic controversies" (Robinson, 1962b, p. 28). Popper had argued that a criterion of truth was not possible and thus Robinson concluded that in economics, some hypotheses were, simply, irrefutable.

Having set out her premises, she proceeded to examine the concepts of value and utility. She exposed the value-ridden concepts and arguments that characterized neoclassical theory in its many manifestations. She identified aspects of Keynes's argument too as containing ideological elements, but she saw the fundamental principle of neoclassical economics, *laissez faire*, as always promoting and justifying the *status quo*. Whether it was justifying production of pollution-causing consumption goods, an unequal distribution of income within nations and also between nations, or luxury consumption in the face of poverty, or free trade for post-war Britain, *laissez faire* in the twentieth century represented privilege as it had done in the eighteenth. Here the connection to the themes of Martineau is direct.

The theory built up to justify it was empty of operational concepts and hence could not give rise to policies, and was centered around one particular, stagnant, concept: equilibrium. The concept of equilibrium she saw as particularly troubling when one acknowledges that the "position of equilibrium...is shifted by the very process of approaching it" (Robinson, 1962b, p. 79). This was a critique of the concept and a critique of the method.⁹ Keynes, she argued, had shifted economic theory off this block on to an edifice in which equilibrium was displaced by testable hypotheses and in which public intervention was legitimized by the new goal of "full employment." But even full employment was tainted by political interest, as Kalecki had shown in his political trade cycle (Kalecki, 1943). And even the scope of public investment policy, undertaken to absorb the slack left by inadequate private spending, could encompass arms expenditure.¹⁰ Why, she asked, should public investment play the passive mop? Public investment typically provides public goods that are difficult to individually price, but they are no less

wrong) and define values on the basis of knowledge and understanding of facts" (JVR, vii/46).

⁹For more on the critique of equilibrium, see the chapters by Harris, Dutt and Skott.

¹⁰"[N]ever before has so great a proportion of economic energy and scientific study been devoted to means of destruction. We combine doctrines of universal benevolence with the same patriotism that inspired the horsemen of Ghengis Khan" (Robinson, 1962b, p. 120).

necessary for a decent life than myriads of wasteful consumer items that have to be advertised to find a market for them.

Her arguments were not in terms of the falsifiability of theories, but rather she subjected them to rational criticism in their own terms. Caldwell (1991) suggests that Popper, when discussing critical rationalism, advocated a methodological pluralism, a criticism appropriate to the problem at hand. This is what Robinson did in her critique of utility or *laissez faire*.

And it is about a better life that she is writing. In this she re-presents Martineau whose mission, as we have seen, included helping the working poor to better themselves through an understanding of how the economic system actually worked. In this, Robinson also shared a strong belief in the power of knowledge. She argues that the social scientist has a professional commitment to faith in the power of reason. With a humane sense of values she expected that when people see the problem as she expounds it, they will want to act as she believes they should. The fact that this has not been so does not mean it was of no use to discover the principles concerned. Robinson quotes Keynes: "Our problem is to work out a social organization that shall be as efficient as possible without offending our notions of a satisfactory way of life" (Robinson, 1962b, p. 54). She pursues this theme later in *Freedom and Necessity* (1970a).

While the nineteenth century writers thought that a better understanding of the principles of political economy could lead to social betterment, Robinson thought that the dominant theory served an unjust ideology and required criticism. A major theme in *Economic Philosophy* is a critique of neoclassical theory in pursuit of a better theory to inform policies and direct society in a "more satisfactory" direction. There are some sub-plots in her narrative and her grounds for criticizing that theory were varied. She makes several jibes at mathematics in economics, formalization as confirmation of truth or validity.¹¹ She also included what was to become a dominant theme in the years to come, a critique of the method of using comparisons of different positions to analyze a process of change or accumulation. And associated with this, she

¹¹"Logical structures of this kind have a certain charm. They allow those without mathematics to catch a hint of what intellectual beauty means. This has been a great support to them in their ideological function. In the face of such elegance, only a philistine could complain that the contemplation of an ultimate stationary state, when accumulation has come to an end, is not going to help us very much with the problems of today" (Robinson, 1962b, p. 61).

mentioned the fact that Keynes's theory had enabled history to be introduced to economic theory. She raised the problem of path-dependence and the identity, indeed existence, of long-period equilibrium. Another theme that reappeared in each of the three books is her despair at the extent of government expenditure on arms. In this she is at one with Marcet and Martineau.

Certainly she extended Marcet's and Martineau's expository roles to develop a series of critiques of the orthodox theory. Whereas the nineteenth century women were conservative interpreters of the dominant theory, Robinson in her interpretation was pure critic: she saw that neoclassical economics was an idea that was intellectually unsatisfactory. She was not arguing that neoclassical economics was flawed because of its ideological dimension, rather, that neoclassical economics *is, first of all*, an ideological construct and has to be seen as such.

Secondly, the theory was flawed because it did not work—persistent unemployment in the 1930s had demonstrated that; persistent balance of payments problems revealed the outcome of *laissez faire* in trade. Indeed, she had argued, rather tenuously, that pursuit of *laissez faire* in the 1920s had led Britain to mass unemployment. Thirdly, it was flawed because its arguments were flawed. Neoclassical theory lacked realism in its fundamental assumptions. Consumer behavior was in reality interactive and involved learning while the neoclassical model assumed isolation, independence and certainty. There were significant external diseconomies of consumption, as well. And, of course, the basic conception of capital denied the obvious: capital was, is and will always be nothing but a collection of heterogeneous machines, the aggregate value of which is subject to changes in relative prices as reflected in the bargaining between capital and labor. Above all, static theory was the most unrealistic; reality was in constant flux, change that theory often ignored. Moreover, more than an oversimplification, neoclassical theory was a misleading distortion of the realities of capitalism as she saw it. Contradictory processes were much more pervasive than arising from “time to time” as Keynes had thought; these were contradictions that arose in the daily vicissitudes of capitalism.

She revealed all these problems with wit and irony. While Marcet and Martineau used illustrations and moral tales to win over the attention of their readers, Robinson employed irony. She left the formal style of pure theory for an informal, intuitively argued prose. But, for all her irony, she was not entirely negative in this book. She sees that Keynesian theory can at least generate refutable hypotheses, insofar as any hypothesis in economics can be refuted. And in the area of economic growth, her own

theoretical turf, she sees that there are many unanswered and challenging questions to investigate. In this respect too, she goes much further than her Victorian forebears in suggesting new ideas for theory.

Yet the book did not create the controversy she might have hoped for. Why did the book fall on deaf ears? The tone of the book is, as I have said, ironic and irony does not have the same force as logic in an argument carried out in the realms of “science.” While it may sway or antagonize, irony will not usually convince. But she also introduced anomalies and logical problems with the neoclassical theory. Some the theory has had to confront over its years and has responded to by introducing special cases, special theorems, resorting, as she observed quoting Wicksell on Walras, to “mathematical formula [for] the very arguments that [were] considered insufficient when they were expressed in ordinary language” (Robinson, 1962b, p. 94).

The book was reviewed, including in the *Economic Journal* and *American Economic Review* as well as in social science journals. But its criticisms were not taken seriously, and in two cases the book was referred to as “this little book.” Boulding referred to “this remarkable little book” as “Economics Recollected in Tranquillity” (knowledge without pain?) that it is clearly not (Boulding, 1963, p. 8). He further referred to her “brilliant little paragraph” (on the proposition that all men are equal). Another reviewer, states that “It is this melancholy question [what is the use?] that dominates this compact, witty and suggestive little book that might well be called ‘A Brilliant Woman’s Guide Away from Economics’” (Baran, 1963, p. 4).

If I might presume to reply for Robinson, while the book is indeed compact, witty and suggestive and written by a brilliant woman, she was not directing her criticism at economics as a discipline but at neoclassical economics as a body of theory. Baran also accuses her of putting too much weight on the role of ideas in shaping history, rather than of interests. But surely it is interests she is describing when she discusses any capitalist structure? Dickinson, furthermore, in the *Economic Journal*, referred to the book as “*une oeuvre de haute vulgarisation*,” which, following eminent predecessors, she managed to pull off!

Like her nineteenth century predecessors, Robinson was attracting notoriety with her writing. Marcet’s *Conversations* had been benign but Martineau had some hostile reviewers. Their views on theory were largely uncritical, but Martineau was accused of “outrageous” views on policy, particularly on population control.

4. AWKWARD ECONOMICS

Marx showed how capitalism contained its own contradictions. Robinson, in *Economics: An Awkward Corner* (1966b), took on Marx's method and showed the forms that these contradictions took and the resolutions of them in Britain over the twentieth century. She opens the book with the following words: "It is impossible to understand the economic system in which we are living if we try to interpret it as a rational scheme. It has to be understood as an awkward phase in a continuing process of historical development" (Robinson, 1966b, p. 11). At its most basic these are contradictions between capital and labor and between different capitals. Overwhelmingly, "The notions of *laissez faire*...are contradicted by the evident need for planning to maintain 'a high and stable level of employment.'" The notion that property confers obligations to justify privilege is contradicted by the separation of ownership from control... The notion that governments have only to see fair play between employers and employed is contradicted by the requirements of control over money incomes and prices. The notion that the free play of supply and demand produce a viable system of international trade is contradicted by the payments crises..." (Robinson, 1966b, p. 16).

She further extends this theme in pointing out a contradiction in *laissez faire*, that the ultimate outcome of competition is monopoly; that the competitive process is one of absorbing all the competitors in order to control the market. This tendency of competition to create non-competitive forms tends then to restrict output and raise prices. The process of competition itself generates waste in large expenditures on advertising, which raise costs and prices. *Laissez faire*, then, cannot lead to maximum/optimum output and efficiency, if it produces its opposite.

Furthermore, in the process of undertaking public investment, to compensate for the gap in employment left by *laissez faire*, the state engages in large expenditures on arms, which wastes resources and ties up skilled labor. Her views on arms expenditure are condemnatory. "The effect of the Cold War, in USA, has been to permit the 'military industrial complex' to consume a great part of the fantastic productivity of American industry thus keeping up prosperity and fending off depressions without having to resort to any means that challenge the principles of *laissez faire*. For the British economy it has been not helpful but disastrous. Expenditure on armaments absorbs as much as the whole of industrial investment in money terms and takes a more than proportionate share

of high technical skill and scientific ability. This has weakened our competitive power to an extent that cannot be estimated" (Robinson, 1966b, p. 26).

To Robinson the most striking anomaly is one of apparent injustice, that the massive accumulation of wealth of the nineteenth century—early twentieth century could only have occurred with the vastly unequal distribution of wealth and income that prevailed. But with the end of World War I, this easy accumulation was over. *Laissez faire* was capable of generating mass unemployment and a balance of payments deficit and showed no tendency to correct the situation. This downward spiral occurs when competition tightens margins and reduces profits, reduces investment and so productivity growth is slow, costs are higher than they otherwise would have been, effective demand is low and employment declines. The downward spiral has set in. With costs higher, exports are less competitive, imports are attractive and the balance of trade moves against Britain. To try and rectify the balances situation by raising interest rates and acting on the exchange rate, will only discourage investment more and exacerbate the downturn. Prior to the war, raw materials had been imported for manufactures, which were then exported and a balance had prevailed. But as imperial preferences broke up, the ex-colonies found that they could produce the manufactured goods themselves, more cheaply, and so they out-competed Britain's manufactures both domestically and abroad. The era of untrammelled accumulation of British capital was over. The very existence of capital implied that the saving that had justified the unequal distribution of income was in fact now harmful to the process of accumulation.

Since World War II, Britain, informed by Keynes, had pursued a full employment policy; in this supported context *laissez faire* can be accompanied by full employment and inflation. The free play of supply and demand forces, if it is associated with full employment, can also lead to rising money wages and prices spiraling. A high rate of inflation makes exports uncompetitive and imports cheaper and so creates a balance of payments strain. Once again, *laissez faire* delivers a problematic outcome.

One plea that Robinson makes throughout this book is for the primacy of full employment policies. Unfortunately, she observes, the choice of what employment will be for has been left to the market to decide and "the old *laissez faire* doctrine, that what is most profitable is best [has] reasserted its sway. Once full employment is reached it is not easy to shift the direction with only the instruments of policy which the new orthodoxy permits" (Robinson, 1966b, pp. 47-8). She points to the

wastage and suffering of a generalized deflation, for example. Another option is to reduce military expenditure overseas. Once full employment is achieved, growth can be the new goal. Growth enables more controversial decisions about the distribution of income to be abstracted from as the benefits are felt at all levels. But she will not let it rest there: "The ideology of growth is designed to prevent us from asking what we want to do with it" (Robinson, 1966b, p. 51). She has definite views on this: growth is to reduce poverty and finance public expenditure on social infrastructure.

The rising tensions between capital and labor, and the competitive position of Britain in the world market have been tackled by introducing incomes policies and, to a lesser extent, price controls. Robinson, while a critic of *laissez faire*, nevertheless follows Keynes in her defense of the capitalist system. But she favors institutions that are adapted to the tensions of the system to facilitate it rather than bring it down. She suggests a strategy involving institutional changes as well as policies. Primary among these is incomes policy. Incomes policy would maintain the relative wage structure and grant growth in real incomes tied to average productivity growth for the economy. Allied to this is a progressive taxation system with high profit taxes and low wage taxes. She also favors the public ownership of some large companies producing for the private market, and of strategic service production.

Politically, her hope for Britain lay in it settling to be a small country that is devoted to neutrality and peace. While drawing on the resources tied up in military expenditure, it may be necessary to curtail growth of consumer expenditure for a time, get the balance of trade in order, pay off short-term debt to clear sterling and overcome the worst domestic poverty. These are the priorities before achieving domestic growth. There are, as well, two global problems—third world poverty and its population growth and "American crusades."¹² But Britain is powerless to do anything about these.

Following the tradition of Marcet and Martineau, *Economics: An Awkward Corner* was a book that tried to help people make sense of the apparent injustices of the system in which they lived. It did so without resort to the formal language of economics and addressed issues pertinent to the struggles of ordinary people. It was also a nationalistic book, addressing Britain's woes in the mid-1960s. It was little reviewed or publicly discussed and perhaps it was disappointing to her to be so

¹²Clarence Ayers asked her "Why are you so bitter about the USA? Granted there is a hole in the doughnut; there is also a doughnut around the hole" (JVR, vii/46. 12.11.62).

ignored. She moved in this book between being a critic of the theory of *laissez faire* and a critic of the injustices and contradictions of its practice. As such, the book was a political statement. While the market had overseen tremendous growth and rise in living standards, it had become something that needed management in the twentieth century.

The three writers would, however, have held differing views on the role of the state in economic affairs. Martineau, for example, is in favor of control over rents to protect the poor from the slum landlords, and state financed education for the poor (see for example, "A Manchester Strike"). But Robinson goes much further and advocates state owned industries in basic needs, state education and health. Marcet, on the other hand, argued "An injudicious interference of government, for instance, may give peculiar advantages to the employment of capital in one particular branch of industry, to the prejudice of others, and thus destroy that natural and useful distribution of it, which is so essential to the prosperity of the community" (Marcet, 1816, p. 389). Both Marcet and Martineau were avidly opposed to poor relief except in extreme cases; the capital saved by not offering relief could then form part of the wage fund. Marcet quoted Townsend: "undistinguished benevolence offers a premium to indolence, prodigality, and vice" (Marcet, 1816, p. 156).

In her third book she moved on to examine that system with even greater scrutiny.

5. FREEDOM AND NECESSITY

It is "the interplay of consciousness with environment, of freedom with necessity, which is the characteristic of human life" (Robinson, 1970a, p. 23). Once again it is a contradiction (real opposition) that informs her argument.

In this book, *Freedom and Necessity: An Introduction to the Study of Society*, she was again writing to an educated audience, probably of social scientists, including economists, although not necessarily so. This was her most ambitious popular book. It opened with the challenge: "This book is intended to provoke enquiry." The function of the social sciences, she argued, is to raise self-consciousness. In pursuit of this the economic interpretation of history is an indispensable element in the study of society. Like Jane Marcet, 150 years before, she was seeing the study of economy to be a study of the history of civilizations. She examined many early societies and noted "examples of how economic rationality for a community can be preserved as a by-product of beliefs and emotions in the individual which have no economic meaning at all" (Robinson, 1970a, p. 29). She asks for an awareness of those patterns of

values that evolve to explain what is and to preserve its identity. “The task of the social scientist is to reassert morality over technology,” that is, over economics.¹³ The book undertakes an historical survey of communities of animals and birds as well as of humans to range over the immense variety of ways in which the fundamentally economic questions of survival had been made manifest and been resolved. Within this vast span lay industrial capitalism, the most recently evolved social construction. And coexisting with the various forms of capitalism were forms of socialism, not so much the successor of capitalism as an alternative means of industrializing poor, agricultural nations. Robinson takes as her subject the study of society, and sees it as a form of metatheory, a study of the practice of ideologies. She argues that “value judgements” are endemic in the social sciences, that it is a self-deception to believe that one is ever purely objective. But some notions of morality are universal and it is not impossible for an honest person to understand another whose ideas were formed in totally different traditions.

What she demonstrated in the display of societies was that each faced the same fundamental (economic) need for survival but that many, many solutions had evolved and pursuit of money-making was only one, and a relatively recent one, of these. The new feature that capitalism legitimized was the elevation of making money for its own sake to a respectable business. Robinson’s is the voice of reason; she had warned that economists “need to combat, not foster, the ideology that pretends that values which can be measured in terms of money are the only ones that ought to count” (Robinson, 1970a, p. 137).

Ultimately, Robinson was a critic of capitalism. She was critical of its tendencies to slumps and unemployment, to wasteful consumerism, to inequalities and in particular she is very critical of its wasteful expenditure on the arms industry. Marshall argued that industry sets all men working for the social good. But under *laissez faire* capitalism there was the huge development of an arms industry (Robinson, 1970a, pp. 71, 84-6). Here is a politically acceptable way for the state to undertake its expenditure in a field that does not produce anything for sale and so does not compete with private capital for its markets.

Her remarks on capitalism may invoke a mood of despondency. But, on the contrary, she has, throughout her discussion, comments on what features of both capitalism and of socialism would contribute to make

¹³An example of the way in which technology, in the guise of economics, had dominated morality was the presentation of an argument for improved health services in terms of lost production due to sickness, or the construction of human capital as a concept.

a good society. For example, she sees in capitalism the tremendous potential for growth and accumulation and so the prospect of ridding the society of poverty. Although an unequal distribution of income may stand in the way, taxation could, to a large extent, redistribute income appropriately. Taxation implies a much larger role for the state. But this she admits. The economy could be more stable with public investment in fundamental industries such as energy, transport and steel: with necessary consumer industries operating without the advertising, with a welfare state but also a market system in most goods and services and with managed trade between countries. Socialism provides the possibility of stability and planning and reduces some of the waste of a *laissez faire* economy.¹⁴ This book inevitably raises the questions of what rules would best direct our society? What are the implications of a more egalitarian distribution of income and of wealth, of raising the education level of all, of nationalizing transport?¹⁵

The outcome of her study of societies was a consciousness of the role of ideology in directing each society and of its implications for the members of that society. At the moment our society is being led by technology in every sphere, including knowledge. The mathematization of economics is an example of the attempt to take over the study of a field of knowledge by a constraining technique. We have seen in her own survey, non-technical, intellectual feats—revelations about a whole range of basic evolutionary economic practices. It is only in modern times, Robinson argues, that technology has come to dominate as the moral authority.

6. A ROBINSONIAN DIALECTIC?

Can we place these three books into a coherent framework? In fact, her methodology develops over the course of the three books. In the first book she examined the role of ideology in theory; in the second she examined the contradictions that put into motion a society reflecting that theory; in the third she examined the evolutionary process that bears alternative social structures and alternative ideologies. The first book was clearly Popperian in its distinction between science and ideology. In the second and third books there is a change in her methodology and the relationship between these two aspects of knowledge becomes

¹⁴She remarks “It is much easier to alter the content of correct conduct for people trained in such a view of life than to introduce the concept itself among people imbued with cynicism and grasping competitiveness” (Robinson, 1970a, p. 104).

¹⁵She is particularly intolerant of forms of wealth such as land and shares, which privilege their owners to an income for no effort.

blurred.¹⁶ In studying society she is doing more than offer an interesting tour through history; she is exemplifying an evolutionary method of analyzing her own contemporary society, offering concepts and relationships to this end. The books followed a method of historical materialism and dialectical process. In particular the second and third books reveal an argument that progresses by a series of contradictions and resolutions. Setterfield (2003) identifies a post-Keynesian dialectical process that opposes an urge for security and continuance of institutions with a psychological urge to innovate. It is the presence of uncertainty that harbors this dual and it is individual behavior that motivates movement of the process. This is as compared with a Marxist process in which it is class conflict that provides the dynamic. For Marx, the dialectical process is rooted in material conditions—the tensions between forces and relations of production—at the point of production. So the dialectical process is an objective process. The opposition of conflicting forces transforms the whole of which those forces are part. For the post-Keynesian dialectic the sociological tendency to conform with existing institutional structures is compatible with innovative psychological tendencies. In Setterfield's terms they were Marxist features of Robinson's method rather than post-Keynesian. Although she did envisage the entrepreneur as possessor of animal spirits, it was as a member of a competitive class rather than as individual. Her *Freedom and Necessity* addressed the historical transformations of society as its very object. Her study then revealed what she referred to as adaptive and also exploratory behavior. Some exploratory behavior was successful in its pursuits of better survival and became adopted, adapted and itself subject to pressures for change. Her process is very clearly thesis, antithesis and synthesis.¹⁷

For Robinson, was there a contradiction between her seemingly Marxist method, her historical materialism and dialectical dynamic on the one hand and her Popperian view of the progress in science and her depiction of the science/value split on the other?¹⁸ As I have pointed out

¹⁶“When two economic theories differ in their ideology the most important distinction between them lies in the sphere of political action, but the best sport that they offer is to trace the difference in their ideologies to its roots in a difference in the logical structure of the systems” (JVR, i/16.1).

¹⁷She stated: “But I want you to think about me dialectically. The first principle of the dialectic is that the meaning of a proposition depends on what it denies. Thus the very same proposition has two opposite meanings according to whether you come to it from above or from below” (JVR, i/16.3/11-12).

¹⁸“To pretend to have none [values] and to be *purely objective* must necessarily be either self-deception or a device to deceive others” (Robinson, 1970a, p. 122, emphasis in the original).

above, her views changed over the period of the three books. Recall her opening words to *Economics: An Awkward Corner*: “It is impossible to understand the economic system in which we are living if we try to interpret it as a rational scheme” (Robinson, 1966b, p. 11). To preface her book with these words is to declare her position on the nature of economic theory as science. Each society generates its own rationality, she argues; it always seeks to justify itself in its ideology. While some aspects of its rationality can be formulated into refutable hypotheses, many other aspects cannot. Robinson's economics explicitly embraced the political dimension of theory.

Robinson was also influenced by Myrdal in her account, and refers to five of his works in her sources for *Freedom and Necessity*.¹⁹ Myrdal (1953) argued that facts do not organize themselves into concepts and theories just by being looked at; indeed, except within the framework of concepts and theories there are no scientific facts, only chaos. Questions must be asked before answers can be given. “This implicit belief in the existence of a body of scientific knowledge acquired independently of all valuations is, as I now see it, naïve empiricism” (Myrdal, 1953, pp. vii-xii). Robinson believed that values pervade all levels of the analysis, not simply the choice of goals. They are part of the process of creating knowledge.

To maintain this split, or these categories, science versus values, is inconsistent with her view of the world as eternally undergoing endogenous and complex change; with the view that theory changes the world just as moral systems change it and then evolve from it. Values also change in response to new situations. Human values, moral codes “are” for her just as the physical world of economy “is.” “Science,” as that which is established through refutable hypotheses, is only one part of knowledge.²⁰ Robinson argued that knowledge was constructed, its models not impartial (Henderson, 1995).

The viewpoint she argues is one that includes dimensions of experience previously denigrated by scientific practice, such as change, emotions and the sense of moral and aesthetic value in the reality to be studied and

¹⁹In reviewing *Asian Drama*, she observed that “At one level the book is an essay in the methodology of the social sciences” (JVR/ii/11).

²⁰Perhaps she heeded the opinion of a much earlier correspondent, Allen Flanders. “The strongest impression your book [EME] left in my mind was the confirmation of previous conclusions that economics has advanced to a very small extent as a science. Is it perhaps not a mistake to consider it as a science, or at least only as a science. Is it not like politics an art? In all human relationships there are so many factors at play that we can only judge the probable effects of certain causes by a kind of intuition which is however, based upon accumulated experience” (JVR/vii/140; 2.10.42).

in the reality to be created. The position is one of combating the “passion for dispassion” (Nelson, 2003, p. 57). The single-minded pursuit of detachment leads to irrelevance. Robinson does not abandon economics because it is ideological, rather she appeals for a self-consciousness. It is a complementarity of methods, a dialogue between distance and attachment, that is needed. This new scope introduces the possibility of improving the process by which economists assess contending theories.

Robinson was concerned with ethics, with the way people lived their lives. She broke down the science/value dichotomy revealing the interconnections between systems of thought and morality, opening the possibility for intuition, for concrete example and for the particular to be part of the economist’s method. Like Harriet Martineau, she was not afraid of the dimension of morality that pervaded the study of political economy.²¹

For Robinson, the scope of “the economic” goes beyond the market to investigate basic survival needs including the reproduction of the society. This society is not a simple aggregation of isolated individuals. At the same time her study of society is not an example of economics imperialism (Thurow, 1977; Harcourt, 1978; Fine, 2000) as she distinguishes the economic behavior from the non-economic that arises, for example, once a society produces a surplus. She demonstrates, through her own historical study, that the categories of economics should themselves be historically and socially delimited and determined.

7. CONCLUSION

In these three books, Robinson abandoned the traditional model of economics. Firstly, she extends the boundaries of the subject. She does so not only by going outside orthodox economics but also by going into anthropology, sociology, history and politics for her material; she broaches the subject of ideology. Secondly, she uses a methodology that

²¹Dobb, in a letter to JVR on 31 January 1941 stated “I feel that the ‘poetic’ element—shades of meaning inherent as it were in style, construction, emphasis—is important in all economic languages certainly, and perhaps in all languages outside the rarest and most refined discourses of Logical Positivists. This is just what gets lost in translation from one poetic convention into another. And most of it, I suggest, is *not* just irrelevant ‘moral’ stuff, but is concerned with the *slant* that theory has on reality—with the completeness or incompleteness of the picture of the real world it affords, with the perspective and ‘projection’ and dimensions it is employing, with what it throws into relief as causally important and what it relegates to the shade. Whether these meanings could or could not ultimately be reduced to a propositional system I don’t feel competent to say. But I feel quite sure they usually can’t be rendered in half-a-dozen or a dozen simple propositions” (JVR/vii/120/12 31.1.41).

is anarchic. She uses examples or particular situations to illustrate her point, she uses the concrete rather than the abstract. She abandons the purely rational, mathematical, self-interested, singly driven autonomous being and constructs instead an alternative explanation using reason, intuition, social classes and mutuality or interdependence between entities who were unequal in their power and held conflicting interests. She brought to economics features of an approach to knowledge that are more commonly associated with pluralist thinking. She directs attention to areas of applied study and then establishes a practical approach to study them rather than assume an *a priori* approach. Furthermore, she not only dismisses the theory of *laissez faire*, she also rejects its practice and advocates a mixed, welfare state/planned market economy.

The economics that Robinson presented was very different from that of Martineau and Marcet: the societies of which they wrote were vastly different in detail. But the women were similar in their views of the scope of the subject and Robinson can easily fit into their view of what comprises political economy. Her construction of society as comprising conflicting interests is also consistent with the earlier view.

Baran, in his review of *Economic Philosophy*, suggested that the criteria by which an economist’s work should be judged include the impact exercised on the consciousness of society, the part played in the social and intellectual tensions of the time and the measure to which the economist’s efforts advance (or sideline) the clarification of the conditions for and requirements of a more rational and more humane economic and social order (Baran, 1963). These were exactly the criteria that Robinson addressed in these three books. Yet these books were not widely influential. Perhaps Robinson places too much faith in the power of reason. Perhaps Robinson misjudges her audience, expecting from them a greater familiarity with the theories she criticizes and hence an ability to draw from her sometimes stylized presentation of their features the implications of these often terse remarks. Based on such a summary, even caricature, a critique such as she makes can be more easily dismissed. Without an understanding of neoclassical theory, for example, her reference to a lack of a concept of capital is lost. She demands that her reader absorbs and understands every word, to be aware of the nuances and allusions and to follow the force of the argument. And much of what she says confronts, sits uncomfortably with the reader who is a narrow specialist.

What of Joan Robinson’s messages is still relevant? She finished each book with a reassurance that despite her gloomy critique of the *status quo*, she was optimistic for the future. She wanted more people to think

about issues of social justice. Her books are now more than 40 years old, yet their themes still resonate today. Her warnings on the arms race and the waste of resources on arms expenditure, the resort to war to resolve disputes, on *laissez faire* capitalism, on the “American crusade,” her concern for external balance and trade relations, for poverty in developed as well as developing countries, are all as pertinent now as they were then and solutions are equally elusive. Robinson used abstract, highly deductive logic in most of her work. In these three books she ventured out of the model of science to create a different genre. But it is not knowledge without pain—she is insistently challenging and provocative.

5. Robinson on “History versus Equilibrium”

Donald J. Harris¹

The long wrangle about “measuring capital” has been a great deal of fuss over a secondary question. The real source of trouble is the confusion between comparisons of equilibrium positions and the history of a process of accumulation.
—Robinson (1978a, p. 135)

A model applicable to actual history has to be capable of getting out of equilibrium; indeed, it must normally not be in it.
—Robinson (1962a, p. 25)

To construct models that cannot be applied is merely an idle amusement. It is only by interpreting history, including the present in history, that economics can aspire to be a serious subject.
—Robinson (1980a, p. 90)

1. INTRODUCTION

In her well-known essay entitled “History versus Equilibrium” (Robinson, 1978a, Ch. 12), Joan Robinson discusses the uses of the concept of equilibrium in economic theory and its relevance to analysis and understanding of the actual historical process of accumulation in the capitalist economy. A sharp distinction, indeed an opposition, is drawn between “history” and “equilibrium.” It is a recurrent theme that runs throughout her later writings. In these writings, she expressed a great deal of skepticism of the historical relevance of the equilibrium concept in its various manifestations and mounted a trenchant critique of the orthodox economic theories associated with it.² It is a subtly layered argument

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²One of the earliest written statements of her views on this subject is in the 1953 “Lecture delivered at Oxford by a Cambridge Economist” (Robinson, 1973a, Ch. 27). Among her Cambridge colleagues, Kaldor was perhaps the first to go public with a systematic critique of the use of the equilibrium concept in orthodox theory (see, for instance, his two papers of 1934 in Kaldor (1960, Chs. 1 and 2)). Robinson acknowledged that her “ideas were formed in a long series of debates with . . . Kaldor . . . though he did not always approve the use to which I put them” (Robinson, 1956a,

that she made, which had the potential of being mistakenly interpreted as a blanket dismissal of what others have called “equilibrium economics.” She sought to counter this effect in a spirited defense of “The Relevance of Economic Theory” (Robinson, 1973a, Ch. 12) addressed, in part, to “the radical economists . . . in American universities.”

Though critical of the concept and uses of equilibrium, Robinson was not a “Luddite.” She was too diligent and penetrating an analyst to dismiss the advantages, albeit recognized to be quite limited, of using the equilibrium concept as a tool for analytical purposes. She herself used the device to great effect in her own work. She viewed it, at times, as a “thought experiment,” useful for solving “analytical puzzles,” even to the point of recognizing a “perverse pleasure” in this practice (Robinson, 1956a, p. 147, n. 3). She also thought: “It is useful for eliminating contradictions and pointing towards causal relations that will have to be taken into account in interpreting history” (Robinson, 1980a, p. 90). Moreover, she was fully convinced of the power of abstraction in economic analysis: “A model which took account of all the variegation of reality would be of no more use than a map at the scale of one to one” (Robinson, 1962a, p. 33). At the same time, she insisted on the historical specificity of the analytical problem at hand, hence the need to develop relevant and realistic economic theory, without seeking to minimize the inherent problems involved in so doing. The object of analysis, she continued to insist, is the capitalist economy, in which “the capitalist rules of the game” constitute the defining order of things, and this reality imposes requirements on the analysis in order for it to be meaningful and relevant.³

Robinson’s endeavor to expose a lacuna between “history” and “equilibrium” constitutes a significant plank in her overall critique of orthodox economic theory. It also goes beyond the hornet’s nest she successfully exposed in her celebrated critique (Robinson, 1978a, Ch. 8) of the treatment of “capital” in neoclassical theory. Indeed, it is evident that she

p. vii). For a discussion of some implications of Kaldor’s stated views on “equilibrium economics”, see Harris (1991). I am prepared to argue that Robinson’s critique is ultimately deeper and more far-reaching, and her practice more consistent, than that of Kaldor, but that will have to be the subject of another paper.

³She spent the first six chapters of her magnum opus (Robinson, 1956a) elaborating in great detail the meaning of this presumption as the starting point of the full-fledged analysis presented there. In the follow-up work (Robinson, 1962a), she starts out with a sharp distinction between two types of economic theory: one appropriate to a society of independent property owners, each specialized in producing particular products, the other a hierarchical class-society of property owners and workers.

considered the latter a secondary matter, as in the first quote cited above. To be properly understood, this endeavor has to be seen, in my judgement, as subsidiary to a larger and more positively oriented effort. That is: her “long struggle to escape” from the confines of the (neoclassical) intellectual tradition of Marshall, Wicksell and Walras, in order to advance the project of the Keynesian revolution, with the aid of insights gained from a critical reading of Marx, towards a “theory of the dynamic development of capitalism.” She took seriously, and as a life-long commitment, the task of carrying on this effort, readily acknowledged the analytical difficulties involved, and offered significant clues on how to proceed.

I argue in this chapter that, instead of a closed circle of equilibrium relations, universally applicable and independent of time and place, Robinson sought to develop a system of analysis that is more eclectic and open to history in a very definite sense. Indeed, the hard core of her work is really an attempt, brilliantly executed, and without resort to mathematical wizardry, to outline an alternative approach to economics that provides a way of understanding economic history in all its richness and diversity. She herself did not manage to advance this approach to any significant extent. Much work has been done since then that strongly bears out her concerns, advances her effort, and serves to clarify and give deeper insights into the nature of the problems she posed. These problems remain until today the most challenging in economic theory.

2. THE CANONICAL NEOCLASSICAL MODEL

In order to provide a specific analytical context and meaning for Robinson’s concerns, it is useful to consider the construction that has long been taken to represent the essentials of the neoclassical theory of capital accumulation.⁴ The central idea is that of accumulation as a dual process of “deepening” the structure of capital and of capital-“widening,” that is held in check by rentiers, impatient to consume their income, who must be compensated for the cost of foregoing present consumption. The core principles of this construction were originally put together by Wicksell. Hence, it is often referred to as a “Wicksell Process” (Robinson, 1962a, pp. 102-3, 132-5). It has been passed down by many different routes, with added complications, to modern day practitioners.⁵ A special case

⁴A more detailed elaboration of this construction and dissection of its underlying properties is presented in Harris (1978a, Ch. 9; 1980; 1981).

⁵The Fisherian tradition represents a different line of descent (from Irving Fisher, 1907; 1930) within the same neoclassical family. In its original version with a multiplicity of physical capital goods, it is not capable of easy interpretation as a process

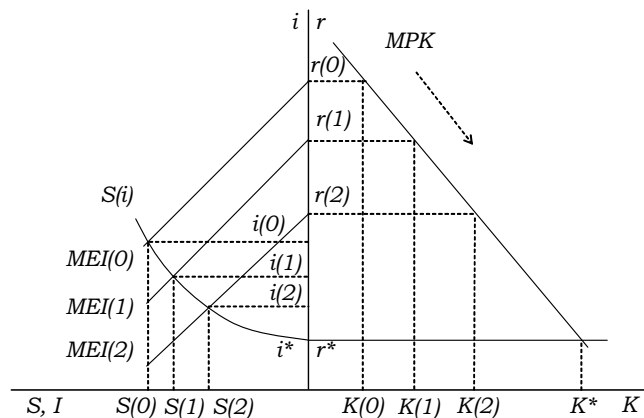


Figure 5.1. Capital deepening

of it, its most recent vintage, is found in the well-known neoclassical model of economic growth (Solow, 1956; Swan, 1956; Meade, 1961) that launched a vast industry of theoretical and empirical research.⁶ Samuelson (1962b, 1966) sought to give it a firm theoretical foundation in a “parable” that was subsequently undercut by the theorems on “reswitching” and “capital-reversal” in capital theory. Yet, oddly enough, it continues to occupy a central place in numerous scholarly efforts to explain actual historical processes.

To simplify the exposition, the idea of “capital deepening” is illustrated in Figure 5.1. In order not to test the patience of the careful Robinsonian reader, note immediately that, in this story, capital is rigorously assumed to be a single homogeneous entity, such as corn, which can be used as seed or consumed directly. In the right-hand quadrant, the curve *MPK* is the marginal product of capital, derived from a well-defined production function (assume it is twice differentiable and subject

of accumulation (Fisher did present a one-commodity version, but only as a “first approximation”). In its modern version, as general equilibrium with the interaction of “time preference” and “dated commodities” (the Arrow-Debreu theory), it has never been shown to be other than a purely formal apparatus of thought, despite the efforts of some researchers to design and empirically implement so-called “computable general equilibrium models.”

⁶Robinson preferred to classify these later contributions as “neo-neoclassical” (Robinson, 1973a, p. 147), in order to distinguish them from the earlier neoclassical contributions of Wicksell, Walras, Marshall, and Pigou.

to constant-returns-to-scale) relating corn as input, combined with labor in continuously variable proportions, to corn as output, viewed in the aggregate at the level of the economy as a whole. It is negatively sloped because of diminishing returns to the variable factor. The total supply of labor is taken as given in the background. The production function represents the state of technical knowledge, which is assumed to be given. Every combination of capital and labor or capital-labor ratio is considered to represent a different technique of production (or “capital intensity” or “degree of mechanization”), involving the substitution of capital for labor, that would be chosen at the corresponding rate of profit, *r*, measured on the vertical axis. The lower the rate of profit, the greater the quantity of capital relative to labor that the profit-maximizing representative firm would employ.⁷ Thus, *MPK* represents the demand curve for capital as a stock.

In the left-hand quadrant, *MEI* is the marginal efficiency of investment, a flow concept. It represents the rate of profit that the firm expects to get from different amounts of current output committed to investment, given the stock of capital already invested and the technique in use. There is one *MEI* for every level of the capital stock. It is negatively sloped, reflecting the condition of diminishing returns, assumed applicable to investment as it is to the stock of capital.⁸ A minimum interest rate, *i**, is required to induce saving by the representative saver in the form of investment loans. The amount of saving is assumed to be an increasing function, *S(i)*, of the interest rate on loans, because of increasing cost (the cost of “waiting”) to the saver from foregoing current consumption.

Now, let the initial stock of capital in existence at the first “moment,” time 0, be given at the level *K*₀. Then there exists an equilibrium in the “stock” market, at (*K*₀, *r*₀), in which the available stock of capital is fully utilized because it meets an equal demand at the profit rate *r*₀. Simultaneously, in the loan market (which is here conterminous with the output market), there exists an equilibrium, (*S*₀, *i*₀), in which the demand for investment loans represented by *MEI*₀ meets an equivalent supply of saving at the interest rate *i*₀. The profit rate on existing capital exceeds the interest rate on loans because the expected yield

⁷This particular specification is usually associated with the name of J. B. Clark. Wicksell, for his part, had wisely noted reasons why the quantity of capital, measured as an aggregate of values, could be positively related to the rate of profit (subsequently called the “Wicksell Effect”).

⁸This assumption is a highly problematical feature of the analysis, even in the context of this simple model, for reasons that need not delay us here but are explained at length in Harris (1981, pp. 367-70).

on the marginal investment, which governs what the profit-maximizing capital-owner is willing to pay for loans, is lower than the productivity of existing capital due to diminishing returns, and the saver is thrifty enough to be willing to supply savings at that interest rate. In the background, the demand for labor at the associated level of output and capital-labor ratio exactly matches the available labor-supply because the real wage rate exactly equals the marginal product of labor at that level of employment.

Call this initial moment a “short period.”⁹ Then, the foregoing is proof that there exists a “short-period equilibrium” corresponding to the given conditions of that moment. By this is meant that there is full consistency between the plans of all market participants and, hence, those plans can be implemented. A distinctive feature is that all markets clear: there is no excess demand or excess supply. Furthermore, this equilibrium is unique, in that there is one and only one such solution.

Insofar as the investment plans at time 0 are actually implemented, then this economy enters the next period, time 1, with a larger capital stock, say¹⁰

$$K_1 = K_0 + S_0$$

where the rate of depreciation of the capital stock is taken as zero for convenience. In the new situation, a similar outcome as at time 0 is repeated. The (greater) quantity of available capital is absorbed through an increase in capital intensity at a (lower) rate of profit, r_1 . At this rate of profit, the (lower) demand for investment loans finds an equal supply of savings at (S_1, i_1) . In the background, full employment of the constant labor supply occurs at a (higher) wage rate corresponding to the (higher) marginal product of labor associated with the (higher) capital intensity of production. These results describe a short-period equilibrium corresponding to the given conditions of time 1.

In the same vein, this analysis can be extended to subsequent periods, time 2, 3, 4, . . . *ad infinitum*. It is found, then, that there exists a definite sequence of short-period equilibria, propelled by the activity of investment. This sequence terminates in a particular equilibrium with the following unique characteristics. The capital stock K^* yields a rate

⁹The long period is dealt with below. See section 4.

¹⁰It must be assumed that this transition, brought about by the activity of investment itself, is effected during some interval of time that allows for the implementation of investment plans. In reality, this would depend on the physical character of the capital good itself, on transportation costs, and other complications. Furthermore, investment plans may not be realized. However, in the special conditions of this case, implementation of investment plans can be conceived to be instantaneous and plans are always realized.

of profit just equal to i^* . At that profit rate, the capital owner is willing to forego investment since the yield on investment at the margin of existing capital just covers the interest cost of a loan. At that interest rate, the saver is indifferent to saving because the reward for foregoing consumption at the margin just covers the cost of waiting. In the labor market, there is full employment of the constant labor supply at the market-clearing wage rate.

Since the activity of investment has come to a halt, the equilibrium solution (K^*, i^*) constitutes a terminal point in the sequence. With zero investment, a constant labor supply, and consistency of plans in all markets, this equilibrium is permanently sustainable with all activities operating at a constant level. It therefore constitutes a stationary state (Robinson called it “Kingdom Come” (Robinson, 1971, p. 9)). It can be easily proved that there exists such an equilibrium and it is unique. To distinguish it from the antecedent points in the sequence, call this a long-period equilibrium. According to standard neoclassical practice, a further proof would be required to show that it is a stable equilibrium. That would constitute an additional step in the analysis, requiring specification of the economic behavior of the representative agents in the different markets, that is to say, how they respond to the circumstance of markets being out of equilibrium and whether or not those responses would lead, on an appropriate time scale, to the eventual achievement of equilibrium.

This analysis may also be readily extended to deal with technical change and growth of labor supply. In either case, the effect is to shift out the *MPK* curve. This is illustrated in Figure 5.2, where the accumulation process, conceived now as a process of “capital-widening,” may be represented in the following terms. Starting from K_0 and MPK_0 , a once-over shift to MPK_1 raises the rate of profit above $r^* = i^*$. This induces a new round of saving and investment and pushes the economy to a new long-run equilibrium at K_1 . Similarly, a subsequent shift to MPK_2 propels the economy to a new equilibrium at K_2 . Continuing in this way, as further doses of technical change and/or labor-supply growth occur, the economy traces out a path of expansion at a rate limited only by the pace of the twin forces of technical change and labor-supply growth. Observing only the long-period equilibrium positions (and ignoring the posited transition between them), it will be found that the rate of profit remains constant along this path and equal to the rate of interest. The trend of the wage rate depends on the specific relation between three

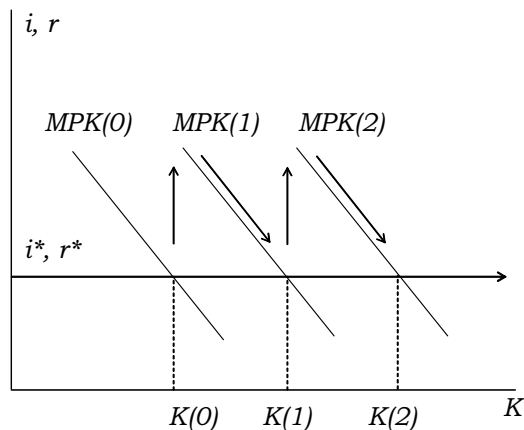


Figure 5.2. Capital widening

forces. Labor-supply growth, by itself, lowers the wage rate due to diminishing returns to the labor input. Increase of capital by itself, and technical change, by increasing labor productivity, raise the wage rate.

Finally, following further the logic of this conception of an accumulation process leads to the special construction represented by modern neoclassical growth theory, the case of a steady state, an equilibrium path along which growth occurs at a constant rate equal to the growth rate of both labor supply and technical knowledge.¹¹ Such a path may exhibit different features depending on the assumed “bias” or “neutrality” of technical change, which is essentially a matter of specifying the shape of the production function. In order to preserve certain selected constancies on the path, technical change must be of a certain type, with constant factor shares and capital-output ratio, that is, “Harrod neutral.” Robinson referred to this particular case as a golden age in order to emphasize its “mythical character.” In an inventive take-off from this benchmark, she constructed, for the purpose of her own analysis, many other types of “ages” of growth, each with its own characteristic features (Robinson, 1956a, 1962a).¹²

The neoclassical construction presents a simple and attractive “story.” It is useful to lay bare what that story is. Evidently, it conveys a striking

¹¹Steady-state growth paths are a larger class of so-called “quasi-stationary equilibria” of which the stationary state is a special case with growth rate equal to zero.

¹²For more details, see section 6.

image of the accumulation process as the “history” of a smooth and inevitable progression (convergence) towards an equilibrium that, even when disturbed by the supposedly exogenous factors of technical change and population growth, is essentially self-perpetuating. It is sometimes presented as a heuristic device, or a “parable,” not intended to be taken literally. Nevertheless, despite such reservations, it has been subjected to widespread adaptation and use as an explanatory device to explain actual historical trends in growth and development, and to provide policy prescriptions, in many different empirical settings.¹³

Robinson regarded the neoclassical construction as wholly inadequate for such purposes; in fact she flatly rejected its use in empirical work.¹⁴ The reasons for her objection, complex and subtle in the details, are spelled out over many writings. Some of these are examined in the next sections.

3. THE MEASUREMENT OF CAPITAL

The idea of capital as “corn” is an obvious simplification, with a distinguished parentage, that is readily admissible as a first approximation. It was so used, and effectively so, by Ricardo in his discussion of the determination of the rate of profit in a simple agrarian economy (closed to international trade) and the prospect that the accumulation process would be driven to an end in the stationary state.¹⁵ One “source of

¹³The growth-accounting formula of Solow (1957) provided the rationale and take-off point for a vast output of subsequent empirical work. Later extensions by Barro and Sala-i-Martin (1995) and Mankiw (1995) attempted to push the limits of this approach as an explanatory framework.

¹⁴See, for instance, Robinson (1973a, pp. 152-4, 167-73). She found confirmation for her position on this issue in the empirical studies of Brown (1957) and Fisher (1969; 1971). Rymes (1971) provided firm support in an elaborate analysis of the conceptual problems involved in empirical application of the neoclassical construction. However, it should be noted that the main emphasis of Robinson’s critique was a focus on the internal logic and theoretical underpinnings of the neoclassical construction. She argued, in reference to this and other models: “These models are all too much simplified and too highly integrated for it to be possible to confront them with evidence from reality. At this stage, they must be judged on the a priori plausibility of their assumptions” (Robinson, 1962a, p. 87). For a vigorous defense of this methodology of appraisal of concepts and theories in economics, see Nooteboom (1986). Some useful clarification is also provided by Maki (1989).

¹⁵The significance and limitations of Ricardo’s conception of capital as “corn” were laid out in lucid and transparent form by Sraffa and Dobb in their introduction to Ricardo’s *Principles*. Robinson, who was intimately familiar with this insight from the time it appeared in 1951, was able to seize upon it as “a gleam of light” in constructing her own analysis (Robinson 1978a, p. xvii). She granted the limited usefulness and relevance of Ricardo’s conception in the context of his time (“he was

trouble,” for both Ricardo’s conception and that of neoclassical theory, comes in attempting to generalize the claims based on this simple idea to a more complex, hence more “realistic” context, in which capital consists of many capital goods differing in their physical specification, age, durability, industry of application, and other dimensions of their use value.¹⁶

In making the transition to this more complex world, and attempting to maintain the essential elements of the neoclassical construction, one must immediately confront a problem that Robinson posed, that is, the problem of “measuring capital.” Specifically, what is the scalar measure of “capital,” consisting of heterogeneous capital goods and not just “corn,” that is supposed to express the “capital intensity of production,” such as to be consistent with a key element of the neoclassical construction, namely, the presumption that (a) a lower rate of profit is uniquely associated with a more capital intensive production method that yields a lower marginal product of capital and, hence, (b) that the profit rate is to be considered in some meaningful sense as ascribable to the (marginal) productivity of capital?

For Robinson, this problem is, at heart, a matter of the logic of comparing different equilibrium positions, hence of comparative equilibrium analysis. Hence, it is most meaningfully discussed in the context of long-period equilibrium positions (stationary states), with a given state of technical knowledge, where the amount of capital is fully adjusted to the technique of production that is appropriate to the prevailing rate of profit, so that “full equilibrium” exists with zero net investment.¹⁷ By appropriate modifications, this analysis can also be done in the context of steady-state growth paths.

It is now known, partly as a result of the extended debate and theoretical analysis stirred up by Robinson’s provocative question that, in general, there is no choice of any economically meaningful index of capital

applying what he believed to be a realistic analysis of the actual situation to problems of policy. His stationary state was not an equilibrium, but an awful warning” (Robinson, 1980a, p. 81)) and sought to separate Ricardo’s usage from what later became neoclassical orthodoxy (“it was not right to throw him into the same box as Pigou in timeless equilibrium” (Robinson 1980a, p. 81)).

¹⁶“We must be careful not to make a simplification in such a way that the model falls to pieces when it is removed” (Robinson 1962a, p. 33).

¹⁷As Robinson put it, “Each set of thriftiness conditions has its appropriate stationary state.” This can be seen in Figure 5.1 where, by extension, there would be a different equilibrium K^* for every level of the interest rate i^* representing the zero-saving rate of interest or minimum supply price of saving. Logically, one must think of these equilibria as different “islands” with no communication whatsoever between them.

that would confirm the validity of the neoclassical presumption, except under very special conditions. One such special case, corresponding to that of Marx’s “equal organic composition of capital” in all producing sectors, is formally equivalent to a “one-commodity model” and therefore reverts to the case of capital as “corn.”

The neoclassical presumption is invalidated as soon as a transition is made to consider the case of just two differentiated capital-goods where it turns out that, if measured by an index of equilibrium prices in terms of a chosen numeraire, there is no necessary monotonic inverse relation between capital intensity and rate of profit (Garegnani, 1970). The resulting relation depends on the combination of three specific elements, identifiable as a price effect, a composition effect, and a substitution effect (Harris, 1973). With any number of heterogeneous capital goods, these problems are compounded. Thus, the general possibility of what was known previously as a “Wicksell Effect” is confirmed. Furthermore, and this is a deeper point shown in a wide-ranging debate to have far-reaching implications no less damaging to neoclassical presumptions, it turns out that there may be “reswitching of techniques:” the same technical method of production may recur at different levels of the profit rate (Symposium, 1966).

In the course of working out her own answer (Robinson, 1956a) to the problem of “measuring capital,” Robinson successfully exposed some of the crucial elements of this problem by setting up what she called a “book of blueprints” to characterize the heterogeneity of capital goods and technical methods (alpha, beta, gamma, etc.) representing “the spectrum of techniques” associated with a “given state of technical knowledge.” She constructed, in this context, the interesting device of a “productivity curve” for ordering the different techniques and showed that it mimicked the neoclassical idea of a “well-behaved” production function but only under the strict assumption that all profitable techniques are evaluated at the same rate of profit, thus emphasizing the necessity of a valuation index.¹⁸ In addition, she hit upon the possibility that reswitching of techniques could occur but unwisely considered it at the time to be a mere “curiosum,” “not of great importance,” and “rather unlikely that cases of this kind should be common.”¹⁹

It was the work of Sraffa (1960) and of those who later elaborated and extended the scheme of analysis that he developed, which provided the

¹⁸ Robinson (1956a, p. 412). This device is further elaborated and corrected as a “profitability curve” in Harris (1973, pp. 110-11).

¹⁹Robinson (1956a, pp. 109-10). She later pointed out that her attribution of this discovery to Ruth Cohen was “a private joke” (Robinson, 1973a, p. 145).

fundamental key to understanding the intricate relationships involved, as far as concerns the comparison of long-period equilibrium positions with a complex structure of production. Much clarity has been produced by pursuing this line of analysis, serving to illuminate a broad range of issues in economic theory.

In the subsequent evolution of her own work, Robinson evidently relied very much on the insights gained from Sraffa's contribution and from the ongoing body of work derived from it. However, it is also abundantly clear, already in *The Accumulation of Capital*, and before, as well as in subsequent work, that she wanted to push beyond comparative equilibrium analysis as such towards the larger goal of analyzing the process of capital accumulation that she regarded as the central feature of the historical process of capitalist development. For that purpose, she considered not only the neoclassical construction to be wholly inadequate but also the method of comparative equilibrium analysis itself to be too confining in the scope of the issues addressed as well as intrinsically incapable of dealing with what she considered the primary question.²⁰ It is in this context that one must confront, she insisted, the role of "time" in the analysis of equilibrium and the potential for "confusion" that it creates.

In this connection, it is worth noting that, though Robinson heaped high praise on Sraffa's model for its "beauty and ingenuity" (Robinson, 1980a, p. x), she was forthright in pointing out what she considered to be its limitations:²¹

There is a great deal to be learned from this model, particularly in a negative direction. ... But as the basis for analysis in a positive direction there is a difficulty about the specification of Sraffa's model in terms of logical time. ... This problem arises because there is no causality in Sraffa's system. ... *if we are to introduce decisions into the model, we must introduce time.* (emphasis added, Robinson, 1980a, pp. 88-9)

²⁰ "The comparison of different economies with the same technical possibilities and different rates of profit is an exercise in pure economic logic, without application to reality" (Robinson, 1962a, p. 33).

²¹ The Sraffian model has been used to characterize a process of technical change as a sequence of long-period positions (Schefold, 1976; 1979; 1980). It was elegantly developed by Pasinetti (1981) to display the properties of a process of "structural change" in a special kind of full-employment growth-equilibrium called a "natural economic system." The peculiarities and limitations of this conception were reviewed in Harris (1982).

Thus, the problem of "measuring capital," though considered to be significant in its own right (it is evidently a matter of the internal consistency of the neoclassical construction) is not "the real source of trouble." Another key issue is centered on the treatment of time. In this regard, both the neoclassical and Sraffian models were seen by Robinson to come up short in their ability to provide a proper framework for analysis of the accumulation process.

4. LOGICAL AND HISTORICAL TIME

A more basic "source of trouble" in the use of equilibrium analysis, Robinson argued, lies in a necessary distinction between logical and historical time. It is a distinction based on a substantive difference that is suppressed when the historical process of accumulation is interpreted as a movement from one equilibrium position to another, a sequence of equilibrium positions, or a progression along an equilibrium path. Recognition of this distinction makes it illegitimate, hence unacceptable, to draw any direct inference from the analysis of equilibrium existing in logical time to be applied as an explanation of events taking place in historical time, let alone events in real time. Logical time is, in a sense, anti-historical.

For clarification of this issue, let us return to the case of the neoclassical construction illustrated in Figures 5.1 and 5.2. Consistent with the logic of this construction, time is a dimension that exhibits the following distinctive properties:

1. In proving the existence and uniqueness of equilibrium, no reliance is placed on time as such. It is seemingly absent from the analysis. It is, nevertheless, there, in the background. "Time may be conceived to lie at right angles to the page" (Robinson, 1962a, p. 22). It would necessarily come into play in the adjustment to equilibrium and the transition from one equilibrium to another.
2. Time is the dimension that separates the short period and the long period.
3. In the short period, only certain things "happen:" the stock of capital, labor supply, and state of technical knowledge are fixed, demand for capital adjusts to the given supply of capital, labor demand adjusts to the given supply of labor, saving and investment adjust to each other. There is "movement" over time through a determinate sequence of short periods so as to bring into existence the conditions of the long period. Thus, in the long period (stationary state), other things "happen:" supply and demand for capital are

“fully” adjusted to each other, labor supply and technical knowledge remain fixed. It follows that we should properly distinguish a third “period” in which everything “happens:” as on the steady-state path or golden age in which accumulation of capital, labor supply growth, and technical change all occur with regularity and are “fully” adjusted to each other. Accordingly, we could call this the secular period, with its own time scale, different from those of the short and long period.

4. Time is divisible into finite components. Each short period is necessarily of limited duration in time because it is about to be upset by the implementation of investment plans. Similarly, the sequence of short periods leading to the stationary state has an end-point in finite time. In contrast, the stationary state itself has no end point, it continues indefinitely in time. Likewise, the steady state (or golden age) goes on forever. And since, as Robinson argues, the stationary state and the golden age, if either exists, must have always existed in past time, then time goes from $-\infty$ to $+\infty$. However, there is a distinction between them, if not much of a difference. In the stationary state, nothing changes. Therefore, it could just as well be conceived as a timeless equilibrium. In the golden age, proportions do not change, only the scale of the economy and at a constant proportional rate, which is a reflection of the assumed linearity in the structure of the economy. Thus, but for the change in scale, the golden age could easily be collapsed into the timeless equilibrium of the stationary state.
5. Time is infinitely divisible. It is therefore possible, in principle, to conceive of things happening at an infinitesimal instant of time. Furthermore, within the logic of this particular construction, there is nothing to preclude all relevant actions (in the short period) from occurring simultaneously at an instant of time. Production is assembled in an instant to produce an output, corn, which by definition can be indifferently consumed or saved and invested. The state of technology is fully known at any instant, as is the supply of factors.²²
6. The “future” is always like the “past” and known with certainty. Therefore, decisions taken “today” in anticipation of future events are always confirmed by future events. Expectations are always fulfilled and plans realized.

²²Alternatively, it would be possible to add a dose of “realism” by the simple specialization of making things happen in discrete time and allowing for the existence of lags in adjustment. See the chapters by Skott and Bhaduri in this volume.

7. Time is reversible: it is possible to go both forward and backward in time. For instance, in Figure 5.1, inasmuch as it is logically tenable to posit a sequence of short periods going forward in time, through positive amounts of investment, from K_0 towards the stationary state level K^* , it would be equally tenable to posit a sequence going backward in time from some level $K_t > K^*$ towards K^* , through consumption (negative investment) of accumulated capital. Similarly, in Figure 5.2, technical “progress” (assumed to be of the “disembodied” form) can be made to go both forward and backward.

The preceding properties together constitute what Robinson called *logical time*. They underpin the neoclassical construction of the accumulation process elaborated above. In contrast, *historical time* is based on an appeal to properties that are drawn from the reality of actual experience. The following are some of the properties that Robinson emphasized.

1. In historical time, “Today is a break [moment] in time between an unknown future and an irrevocable past” (Robinson, 1962a, p. 26).
2. The past is embodied in the current situation and limits the range of actions that can be taken to bring about an adjustment to changing circumstances. In this respect, the economy is, so to speak, “locked into” the initial conditions existing today and inherited from the past. This property is grounded, in part, in the historical reality of an industrial society (as distinct from a society of “corn” producers) characterized by a complex division of labor, and succinctly expressed in the idea of heterogeneity of capital goods. It means, specifically, that capital goods exist in a fixed form embodying the existing state of technical knowledge, are adapted to specific uses, in most cases are not directly transferable without cost to other uses, cannot be directly consumed, and require a time-intensive process of investment (scrapping) for expansion (reduction) of the existing stock. It is grounded also in the reality of the “labor force” as conscious beings, differentiated in age and other physical and social characteristics, endowed with acquired skills and knowledge, specialized to different spheres of production, and capable of acting in organized groups (for example, trade unions) to defend their positions (wages, hours, “benefits”) gained in the past.

3. The technical conditions of production ("technology") may change over time as a result of innovation or "technical progress." But, the techniques that exist today are the result of changes that have occurred in the past and decisions taken in the past that have brought them into existence today in anticipation of what today was likely to be. They are reflected in the age or vintage of different outfits of capital goods existing "today." Because of a turbulent past, different techniques may coexist in time. Then, the range of techniques actually in use "today" can be varied by moving existing outfits ("old" vintages, "fossils") in the stock of capital goods "in and out of mothballs." Adoption ("choice") of "new" techniques is a matter of production of, and investment in, new vintages that incorporate the new techniques.²³
4. Production itself is a time-intensive activity (the "production run") with different durations in time (long or short "runs").
5. Time is not reversible.²⁴ Knowledge gained cannot be lost.²⁵ Production, once completed, cannot be undone: goods produced for sale must be sold or else inventoried ("put to stock").
6. Decisions and actions are taken "today" in the light of beliefs ("expectations" or "guesses") about their future consequences and the consequences of the decisions and actions of others. The future is intrinsically unknowable; there is "not even knowledge of probability distributions." Decisions are "rational" in the sense that they are based on existing knowledge and the projection of such knowledge into the future.
7. Acquisition of knowledge is an activity ("learning," "experience," "search") that takes place along a time-space dimension and involves real costs. The computational costs involved in sifting the

²³"The fossils embedded in the stock of capital (and in the supply of labour trained to various occupations or settled in various districts) destroy the possibility of perfectly smooth development" (Robinson, 1952a, p. 125).

²⁴"Time goes only one way; there is no going back to correct a mistake; an equilibrium cannot be reached by a process of trial and error" (Robinson, 1980a, p. 8).

²⁵"Marshall was aware of the difficulty. He drew a long-period supply curve going forward through time, with economies of scale and learning by doing. At any date that had once been reached, he conceived that there was a curve running backwards showing lower costs than on the forward curve because economies that have once been achieved would not be lost if demand were to shrink so that output had to be reduced. But this device raises more problems than it solves" (Robinson, 1980a, p. 88). She is here skeptical of Marshall's treatment for a reason she had given elsewhere: "The reason is that he somehow boiled the effect of technical progress going on through time into the movement down his supply curve" (Robinson, 1952a, p. 151).

information gathered in this way make it prohibitive, if not impossible, for any single individual to acquire "full" knowledge. Hence, knowledge is always "imperfect:" "the full information required to make a correct choice can never be available" (Robinson, 1980a, p. 8).

8. "Since all individual choices are based upon more or less independent and inaccurate judgements about what outcomes will be, it is impossible that they should be consistent with each other." They "may turn out later to have been mistaken." Hence, the assumption of "perfect foresight" "has no point of contact with empirical reality" (Robinson, 1980a, pp. 8, 89).
9. Decisions and actions by individuals or collective institutions that involve human agency (firms, trade unions, government) are imbued with "inertia," entailing that there is "stickiness" or "lags" in adjustment to changing circumstances.
10. "Money" (cash on hand, finance, and credit) and the institutions that support it are strictly necessary requirements of economic activity taking place in historical time. It is the means of payment for effecting transactions today ("medium of exchange"), including the exchange of labor time, and the vehicle for carrying wealth in "liquid" form over time ("store of value").

Robinson's argument is that these properties of historical time stand opposed, in their implications, to the properties of logical time. (A direct contrast of the two sets of properties as related to relevant economic variables is summarized in Table 5.1.) In her view, that would make the neoclassical construction, based as it is on logical time, devoid of any explanatory significance in dealing with the actual history of accumulation.

5. A CAUSAL-HISTORICAL MODEL

I interpret Robinson's basic proposition as follows.²⁶ There are two distinct and mutually exclusive conceptions of the accumulation process. They may be represented in the simplest formal terms as the following two dynamic processes:

$$\text{Case 1} \quad \frac{dx}{dt} = F_{x^e}[x(t)] \quad -\infty \leq t \leq +\infty \quad x^e = \text{equilibrium point}$$

$$\text{Case 2} \quad \frac{dx}{dt} = F_{x_0}[x(t)] \quad 0 \leq t \leq +\infty \quad x_0 = \text{initial condition}$$

²⁶The interpretation that follows was earlier sketched out in Harris (1991).

Table 5.1. Logical versus historical time

	Logical Time	Historical Time
1 Directionality of time	Reversibility	Irreversibility
2 Time intensity of action	Instantaneous	Discreteness, lags, inertia
3. Expectations	Self-realizing, correct foresight	Falsifiable, future unknowable
4. Information /Knowledge	Complete, free, symmetric	Imperfect, costly, local learning
5. Capital goods	Substitutability	Specificity, lumpiness
6. Investment	Elastic	Inertia, animal spirits
7. Technical change	Disembodied	Embodied, path-dependent
8. Money/Finance	Barter, passive money, complete futures market	Active money, liquidity preference, incomplete markets

Case 1 is an *equilibrium process* in which the function governing the movement in time generates a unique and stable equilibrium solution x^e and is invariant both to the starting point and to the path of movement to equilibrium.

Case 2 is an *historical process* in which the function governing movement along any path is uniquely dependent on the initial condition or state variable x_0 and, for full generality, may be considered to shift as experience builds up along a given path.

Only in a very special, unique, and hypothetical state, which she calls the state of *tranquility* (Robinson, 1956a, pp. 59, 66-7), could these two cases be made to collapse into each other. In reality, however, the observed historical process is generally in a state of *turbulence*, not one of tranquility. In conditions of turbulence, disturbing events (“surprises”) occur that are not predictable with certainty (they are “unpredetermined”). They are the “stuff” out of which actual history is made. If and when such an event occurs, it makes the actual, realized, position

of the economy different from what it was projected to be in the prior process leading up to that point in time. The actual position represents the “initial condition” to which the economy must then adapt in a forward-looking process. “What will happen next?” is an open question. That reflects the essential “openness” of actual history, on which a properly constructed economic model of the process may be applied to throw some light. For that purpose, the model of an equilibrium process is considered to be irrelevant. What is required is the model of an historical process.

Robinson’s answer to the question of “what will happen next?” would then run along the following lines.

If all past history had been one of equilibrium, then one may infer that any perturbation which occurs here and now would set into operation forces that cause the perturbation to cancel itself out and bring about a return to equilibrium. The economic system would then be self-correcting, at least for small perturbations. It is quite another thing, however, if history has never been anywhere near equilibrium. It would be illegitimate then to claim that, starting from today, there will come into play a process of getting to equilibrium. The system could, and would likely, wander off into the unknown without ever achieving equilibrium.

A mathematician would correctly reply that, from the standpoint of an abstract analysis of stability, these two cases are not qualitatively different. But, for the social theorist and historian, there is a world of difference between them. Specifically, the difference is that, in the one case, the properties of equilibrium have already been learned in history and can confidently be expected to persist. In the other case, there can be no necessary presumption that a real process of learning, which is in general a path dependent process, will lead to an equilibrium, if any exists and whether it is unique or not. (Harris, 1991, p. 98)

It is worth adding here another key feature of her analysis that is often missed. Specifically, she conceives of the economy at every moment, in the short period and the long period, as an *under-determined system*. In formal terms, there are more variables, at least one, than there are equations to solve the model. Consequently, even if an equilibrium can be shown to exist, there is always something about to happen that will upset any tendency to equilibrium. This is the essential “open” feature of a truly historical process. Throughout all of her analysis, it appears

that the investment decision is that loose variable. It is made to hang on historically contingent factors expressed in “the animal spirits” of the capitalist investors.²⁷

Because of the emphasis placed on expectations, it is sometimes said that her analysis allows a “subjective” element to “rule the roost.” Or, to use another metaphor, she allows the tail of expectations to wag the capitalist dog. I believe that this criticism is based on a misunderstanding.²⁸ In her analysis, it is capitalist investment decisions that rule the roost and these are not always entirely subjective. But, though driven by the heat of the competitive struggle, they are intrinsically fraught with “fundamental uncertainty.” In the short run, they are subject to inertia (they adapt slowly relative to other “fast” adaptors) and in the long run they may vary within a wide range dependent on specific historical circumstances. Therefore, “history” always has to be brought into the analysis.²⁹

Now, as Robinson asserted, “There is one point on which all schools of thought can agree—that the actual process of capitalist accumulation goes on through historical time” (Robinson, 1980a, p. 74). On the other hand, much of economic analysis, including some of her own, is set out in terms of equilibrium states—in particular, the steady state—based on logical time. Therefore, the crucial problem (“the real source of trouble”) for economic analysis, she argued, is the following.

In a steady state all events are predetermined. Anything that happens “today” is fully determined by the past, including expectations about “today” that were held in the past. It is precisely those expectations, confidently held, that are now reflected in the various stocks in existence in the appropriate configuration “today.”

To discuss the effects of change in any element in our story, we must break this link between the past and the future

²⁷“To attempt to account for what makes the propensity to accumulate high or low we must look into historical, political and psychological characteristics of an economy” (Robinson, 1962a, p. 37).

²⁸For her defense of her position, see Robinson (1980a, p. 128).

²⁹She discussed at length issues involved in the specification of an investment function, reviewing critically various alternatives proposed by others (Robinson, 1952a, pp. 159-64; 1956a, Chs. 21-22; 1962a, pp. 78-87). She opted for a specification of the rate of accumulation as a function of the expected rate of profit in her own formulation of a model of accumulation (Robinson, 1962a, pp. 46-51). She was elsewhere mostly concerned to emphasize the variety of factors and limits acting upon the “desire to accumulate” in different phases of growth (booms, recessions) and over the long haul (with technical progress, natural-resource scarcity, population growth), drawing a sharp distinction between investment in fixed capital, working capital, and inventories.

and treat “today” as a gap between the two in which undetermined events may occur. This is necessary to set the analysis in historical, not logical, time. (Robinson, 1980a, p. 74)

To fill in the story of a movement towards equilibrium, a complicated dynamic process must be specified and to specify a process that will actually reach equilibrium is by no means a simple matter. (Robinson, 1980a, p. 87)

The now common practice for dealing with this problem, among economists of different schools of thought, is to resort to using the tools of *stability analysis*.³⁰

To my knowledge, Robinson did not offer a systematic appraisal of this practice. From her cursory remarks on the subject (for instance, Robinson, 1980a, Chs. 4 and 7), one could infer that she was skeptical of its capacity to uncover the deeper layers of the problem (for example, the process of technical change) or to yield results having great generality or directly applicable to empirical reality. She reckoned that, quite apart from the obvious difficulty of managing the complex relations among the (quantifiable) economic variables and finding results capable of meaningful interpretation, mathematics was incapable of giving full play to the (non-quantifiable) human and social factors involved.

She was, however, not averse to the use of mathematical modeling as such, if designed to eliminate errors in “thinking” and to “clear the logical ground for a discussion of real issues involved in the analysis of capitalist accumulation” (Robinson and Bhaduri, 1980). She thought that much insight could be gained in this way, by proceeding in the step-by-step manner of successive approximation: “To sort out the analysis of this turbulent scene involves the whole of economics and . . . we must approach it bit by bit” (Robinson, 1980a, p. 22).

³⁰Samuelson (1947), in the bloom of youth, had earlier sought to resolve this problem by deploying his “correspondence principle,” a theorem concerning the formal correspondence between comparative statics and dynamics, to support the hypothesis that equilibrium states not capable of persisting over time are less likely to be found in reality than those that are. After all, “How many times has the reader seen an egg standing upon its end?” he asked (p. 5). That proposition was obviously a slippery slope, based on employing the principles of mechanics to sweep under the rug a substantive problem of social and historical analysis. That it is a dubious proposition on logical grounds (that is, for lack of necessary conditions) was pointed out by Arrow and Hahn (1971, pp. 320-21). But in 1975, in the context of the “reswitching” debate, Robinson was not about to let him get away with it, while standing her own ground on this issue. In his response to her, which she justly considered to be “patronizing” (Robinson, 1980a, p. 138), he was evidently not prepared to accept or admit the weakness in his own position.

However, she rejected “pseudo-causal models” (Robinson, 1962a, pp. 23-9). An acceptable economic model had to be, what I would call, *causal-historical*, in the sense that the initial conditions and behavioral relations are fully specified and plausible and, in particular, expectations are specified to satisfy the properties of historical time: “the economy follows the path because the expectations and behaviour reactions of its inhabitants are causing it to do so” (Robinson, 1962a, p. 26). Her argument suggests that, under those conditions, she might be prepared to accept the idea of *local stability* of an equilibrium, if one exists. This is strictly because, in that case, the economy is presumed to have been “near enough” to equilibrium in the past so that the inhabitants have come to learn from experience the properties of that equilibrium and may confidently act as if they expect it to continue. By the same token, she regarded the question of *global stability* (that is, when “the actual position [is] appreciably off the prescribed path”) as “a nonsense question to ask” (Robinson, 1962a, p. 24). Presumably, she would also have rejected the idea of a “rational expectations equilibrium” as wholly inconsistent with the conditions of information acquisition and learning in historical time.

She did not examine the possibility that there might be *multiple equilibria*, which we now know to be generally the case, not a special case. In some respects, that would have made her argument for a causal-historical model even stronger. An example of this possibility is constructed in Figure 5.3, which allows for the existence of regions of increasing returns in the production function (instead of generalized diminishing returns) in an otherwise standard model of steady-state growth. In this example, there exist multiple equilibria, some stable (at *b* and *d*), others unstable (at *a* and *c*). Evidently, the relevant dynamic outcome depends on the historical starting point of the economy. Starting below some minimum level of *k* leads to a degenerate outcome.

To be fair to her, it must also be noted that she did make, at various times, a concerted effort to get the neoclassical construction to stand up in historical time. She concluded that it could not be made to work in this context (Robinson, 1956a, Notes, Diagrams; 1960, Part II; 1962a, pp. 57-8, 102-3, 132-5; 1971, pp. 14-15). As for the more elaborate inter-temporal theory of general equilibrium, she confessed that: “I have never been able to make that theory stand up long enough to knock it down” (Robinson, 1980a, p. 128). Her skepticism, on both counts, was actually confirmed early on by the work of neoclassical theorists who showed that, under the usual neoclassical behavioral rules and with

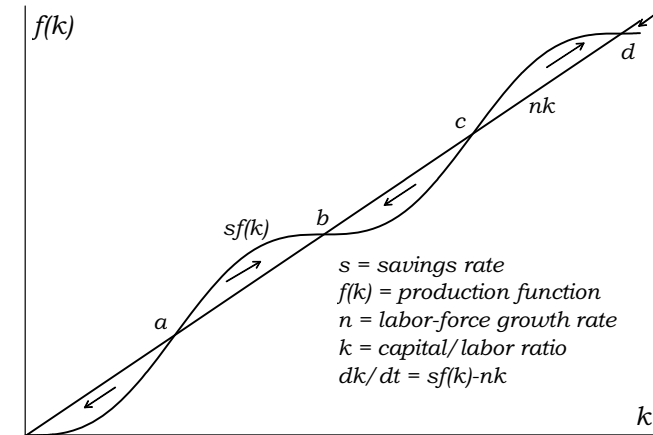


Figure 5.3. Multiple growth equilibria

heterogeneity of capital goods, the neoclassical long-run equilibrium is unstable (see Hahn, 1966; Shell and Stiglitz, 1967; Kurz, 1968).

6. THE ROBINSONIAN MODEL OF ACCUMULATION

The core of Robinson’s own analysis of the accumulation process in historical time is presented in three major texts (Robinson, 1952a, 1956a, and 1962a). The analysis is laid out mostly in literary terms. It is tightly reasoned, and dense with details that are woven in, sometimes only temporarily. This manner of exposition may prove to be off-putting to the impatient reader brought up on using flashy mathematical tools. But patience in following out the argument and managing the flow of details will be amply rewarded with some precious gems and colorful vignettes.

The analysis typically begins with, or assumes in the background, the conditions of the *short period*. But this is not the market-clearing short period of the neoclassical model. Instead, it is the short period of Keynes, updated to remove what she often indicates to be the deficiencies of Keynes’s own analysis. In the Robinsonian short period, initial conditions matter, and they matter decisively in terms of the size and composition of the capital stock and state of technology inherited from the past, which cannot be altered except within narrow limits, and the posited expectations of the future expressed in the level of investment plans. Investment demand, which determines aggregate demand and income through the multiplier, is subject to inertia: it is the “slow” adaptor

relative to other variables. Besides, it is bounded from above by the size and composition of the capital stock in the capital-goods-producing sector. Saving adjusts to the level of planned investment through changes in the level and distribution of income, not through changes in the level of the interest rate as in the neoclassical model. In the labor market, the real wage is also a “slow” adaptor, because labor-market institutions are subject to hysteresis, giving rise to “stickiness” of money wages. Likewise, firms (large enough to have a say in the output market) are “slow” to raise prices in a “weak” market (and to lower prices may “spoil” the market by disturbing the existing conditions of competition). The *short-period equilibrium* consistent with these conditions is necessarily one of underutilized capacity and unemployed labor.

The *long period* is not a length of time. Like the short period, it is a process. It is distinguished from the short period by the specific adjustments that take place in each process.³¹ The long period is the process of the working out of investment plans through changes in the level and composition of the capital stock in accordance with the state of long-term expectations and through interaction with the other factors that can plausibly be assumed to adjust as the inherited stock of capital is (gradually) changed to accommodate the changing level and composition of demand.

For the analysis of accumulation, she sets up a neat and simple model in which the central focus is on “the double-sided relationship between the rate of profit and the rate of accumulation” (Robinson, 1962a, pp. 46-51). She shows the possible existence of an equilibrium in which the desired and actual rate of accumulation coincide because the rate of profit generated by that rate of accumulation is just what is required to maintain it. The underlying idea is derived from a combination of the Keynesian principles of effective demand and the multiplier extended to the long-period context of growth in productive capacity, with Kalecki’s “widow’s cruse” principle that allows firms to gain (or lose) profits depending on the state of demand and their ability to adjust mark-ups

³¹She emphasizes that, in order to start up the long-period analysis, the initial conditions must be appropriately specified. In particular, it must be assumed that the economy is already in short-period equilibrium (Robinson, 1962a, p. 46). In this sense, the short period is embedded in the long period. Given the logic of this starting-point, it would naturally lead to the question of how, if at all, the long-period process of accumulation could eliminate a condition that necessarily exists at its start, that is, the condition of underutilized capacity and unemployed labor. A striking outcome of Robinson’s analysis is to confirm that this condition is fully consistent with long-period equilibrium. Therein lies, one might infer, the power of a causal-historical analysis.

in response to market conditions. A key element is that firms’ investment plans are influenced by the expected rate of profit and expectations depend on actual current experience.

This simple model represents the stripped-down (“bare bones”) version of Robinson’s analysis of accumulation.³² She puts it through its paces by examining the conditions under which an equilibrium may or may not exist and, if it exists, whether or not it is likely to be sustained. Again, the crucial feature is that it is an under-determined equilibrium. And again, this is essentially because of the role of investment: it cannot be pinned down to satisfy the requirements of equilibrium. Though the *rate of accumulation* may be more or less sensitive to variations in the rate of profit, the *accumulation function* depends on conditions that are outside the model, that is, on “animal spirits.” She shows that various dynamic disequilibrium outcomes are possible and analyzes their implications. They depend on “internal contradictions” that may make it impossible to find an equilibrium solution. Or, if an equilibrium exists, it is about to be upset by “disturbances” from outside. Equilibrium is therefore decidedly not a “natural state,” nor is it permanently sustainable in the specific context of the ongoing turbulence of history.

On the foundations of this basic model, Robinson proceeds to construct, by careful layering of details that are woven into the analysis, numerous dynamic scenarios of equilibrium and disequilibrium, distinguished by the specific internal contradictions that characterize each of them and/or the specific disturbances that bring them about. She gives each its own name as a particular “age” of accumulation. Of those arising from internal contradictions, one interesting case is that of a *bastard golden age*. It is characterized by persistent unemployment, which is therefore a condition that is as much likely to come about in the long period as in the short period. Another is the case of an *inflation barrier*.³³ There are many other cases, representing a rich array of possible dynamic paths that an economy might take. Each deserves close scrutiny as the characterization of conditions that, it is presumed, could come about in actual history. In this context, the golden age emerges

³²Following the same lines as Robinson and Kalecki, some elements of this model and of Kalecki’s were picked up and assembled in Harris (1974; 1978a, Chs 8 and 10) so as to provide an extended analysis of the short-period and long-period possibilities. A further extension was later developed by Rowthorn (1982) and subsequently by Marglin (1984), Dutt (1984), and Marglin and Bhaduri (1991). This framework of analysis has since come to represent the standard for what is now called post-Keynesian growth theory.

³³A model incorporating this intriguing case was explicitly formulated and analyzed in Harris (1967).

as a singular case in which it happens, by accident, that all the requirements of equilibrium are satisfied and full equilibrium prevails without internal contradictions or outside disturbances. It is the mirror image of the neoclassical steady-state path with full employment.

Robinson regarded the golden age as a “mythical state of affairs not likely to obtain in any actual economy” (Robinson, 1956a, p. 99), or “nothing more than a piece of simple arithmetic” (Robinson, 1952a, p. 96). In the context of her own analysis of its properties, she independently proved a “neo-neoclassical theorem” (Robinson, 1962a, Ch. IV and Appendix 2), showing that consumption is maximized if the rate of accumulation is equal to the profit rate in the golden-age economy. Oddly enough, when neoclassical growth theorists later rediscovered this theorem in the neoclassical growth model, it was celebrated as the “golden rule of accumulation” and interpreted as a prescription for economic policy in a capitalist economy.

7. HISTORY VINDICATES JOAN ROBINSON

One of the more interesting turns in the history of economic thought is the trend that has taken place since Robinson wrote, away from an earlier and highly restrictive form of economic dynamics towards a “truly” dynamic economic analysis. This particular turn has many different branches and is not yet fully explored nor documented. But it would not be premature to say that it has fully vindicated some of the basic concerns of Robinson while taking economic dynamics into deeper realms. The irony in this history is that the mathematicians have come around (unknowingly in some cases) to validating, in their own way, some of the ideas embedded in Robinson’s “untidy” literary style, which she discovered entirely without the use of mathematics. Also, it shows that she was far ahead of her time.

The earlier analysis of economic dynamics was focused on linear models. Widely used in the analysis of business cycles, these models were subject to well-recognized limitations that restricted their interpretive value (Pasinetti, 1960). They yielded very limited forms of motion consisting of: explosive growth, oscillations that are explosive, damped or of uniform amplitude, and smooth convergence. To get meaningful “turning points” consistent with observed business cycles, arbitrary “ceilings” and “floors” (a kind of “exogenous” non-linearity) had to be imposed on the endogenously generated dynamics. Worst of all, the cycle could only be made consistent with capital accumulation by imposing an exogenous growth rate of output, hence “separating the cycle from the trend.”

Robinson was rightly skeptical of the business cycle models. Yet, she welcomed the development, within this genre, of the different approaches of Harrod and Kalecki towards “a theory of economic dynamics,” viewing them as a positive move to carry forward the Keynesian revolution through “generalizing” Keynes’s *General Theory*. Her own efforts during this period were designed to further advance this new wave of economic theorizing. Against the background of these developments, she could not help but view the emergence of the “neo-neoclassical” growth models as a backwards step. She viewed them as explicitly designed to counter the knife-edge and instability of Harrod’s “dynamic equation” by reviving the “Wicksell process.”

She did not witness the more recent emergence of neoclassical models of “endogenous” growth. She would undoubtedly have regarded them as a hybrid of self-contradictory principles and behavioral rules: that is, introduction of the historically relevant idea of increasing returns based on scale economies, investment in R&D, and education of the labor force, in combination with the neoclassical presumptions of marginal productivity pricing of factors of production, marginal-cost pricing of output, passive adjustment of investment to the “natural growth rate,” and correct foresight.

In contrast, the recent trend towards dynamic analysis of “complex” systems is based on non-linearity and evolutionary principles that capture explicitly the role of initial conditions, increasing returns, learning, cumulative feedback effects, inertia, hysteresis, natural selection, and other properties of “historical time” that are deeply relevant to an understanding of the real economy in motion (Anderson *et al.*, 1988; Arthur, 1994). This type of dynamic analysis has been shown to yield complex forms of motion, stable and unstable, including limit cycles, path dependence, and chaos, with solutions consisting of multiple equilibria, a single equilibrium, or no equilibrium at all. The rich variety of dynamic paths and outcomes found in these analytical studies is definitely consistent with and supportive of the patterns of economic dynamics that Robinson sketched out or suggested in her work.

It turns out, for instance, that a simple specification of Ricardo’s “corn model,” which has had a long life as an equilibrium model since the time of Ricardo, is capable of yielding chaotic behavior (Bhaduri and Harris, 1987). This result undermines the long-standing presumption of a necessary convergence to a stationary state in this model.

Analyses of the neoclassical growth model in this new framework of economic dynamics, even with “corn” as capital good, or with more general technologies, have found a similar pattern of complex dynamics

(see, Cass and Shell, 1983; Benhabib and Nishimura, 1985; Grandmont, 1985; Boldrin and Montrucchio, 1986). These results undermine the presumption of a necessary convergence to the steady-state in this model.

Various studies of the “cross-dual dynamics” of output and prices in a Sraffa-type model of competition (reported in Semmler, 1986, and earlier by Medio, 1978) have found unstable trajectories, instead of “gravitation” to a long-period equilibrium, even in the most congenial case of expectations tied down to knowing “in advance” the equilibrium vectors of output and prices (a type of correct foresight). These results leave in doubt the “causality” of the Sraffian equilibrium construct, thus confirming Robinson’s stated intuition regarding this issue.³⁴ These and other studies reported in the same volume and elsewhere (Semmler, 1989) also demonstrated a wide range of dynamic possibilities that can be obtained, using sophisticated tools of mathematics and computer simulation, in the study of different aspects of economic behavior (some grounded in historical time, others in purely logical time), at both the micro- and macro-levels of the capitalist economy.

The study of technical change, long recognized as a crucial feature of the accumulation process beginning with the early contributions of Marx, became dormant after the initial bunching of innovations around Schumpeter’s contributions. Robinson’s early system for classification of inventions had barely touched the surface of this problem and in her later work she did not add much. Analysis of this problem has recently received new life from the integration of new theoretical models and analytical tools with a vast accumulation of empirical studies.

There are significant gaps, missing links, and other shortcomings in the work that has been done so far, for instance, as concerns the specification of institutional structure, labor market interactions affecting money wages and prices, price- and output-determination in an oligopolistic setting, investment behavior of firms, the role of financial markets, and the formation of expectations. Thus, the analysis is still far away from coming up with an adequate theory of accumulation. All of this suggests, as Robinson earlier indicated, that there is “much work to be done.” Furthermore, in tackling the manifold and complex features of the accumulation process, Robinson’s “bit by bit” approach is still relevant. She also added the important proviso: “that we give up the search for grand general laws and are content to try to enquire how things happen” (Robinson, 1980a, p. 95).

³⁴Some of the behavioral issues that arise in seeking to adapt the Sraffian model to “historical time” are explored at length in Harris (1988; 1991).

6. Expectations and the Capital Controversy

Harvey Gram¹

1. INTRODUCTION

What Robinson described as the negative part of her famous critique of the aggregate production function (Robinson, 1953a) was so easily extracted from the original that only a single paragraph was added to the reprinted version appearing in her *Collected Economic Papers* (Robinson, 1960a, pp. 114-29). This testifies to its self-contained argument. The constructive parts were omitted on the grounds that they “are better done in my book, *The Accumulation of Capital*,” (Robinson, 1960a, p. 130). Reverse capital deepening and reswitching are indeed easier to grasp using a set of intersecting wage-profit, as opposed to productivity curves (Robinson, [1956a], 1969a, p. 426), but the connection between them is well understood.²

Bearing in mind the course of the subsequent debate in the theory of capital, it may fairly be asked if Robinson’s emphasis on the negative part of her critique was well placed. She had, in fact, reworked the whole argument (Robinson, 1959a) in light of the controversy “partly aroused by the first article” (Robinson, 1960a, p. 144) and placed her new statement in its entirety next to the reprinted excerpts of her 1953 article (Robinson, 1960a, pp. 132-44). It was there and in later articles that she insisted on the importance of the logical connection between fulfilled expectations and equilibrium. This set her apart from the controversy that swirled around the significance of reverse capital deepening and reswitching. Indeed, some came to regard Robinson’s emphasis on expectations as an unhelpful distraction from the larger enterprise of reviving interest in the “standpoint... of the old classical economists from

¹Professor of Economics, Queens College, City University of New York. I would like to thank Bill Gibson for asking me to clarify and amplify a number of points. Responsibility for remaining ambiguities and errors is mine alone.

²See Salvadori (1996) and the relation between his work and other contributions in Gram (2003).

Adam Smith to Ricardo... submerged and forgotten since the advent of the 'marginal' method" (Sraffa, 1960, p. v).³

It will be argued here that the negative part of Robinson's critique, referred to below as her Main Battle, remains a robust line of defense against the "high brow" version of mainstream capital theory. Her Keynesian inspired description of equilibrium paths of accumulation can, indeed, be read as a rejection of saddle-path solutions, which are endemic to "high brow" models of intertemporal general equilibrium theory.⁴ Of course, a "low brow" version of capital theory survives in macroeconomics textbooks where the aggregate production function lives on as if no questions had ever been raised about the meaning of substitution between labor and capital for the economy as a whole. One reason is that defenders of orthodoxy have never accepted the relevance of a relationship between the rate of profit and the value of capital per worker that focuses entirely on a comparison of steady states. The properties of such a relationship—whether it is a function or a correspondence and whether its slope is positive or negative—have been seen by critics of orthodoxy as central to their critique of its supply and demand oriented theory of the rate of profit. For defenders, a comparison of steady states simply has no direct bearing on the analysis of growth, which, in their view, should take as arbitrary the initial stock of capital goods and other factors of production. The difficulty that must then be faced concerns the theoretical requirement that initial prices be set in a manner that makes an equilibrium path possible. This is the Achilles' heel of "high brow" intertemporal general equilibrium theory. Before turning to this

³This emphasis prompted a referee of Gram (2003) to remark that Robinson "dismisses the capital controversy because she never truly understands it," and to opine that my comments on the reprinted version of Robinson (1953a) and its companion piece (Robinson, 1959a) "inadvertently demonstrate the lack of understanding of Robinson."

⁴Peter Skott, in this volume, recalls Samuelson's joke about the distance between himself and Robinson being shorter than the distance between her and him. There is a parallel here. Neither the negative part of Robinson (1953a) nor its restatement in Robinson (1959a) struck me as having anything to do with intertemporal general equilibrium theory until I had thought about the significance for capital theory of the transversality and "jump" conditions of optimal control theory. In short, I was better able to appreciate the importance of Robinson's literary argument from the vantage point of a mathematical model. Going the other way—from Robinson's wide-ranging discussion to a formalization that captures its essence—is much harder to do. Nevertheless, just as the interpretation of formal models can sometimes fail to educe all their implications, so the literary arguments of a subtle thinker of Robinson's caliber can actually shed light on what might otherwise be missed.

fundamental issue, we take up the constructive part of Robinson's critique, which is most easily introduced by first considering a traditional question that arises in connection with the simplest model of production.

2. AN OLD-FASHIONED QUESTION

To-day, in country Alpha, a length of roadway is being cleared by a few men with bulldozers; in Beta a road (of near-enough the same quality) is being made by some hundreds of men with picks and ox-carts. In Gamma thousands of men are working with wooden shovels and little baskets to remove the soil. —Robinson (1953a, p. 82)

Where are the workers and the capital goods to be placed on an isoquant corresponding to a "length of roadway?" The strong men, carrying baskets of stones are at one point; the more ordinary fellows with picks and ox-carts are somewhere else; and the skilled drivers of expensive bulldozers are at a third point. What is the variable on each axis, Robinson wanted to know, and why do the three points fall along a graceful convex curve?

In an article that was once standard fare for undergraduate students, Robertson gave an answer to a similarly motivated question. He appeared to embrace the idea that substitution of labor for capital entailed a change in the type of capital goods in use:

If ten men are to be set to dig a hole instead of nine, they will be furnished with ten cheaper spades instead of nine more expensive ones; or perhaps, if there is no room for him to dig comfortably, the tenth man will be furnished with a bucket and sent to fetch beer for the other nine. (Robertson, 1931, p. 226)

Stigler expressed the same view:

We can hold the house-building tools at \$2000, say, but vary their form so that they are most appropriate to whatever quantity of labor we employ. With fewer men, we use fewer and more elaborate tools; with more men, we use more, but less elaborate, tools. ... This broader sense of "constancy" is obviously more appropriate when we are studying the behavior of an entrepreneur who seeks to maximize the output

from given resources, if he can in fact change the form of the constant factors. (Stigler, 1987, p. 136)⁵

As in the road-building and digging examples, capital goods change their physical nature when labor is substituted for capital—a difficulty for the production function/isoquant point of view, which led Robinson to a pithy conclusion. “‘Capital’ is not what capital is called, it is what its name is called” (Robinson, 1953a, p. 83).

No one denies that a given piece of capital equipment, such as a blast furnace, can be operated more or less intensively, but variable factor proportions in this sense should be confined to the short period.

Therefore the description of a blast furnace includes an account of its rate of output as a function of the number of bodies operating it. (When long-period equilibrium prevails, the number of bodies actually working each piece of equipment is the number which is technically most appropriate to it). (Robinson, 1953a, p. 83)

And certainly there are instances in which the empirical existence of an isoquant is confirmed by data. One famous study (Cookenboo, 1955) revealed a trade-off between hydraulic pressure and pipe diameter in the generation of throughput over an oil pipeline. This godsend became a part of standard pedagogy and is still cited (Besanko and Braeutigam, 2002, p. 250). The paucity of such direct confirmations of a standard analytical device suggests, however, that an alternative approach to production theory should be considered.⁶ In particular, no one denies that examples of substitution of labor for capital in industry often entail differences in the physical characteristics of produced inputs. Highlighting

⁵This passage is unchanged from Stigler (1966, pp. 129-30). In an earlier edition of *The Theory of Price*, the corresponding section recalled Robertson's remark that the tenth man might be given another task (fetching beer) if the given input (nine spades) were not “adaptable” (Stigler, 1952, p. 117). Modern textbooks simply gloss over the problem of drawing a link between examples of substitution, not unlike Robinson's, and the analytical construct that is meant to represent them. A thoughtful reader of Besanko and Braeutigam (2002, pp. 234-5) must wonder how to connect the discussion of a switch from low-tech to high-tech workers—appropriately equipped—to the isoquant appearing on the previous page.

⁶The standard defense of the production function point of view is based on duality arguments. No inherent interest attaches to the form of the production function, according to this line of argument, because only the estimated coefficients of a dual cost function, which satisfies linear homogeneity and concavity in factor prices, are of interest. See Silberberg and Suen (2001, pp. 237-38).

this aspect of choice of technique was a hallmark of many of the formalizations of the constructive part of Robinson's critique of the aggregate production function.

3. THE CONSTRUCTIVE PART

The simplest model to bring out the significance of differences in the physical characteristics of the capital goods embodied in the various techniques is well known from the work of Hicks (1965), Spaventa (1968), and Garegnani (1970). The model allows for the perverse case in which a more labor intensive technique is eligible at a higher real wage rate and shows how reswitching of techniques can arise. In a characteristic turn of phrase, Robinson emphasized the significance of reswitching for the relationship between the real wage and the labor intensity of the technique: “double switching is associated with perversity. The interesting point, however, is the perversity, not the duplicity” (Robinson and Naqvi, 1967, p. 580).⁷ Her conclusions concerning the unimportance of reswitching are found in a subsequent paper where Harris (1973) is credited with setting out the analysis “elegantly and perspicuously” (Robinson, 1975a, p. 35). Harris analyzed the relationship between the rate of profit and the value of capital per worker in terms of a *price* effect, a *composition* effect, and a *substitution* effect.

When technical coefficients are given, a difference in the rate of profit has both a price effect and a composition effect. The former alters the relative price of each capital good and thereby changes the value of the economy's capital-labor ratio; the latter alters physical ratios of capital goods per unit of labor, as a change in the profit rate alters the composition of output through its effect on the growth rate. In a two-sector model with one capital good or machine, the price effect can increase the value of capital per unit of labor or reduce it, at a higher profit rate, depending on whether production of the machine is machine intensive or labor intensive relative to the consumption good.

The composition effect can go either way. It depends on differences in technical input ratios and the propensities to save out of wages and profits. The easiest way to see this is to consider Harrod's expression for the warranted growth rate: the overall propensity, *s*, to save divided by the capital-output ratio, *v*. If propensities to save out of wages and

⁷Read “duplicity” here not as a reference to the neoclassical argument or as a rude slam against those who offered it, but rather as a memorable characterization of a formal result, carefully worded by Robinson to highlight its significance. A technique that comes back cannot “decide” whether it is a low profit rate technique or a high profit rate technique—it is *duplicitous*.

profits are equal, the numerator is constant with respect to distributive changes and so the growth rate varies inversely with the capital-output ratio. In this case, the composition effect is always negative. On the one hand, suppose that the machine is machine intensive. Then v is higher when the profit rate is higher and so the growth rate is lower. For this reason, the machine labor ratio is lower (because the machine is machine intensive) and so the capital-labor ratio is lower. On the other hand, suppose the machine is labor intensive. Then v is lower when the profit rate is higher and so the growth rate is higher. But the machine/labor ratio is still lower (because the machine is now labor intensive) and so the capital-labor ratio is again lower. When the average propensity to save increases with the rate of profit (because the propensity to save out of profits is higher than the propensity to save out of wages) the composition effect can go either way. This possibility arises because the effect on the capital-output ratio is small (but positive) when the machine is only slightly more machine intensive than the consumption good. In such a case, the growth rate increases when a higher profit rate raises s proportionally more than v (machines are somewhat machine intensive) and so the machine/labor ratio is also higher (again, machines are machine intensive). Now, the composition effect results in a higher rather than a lower capital-labor ratio.⁸

These results find comparable expression in a neoclassical growth model. Indeed, much of the interest in the two-sector model made famous by Uzawa (1961; 1963) turned on the possibility of an unstable solution in the case in which capital goods are capital intensive. However, there is a more fundamental difference between the neoclassical formulation and the two-sector heterogeneous capital good model, which was used to elucidate the reswitching phenomenon. That model allowed for the units of measurement of capital goods to *differ* across techniques, unlike Uzawa's formulation where variable proportions in the use of a given type of capital and labor is the focus of analysis. Thus, choice of technique is differently defined even in the case in which the spectrum of techniques allows for a continuously differentiable envelope of wage-profit curves. As Robinson remarked, "however dense the pages of the book of blueprints,

⁸See Spaventa (1968, pp. 29-30) for a discussion of the composition effect. It may be noted that the sign of the price and composition effects, taken together, depend only on the relative machine/labor ratio in the two sectors: positive when the machine sector is machine intensive and negative when the consumption sector is machine intensive. In the last row of Table 1 in Harris (1973) the "?" mark can therefore be changed to "+", given fixed coefficients. See Gram (1976, p. 898, n. 10).

there must always be a discontinuity in engineering terms between one technique and the next" (Robinson, 1977b, pp. 66-67).

This means that the physical characteristics of the capital goods in use may be entirely different comparing one technique with another. What makes two techniques equivalent at a switch point on the wage-profit frontier involves a calculation of values; namely, equality of the rate of profit corresponding to a switch point with the ratio of the difference in the value of output per worker to the difference in the value of capital per worker, comparing one technique with the other (Harris, 1973, pp. 105-6). Robinson, of course, always insisted on the conceptual distinction between the who's who of capital goods and the value of the stock of capital as a whole.

Harris's substitution effect brought out the implications of this key difference in the meaning of choice of technique. Along an envelope of wage-profit curves, it is remarkable that the units of measurement of the capital good are hidden. In the two-sector model, the only coefficients that matter for the slope and curvature of each wage-profit curve are: (a) the unit labor requirement in the production of the consumption good; (b) the capital good requirement in the production of the capital good; and (c) the mixture of coefficients (a pure number) that defines the relative use of labor and machines in the two sectors.⁹ In the continuous case, even the latter drops out (Brown, 1969, p. 340) in which case the substitution effect depends on just two of the four technical coefficients in the model.¹⁰

⁹Only the product of the labor input per unit of output of the machine multiplied by the machine input per unit of output of the consumption good appears among the parameters of each wage-profit curve. In this connection, Hicks (1965, p. 140) drew a distinction between his *wage equation* (the wage-profit curve) and Samuelson's linear factor price equations whose envelopes are contours of sectoral unit cost functions with wage rates and rental rates on the axes. (Units of measurement of produced inputs and the prices of each sector's output determine the relative positions and points of intersection of a set of factor price frontiers.) Hicks noted that the rate of profit is not a factor price. Rather, when prices are constant, the profit rate is the ratio of each rental to the price of the corresponding produced input. Eliminating all such prices from a set of factor price equations yields a wage-profit curve. When prices are changing over time, own rates of return reflect both rental rates and capital gains and losses. Bruno (1969, p. 49) derives a surface showing the relationship between the real wage and the various own rates of return for a given technique. Garegnani (2000, pp. 392-3) also considers the incorporation of changing prices in the definition of own rates of return and contrasts this with inequality of effective rates of return.

¹⁰Garegnani (1970) allows for continuous variation in the coefficients that define the wage-profit curve even though underlying techniques use different capital goods and labor in fixed proportions. Differentiability of his envelope of curves is discussed

Continuity of change may seem out of place in a model in which capital goods are specific to techniques. In the context of the two-sector heterogeneous capital good model, it does have the advantage of showing that none of the novel results in capital theory first discovered by Robinson were in any way dependent on jumps in the slope of the frontier of wage-profit curves at switch points. Moreover, when the change in the parameter indicating relative machine intensity across sectors is eliminated (using conditions for a continuously differentiable envelope of wage-profit curves), reswitching is thereby shown to be independent of the concept of “factor intensity reversal”—one can occur with or without the other. Thus, each of a pair of hyperbolic wage-profit curves that intersect twice in the positive quadrant can be convex to the origin (the consumption good is machine intensive); concave to the origin (the machine is machine intensive); or one can be concave and the other convex, indicating a difference in relative machine intensity, comparing one technique with the other.

When choice of technique means nothing more than a variation in the proportions in which given inputs are utilized—a variation that Robinson confined to the short period (Robinson, 1975a, p. 33)—the substitution effect in a two-sector model always contributes towards (without guaranteeing) an inverse relation between the value of capital per worker and the rate of profit. A higher rate of profit and lower wage is associated with an increase in the unit labor requirement in the production of the consumption good and a decrease in the capital good requirement in the production of the capital good. However, both input requirements can increase or decrease with the profit rate when different long-period positions entail a difference in the physical specifications of the capital good in use, *pace* Robertson and Stigler. This leaves completely indeterminate the relationship between the rate of profit and the value of capital per worker, whether Harris’s combined price and composition effect is positive (when the capital good is capital intensive) or negative (when the consumption good is capital intensive).¹¹

in the Appendix to Gram (1976). Kurz and Salvadori (1999) simplify Garegnani’s example and obtain an explicit function for the wage-profit frontier.

¹¹These results are worked out in detail in Gram (1976) where a comparison is drawn between the two-sector, many technique (and therefore many capital good) model and the two-sector variable proportions (one capital good) model. In Gram (2003), the results are extended to encompass the formal development of Robinson’s productivity curves by Salvadori (1996). Contrasting definitions of Real and Price Wicksell Effects are also considered. In the Appendix to Gram (2003) there are misprints at the bottom of p. 505 that do not affect subsequent results. In the equation

The clarifications and extensions of the constructive part of Robinson’s critique showed that there is no basis for the conclusion that an economy with a higher value of capital per worker, and facing the same spectrum of techniques as some other economy, will generally have a lower rate of profit. That the rate of profit is not therefore a measure of the relative scarcity of capital was seen as a fundamental challenge to orthodox theory. The answer to this striking proposition was not a conspiracy of silence, as has been suggested, but a reasoned argument about the meaning of dynamic equilibrium, which had been developing in parallel from the very beginning of the controversy. To this, we turn in the next section. As for Robinson’s own reaction to those who had carried forward the constructive part of her critique, she acknowledged that her original treatment of the implications of choice of technique “was clumsy and contained errors” (Robinson, 1975a, p. 35). Crediting others with a more rigorous analysis, she nevertheless took pains to dismiss the claim that the main problem with the neoclassical analysis of capital accumulation turned on reswitching and other capital theoretic anomalies.

Nothing could be more idle than to get up an argument about whether reswitching is “likely” to be found in reality. Even if there was such a thing as a pseudo production function, there could be no movement along it to pass over switch points, and furthermore, in reality, there is no such thing as a pseudo production function. ... There is no such phenomenon in real life as accumulation taking place in a given state of technical knowledge. The idea was introduced into economic theory only to give a meaning to the concept of the marginal productivity of capital, just as the pseudo production function was constructed in order to show that it has no meaning. (Robinson, 1975a, pp. 38-39)

The prominence Robinson gave to the negative part of her famous critique of the aggregate production function in her *Collected Economic Papers* suggests that she had come to this conclusion by the late 1950s. And it became increasingly clear. In her 1975 exchange with Samuelson, from which the above passage is quoted, she insisted that none of the thought experiments surrounding the pseudo production function (and its dual wage-profit frontier) shed any light on the difficulties of analyzing

for the combined composition and price effect, a minus sign should immediately follow both “=” signs, and the numerator of the second term should be multiplied by v_1 . A minus sign should also follow “=” in the equation for $C + P$ on p. 497.

an actual process of accumulation in a world where the consequences of past mistakes cannot be undone and where the future is unknowable.¹²

4. ROBINSON'S MAIN BATTLE

Undisputed results concerning reverse capital deepening and reswitching of techniques shook the faith in "low brow" capital theory based on one-sector "parables," but had no such consequences for "high brow" theory. Defenders of orthodoxy regarded the citadel of intertemporal general equilibrium theory as immune to attack. Work in this area goes back to Frank Ramsey (1928), but among the more important contributions to be made during the period of controversy in the theory of capital were Malinvaud (1953), Dorfman *et al.* (1958), and a collection of essays on the theory of optimal economic growth (Shell, 1967), all of which find echoes in the later work of Bliss (1975), Cass and Shell (1976), and Burmeister (1980). More recently, a systematic study by Burgstaller (1994) goes so far as to claim that the Hamiltonian dynamics typical of intertemporal equilibrium analysis provides a unifying framework for classical and neoclassical theory (Burgstaller, 1994, p. 10).

As noted above, this parallel universe existed from the beginning—even the dates of some of the key publications match up with some of the key contributions to the capital controversy. Malinvaud's seminal paper was published in the same year as Robinson's famous critique, and the Shell volume of essays came out close on the heels of the famous 1966 "Symposium" in the *Quarterly Journal of Economics*. Surprisingly, "high brow" neoclassical capital theory received little attention from the critics of neoclassical "parables." Recent papers by Garegnani (2000) and Schefold (2000) are exceptions together with an issue of *Metroeconomica* (May, 2001) devoted to critical commentary on the remarkable book by Burgstaller (1994). His goal was to provide an analytical bridge between classical and neoclassical theory (including its most general Arrow-Debreu formulation) using the techniques of optimal control theory and dynamic programming—what Burgstaller refers to generally as Hamiltonian dynamics. He analyzes a wide range of familiar, low-dimensional models, which allows him to use simple diagrams to elucidate some otherwise difficult mathematical analysis. The essence of the argument is to generalize the notion of a uniform rate of profit to allow for capital gains and losses, a generalization entirely acceptable to those engaged in

¹²See also the discussion in Harris, this volume, leading up to his notes 17 and 18, and also the sixth of his ten properties of historical time. Dutt, also in this volume, considers in a more general way the role of changes in parameters, which are unknowable, even in a probabilistic sense.

the revival of a Sraffian inspired classical economics (Garegnani, 2000, n. 2). But this is not all. Relative prices are not only structured by the imposition of arbitrage conditions, they are also anchored to some future point in time when relative prices stabilize. It is this anchoring that raises all the questions that Robinson was concerned about in the negative part of her critique of mainstream capital theory.

That the emperor has no clothes is now clear. All the work on intertemporal general equilibrium theory shows that it is afflicted by a profound type of instability—what Burgstaller (1994, pp. 36-42) calls saddle-path instability, although he does not regard it as a weakness.¹³ Robinson's assessment was typically terse. "For my part, I have never been able to make that theory stand up long enough to knock it down" (Robinson, 1980a, p. 128). Her dismissive remark was mathematically cogent—getting an economy to follow a convergent saddle-path to a position of long-run equilibrium *is* rather like trying to stand an egg on its head!

In the abbreviated version of her original attack on the production function, and especially in her re-statement of its central argument, Robinson described such equilibrium paths with great subtlety. Her discussion remains a penetrating, critical commentary on the central economic questions that optimal control theory and dynamic programming fail to address. For what is striking about the applications of these formal methods to the analysis of capital accumulation is the requirement that initial *prices* be *set* in such a way as to ensure that myopic foresight does not lead, in finite time, to a meaningless result. This setting of initial prices puts the rabbit into the hat in full view of the audience, a kind of circular argument that reconciles the inherent conflict between the arbitrariness of the initial stock of physical capital and the requirement of a uniform effective rate of return on the supply prices of all capital goods.¹⁴ It is as if the model's parameters were to include the variables it is meant to determine!¹⁵

¹³Of course, he is not alone. A spirited defense of models whose solutions are saddle-paths is found in the first three chapters of Begg (1982). The analysis of saddle-path solutions by Evans and Guesnerie (2003) offers a more pessimistic viewpoint.

¹⁴In response to a question about his early work on capital accumulation, Malinvaud remarked: "Overall, this work contributed to make mathematical economists understand why they should pay attention to transversality conditions" (Krueger, 2003, p. 189).

¹⁵Circular reasoning associated with perfect foresight has long been viewed as a methodological error. "Should complete foresight be an indispensable postulate... there results that wider paradox that the science has already posited the object that it is first to investigate; that, without this assumption, the object could not exist at all in the meaning specifically considered" (Morgenstern [1935], 1976, p. 175).

The inherent problem of reconciling an inherited past—that arbitrary vector of capital goods—with the classical competitive requirement of a uniform rate of profit has been made less visible by assuming that prices take on initial values that can then follow a path that reconciles the future with the past. The problems that equilibrium saddle-path solutions thus ignore are precisely the issues that are the central focus of Robinson's argument.

The Keynesian freedom of entrepreneurs to invest as they please has... been sacrificed... to the postulate that equilibrium is never ruptured.... There is one pattern of physical investment that will preserve equilibrium, and one pattern of expectations that will induce investment to take that physical form; it is just these expectations that are confidently held by the firms carrying out investment.... Since this is true at every moment, the history of accumulation is prescribed and the evolution of the stock of capital through time is determined by it.... The who's who [of capital goods] and the values for all past and future dates are implicit in the situation at the moment, and the whole history, backward and forward, can be seen at any moment in it... We let ourselves in for this when we accepted the neoclassical postulate of continuous equilibrium with full employment. (Robinson, 1959a, pp. 435-6)

This description of an equilibrium path—even more vivid in its full dress version—complements and immeasurably enriches its mathematical counterpart. It is an antidote to the formal beauty of dynamic optimization theory, a theory that “posits myopic perfect foresight... and then picks out the path that leads to a stationary or steady state by invoking the transversality condition... [simply because] the mathematics shows that all other paths lead eventually to a meaningless result” (Gram, 2003, p. 502).

Samuelson once used the compelling imagery of a bicycle, balanced in motion, to lend plausibility to this type of equilibrium:

The rider of the bicycle is the bulk of the market... like... the well-informed speculator who gets his way in the end because his way is the correctly discerned way of the future; and those who think differently are bankrupted by their bets against (him and) the future. (Samuelson, 1967, pp. 229-30)

It would have lent clarity to his debate with Robinson in 1975 if Samuelson had repeated this imagery. After asking why a system might

move along a warranted path, he refers to the role of “perspicacious planners, or avaricious speculators in forward markets” (Samuelson, 1975, p. 45, n. 7). It is their role to place the economy on a convergent saddle-path (*cf.* Burgstaller, 1994, p. 14). In his text, Samuelson grants that:

a skeptic may legitimately doubt that... a competitive market system will have the “foresight” or the perfect-futures markets to approximate in real life such warranted paths that have the property that, if everyone knew in advance they would occur, each will be motivated to do just that which gives rise to them. (Samuelson, 1975, p. 45)

Indeed, the manner in which speculators bring about an intertemporal equilibrium of supply and demand is never made clear. Is the cyclist's sense of balance sufficient justification for using a magic wand, called the transversality condition, to pick out a convergent saddle-path? This sleight of hand erases the troublesome effects of past decisions made under different circumstances and sets the economy on a new convergent path where events unfold as expected. For Robinson, this methodology is unacceptable. It ignores the dead hand of history and regards the future as knowable.

Thus, the key point that unifies Robinson's critiques of orthodoxy is the intimate connection between realized expectations and equilibrium, an essential element of neoclassical theory. Her argument is robust against the claim that the capital theoretic problems “thrown up by Robinson's article and related work especially that by Sraffa” (Harcourt, 1972, p. 14) can be *finessed* using a theory that literally jumps past the awkward corners. For it is the aptly named “jump condition” (Bruno, 1967, p. 185) that ensures that: “There *is no technique reswitching* along the optimal path... The own rates of interest... jump discretely, avoiding intermediate switching points” (Bruno, 1967, p. 215). That such paths cannot be reached without assuming away the influence of the past and letting the unknowable future determine the present configuration of prices was precisely Robinson's point!

5. CONCLUSION

The importance of foresight for the problem of capital valuation was seen by some readers of Sraffa, in particular, as a distraction from the larger goal of developing a mathematically rigorous classical economics. Unresolved questions surrounding the problem of gravitation of market prices towards long-period Sraffian prices suggest that expectations may

yet play a central role in such a theory. In any case, what is demonstrably clear is that “high brow” neoclassical capital theory is caught in an expectations conundrum from which there is no escape. Initial prices (including “new” initial prices following a change in parameters) must be set precisely in order to evolve coherently—a result closely connected to the saddle-path property of an equilibrium path of accumulation. Intimations of this problem are found in early criticisms of cost-of-production theories of price. Irving Fisher wrote, “When prices find their normal level at which cost plus interest are covered, it is not because the past costs of production have determined prices in advance, but because the sellers have been good speculators as to what prices would be” (Fisher, 1906, p. 188). He was equally clear about causation. “When values are considered, the causal relation is... not from present to future, but from future to present” (Fisher, 1906, p. 328).¹⁶ Of course, all would agree that the current price of any traded durable good depends, in part, on its expected future value. But what is the basis for such an expectation? Neoclassical theory assumes that the future is knowable and that at least the probability distributions of future prices can be discerned from past history. Robinson saw no justification for either assumption. For her, the concept of equilibrium, especially when pressed into service to reconcile an unchangeable history with an unknowable future had the enervating effect of closing off discussion of complex and sometimes politically charged questions.

The history of economic thought is a largely unused mine of insight and understanding for today’s graduate students, but if they can spare a few moments for Robinson’s Keynesian inspired assessment of what it means to follow an equilibrium path of accumulation along its undisturbed course, they might be steeled against an unquestioned faith in the relevance of the type of dynamic theory that is now de rigueur. Thus inoculated, new horizons will beckon and they may even be inspired to write economic theory in the often beautiful, incisive and sometimes biting style that made so many of Robinson’s papers a pleasure to read.

¹⁶See also my comment appended to Bharadwaj (1990) who drew upon these remarkable passages from Fisher’s classic, *The Nature of Capital and Interest*.

7. Robinson, History and Equilibrium

Amitava Krishna Dutt¹

1. INTRODUCTION

Most of economic theory relies on the concept of equilibrium, which normally implies that the economy’s resting place (or its equilibrium) is independent of the path through which it travels.² In other words, where the economy ends up does not depend on its past history.

This disjuncture between equilibrium analysis and history appears to run counter to common sense. Next time you are in a group of people, ask them whether what happens to us over time determines where we end up. They will most likely answer in the affirmative.³ Are they wrong, or is so much of economic analysis off the mark?

Not all economists are comfortable with this disjuncture, however. Joan Robinson, for one, has frequently argued that equilibrium analysis in economics does not provide an adequate role for history, and has made this the basis of her criticism of mainstream neoclassical economics. In this, she has been joined by many other post-Keynesian economists. At the same time, and like most economic theorists, she has frequently used equilibrium analysis in her own work, including that on economic growth.

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²A growing body of economic analysis, some of it discussed below, has begun to give history a more prominent role. However, such analysis can still be called the exception rather than the rule, with standard models of path-independent equilibria predominating.

³This is likely to be the case even for economists, who have had heavy exposure to equilibrium models, but is probably more strongly the case for people who are not economists. Although I have not conducted a formal survey on this question, at a seminar presentation in the Faculty of Economics at the University of Notre Dame in September 2003, all but one of the 26 present (all economics faculty or graduate students) answered the question—what happens now affects where we end up—in the affirmative. The remaining person abstained; no one thought that where we end up is unaffected by what happens now. At the Joan Robinson Conference I asked a large lecture theater full of people the same question, and every single person in the room agreed with the statement. The sample was probably a biased one, however!

The purpose of this chapter is to critically examine the views of Robinson and other post-Keynesian economists on equilibrium analysis and its relation to history, and to assess the extent to which equilibrium analysis has grappled with their concerns. This is done with a view to understanding how, and the extent to which, equilibrium analysis can be and has been modified to allow history to play a greater role in economic analysis. The chapter uses Robinson's contributions as a point of entry into the discussion on equilibrium and history, and devotes some space to discussing and evaluating Robinson's views on the issue. However, it can also be read as a critical appraisal of different ways in which equilibrium analysis has tried to make more room for history.

The rest of this chapter proceeds as follows. Section 2 reviews Robinson's views on the subject, as well as the related ideas of Nicholas Kaldor and other post-Keynesian economists. Then, section 3 examines five different ways, with the analysis of time paths, parameters, instability and multiple equilibria, zero-root and unit-root systems, and hysteresis, in which history has been given a role in equilibrium analysis and clarifies some of the post-Keynesian ideas on history and equilibrium in terms of them. Section 4 concludes.

2. HISTORY AND EQUILIBRIUM

This section discusses the views of Robinson and other post-Keynesian economists, including Kaldor, on equilibrium and its relation to history.

2.1. Robinson

Robinson's views on the relevance of equilibrium analysis and the role of history evolved over time.⁴ From her first publication, in which Robinson (1932) held high hopes for equilibrium analysis, to her posthumously published nihilistic paper (Robinson, 1985), she traversed a wide range of views. The discussion here concentrates on the issues raised in her two main works on growth theory, that is, Robinson (1956b) and Robinson (1962a), and on her methodological discussions in Robinson (1974), because they are most relevant for understanding her views on history versus equilibrium.

In *The Accumulation of Capital*, Robinson (1956b, p. 57) writes that "(t)he metaphor of equilibrium can be applied to economic affairs only with great caution." She provides a number of reasons that make this caution necessary.

⁴I am grateful to Cristina Marcuzzo for pointing out that Robinson's views on equilibrium evolved over time. See also Cohen (1993) and Harcourt (1995).

First, she argues that although under some circumstances an economic system may be in equilibrium like a balance when it is stationary, such an equilibrium "is likely to be temporary and to contain within itself causes of change which will operate as time goes by (as though the balance were to grow restless and begin to shift without any change in weights)" (Robinson, 1956b, p. 57). As an example she considers the case of equilibrium in the bond market where the price is at a position of rest that is higher than the average experienced over the recent past, with an upward movement checked by asset holders who expect that high prices will not last. But if the market remains in this position for a while, expectations may be revised, as bearish asset holders become bored and begin to buy bonds, pushing up bond prices. She states that similar considerations may also apply to goods markets.

Second, she argues that "[w]hen a market reacts to changes in circumstances, we cannot liken it to the reaction of the balance to a once-for-all change in the weights. However the balance wobbles about, it will come to rest in exactly the same position; but in most economic situations the path the market follows, while it is adapting to change, has a long-persisting effect on the position that it reaches" (Robinson, 1956b, p. 58). As an example she points out that plant once installed cannot readily be switched to other markets, so that investment will have a long-lasting effect.

Third, she states that we cannot "apply the metaphor of a balance which is seeking or tending to a position of equilibrium though prevented from actually reaching it by constant disturbances. In economic affairs the fact that disturbances are known to be liable to occur makes expectations about the future uncertain and has an important influence on any conduct... directed towards future results... A belief that a particular share is going to rise causes people to offer to buy it and so raises its price... This element of "thinking makes it so" creates a situation where a cunning guesser who can guess what other guessers are going to guess is able to make a fortune. There are then no solid weights to give us an analogy with a pair of scales in balance" (Robinson, 1956b, p. 58-9).

To make clear that equilibrium in economics is not a state in which disturbances can be ruled out, Robinson introduces a different term for such states: a state of *tranquility*. In such a state the economy "develops in a smooth regular manner without internal contradictions or external shocks, so that expectations based on past experience are very confidently held, and are in fact confidently fulfilled and therefore renewed as time goes by" (Robinson, 1956b, p. 59).

In her subsequent *Essays in the Theory of Economic Growth* (1962a), Robinson continues with her analysis of problems with the concept of equilibrium in economics by distinguishing between two kinds of economic “arguments:”

One kind ... proceeds by specifying a sufficient number of equations to determine its unknowns, and so finding values for them that are compatible with each other ... The other type of argument specifies a particular set of values obtaining in a moment of time, which are not, in general, in equilibrium with each other, and shows how their interactions may be expected to play themselves out. (Robinson, 1962a, p. 23)

In the first type of argument the equations may in fact determine a path through time, but “the time through which such a model moves is, so to speak, logical time, not historical time” (Robinson, 1962a, pp. 23-4). Although she admits that one can learn much from

a priori comparisons of equilibrium positions, they must be kept in their logical place. They cannot be applied to actual situations; it is a mortal certainty that any particular actual situation which we want to discuss is not in equilibrium. Observed history cannot be interpreted in terms of a movement along an equilibrium path nor adduced as evidence to support any proposition drawn from it. (Robinson, 1962a, p. 25)

She argues that on “a two-dimensional diagram, time lies at right angles to the plane on which the diagram is drawn, with the past behind it and the future in front” (Robinson, 1974, p. 52).

The second kind of argument can, presumably, be used to analyze historical processes. She writes:

When the initial conditions are not in equilibrium, the model depicts how their interactions will play themselves over the next future. When a disturbance occurs on the equilibrium path, the model depicts how the economy responds to it. In reality, disturbing events occur on disequilibrium paths. The resulting turbulence is beyond the skill of model builders to analyse. Historical analysis can be made only in very general terms. When the analysis leads to results that are contradicted by experience the model must be re-examined to see whether there was some error in its construction or only some ill-considered application of it in the analysis. (Robinson, 1962a, pp. 26-7)

Robinson’s description suggests that, in her view, the main differences between the two kinds of arguments relate to, first, whether the model involves a set of simultaneous equations that are independent of time or whether it involves interactions that work out over time, and second, the extent to which the analysis can be precisely formalized. An additional difference relates to causation. She argues that

[i]n a model depicting equilibrium positions there is no causation. It consists of a closed circle of simultaneous equations. The value of each element is entailed by the value of the rest. At any moment in logical time, the past is determined just as much as the future. In an historical model, causal relations have to be specified. Today is a break in time between an unknown future and an irrevocable past. What happens next will result from the interactions of the behaviour of human beings in the economy. Movements can only be forward. (Robinson, 1962a, p. 26)

However, Robinson does not argue that the distinction between logical and historical time has to do with stationary equilibrium relations. Logical time analysis can determine a time path, for instance “a continuous accumulation of capital, or a particular pattern of fluctuations” (Robinson, 1962a, p. 23).

So far we have focused on some *characteristics* of logical and historical time. To dig deeper into Robinson’s distinction between them we can examine the *sources* of the difference between them. These can be understood by reviewing her method of analyzing growth. In developing her growth model, she argues that the determinants of equilibrium can be grouped under: technical conditions; investment policy; thriftiness conditions; competitive conditions; the wage bargain; and financial conditions. But, for a historical model “we want to be able to start in any position, whether equilibrium or not, and discuss what will happen next. To the above list of determinants, therefore, we must add ... [t]he initial stock of capital goods and the state of expectations formed by past experience” (Robinson, 1962a, p. 35). This suggests that the two important sources of difference between equilibrium (logical time) and historical analysis, are the stock of capital and expectations. In particular, Robinson repeatedly stresses the role of expectations. She argues that the analysis of historical time requires the analysis of disequilibrium states in which economic agents have expectations that can be falsified (see Robinson 1962a, pp. 25-6). “As soon as the uncertainty of the expectations that guide economic behaviour is admitted, equilibrium drops out of the argument and history takes its place” (Robinson, 1974,

p. 48). In later work she points out that, “For mechanical movements in space, there is no distinction between approaching equilibrium from an arbitrary initial position and a perturbation due to displacement from an equilibrium that has long been established. In economic life, in that decisions are guided by expectations about the future, these two types of movements are totally different” (Robinson, 1974, p. 49).

For Robinson, the distinction between logical and historical analysis is related to the distinction between the effects of a parametric change in any economy as it evolves over time, and the effects of different levels of parameters for two different economies. “If we construct the equations for a single self-reproducing system and then confront it with an unforeseen change, an event taking place at a particular date, we cannot say anything at all before we have introduced a whole fresh system specifying how the economy behaves in short-period disequilibrium” (Robinson, 1974, p. 50). “The argument must be conducted ... strictly in terms of comparisons of specified positions. We cannot say anything about how any position was reached from some other starting point. ... It is not legitimate to introduce an event into a system of simultaneous equations” (Robinson, 1974, p. 52). It is for this reason that in her analysis of growth, Robinson (1956b, p. 77) makes comparisons between two different economies, *Alaph* and *Beth*, which are similar in all respects except for one element, rather than considering changes in that element in one economy.

To conclude this discussion we note that Robinson’s main target in criticizing equilibrium and advocating the analysis of historical processes appears to be the neoclassical approach.⁵ Discussing the basic textbook neoclassical supply-demand diagram she states that for the price “falling and rising are movements in time, and there is no time on the plane surface of the diagram. Time may be conceived to lie at right-angles to the page but nothing in the picture tells us what happens when we move off the sheet” (Robinson, 1962a, p. 22). She absolves the classical economists of the charge of doing equilibrium analysis, since their main preoccupation was with “an historical process of accumulation in a capitalist economy with its relation to the distribution of the product of industry between the classes of society while the neoclassicals concentrated upon conditions of equilibrium in a stationary state” (Robinson, 1974, p. 48). According to her, Keynes, by taking into account the fact that expectations about the future are necessarily uncertain, takes into

⁵Although she does not define the approach precisely, from the contexts it seems that she has both the Marshallian partial equilibrium supply-demand approach, as well as the Walrasian general equilibrium model in mind.

account the historical nature of time. Robinson recognizes that her quarrel with the neoclassical approach is primarily because of the distinction between equilibrium and history. Although Robinson was one of the main participants in the Cambridge capital controversies (see Harcourt, 1972), she states that “[t]he long wrangle about ‘measuring capital’ has been a great deal of fuss over a secondary question. The real source of trouble is the confusion between comparisons of equilibrium positions and the history of a process of capital accumulation” (Robinson, 1974, p. 57). Despite her critique of neoclassical economics on this basis, however, she recognizes that this approach does not have a monopoly in ignoring history. She points out that the “specification of a self-reproducing or self-expanding system such as that of Sraffa or von Neumann exists in logical time, not in history” (Robinson, 1974, p. 50).

2.2. Kaldor and other post-Keynesians

Although the work of many economists who can be called post-Keynesians is of relevance for the interpretation of equilibrium, this subsection concentrates on Kaldor’s work, since he explicitly discussed the shortcomings of the equilibrium method for its failure to incorporate history into economic analysis.⁶ A few other post-Keynesian contributions are briefly discussed because of their relevance to Robinson’s writings: Kregel (1976), for shedding important light on uncertainty and expectations; Dow (1985), for providing a useful taxonomy of different conceptions of time in economics; and Eatwell (1997) because of its opposition to Robinson’s distinction between logical and historical time.

In one of his earliest publications Kaldor reveals a subtle understanding of the nature of equilibrium analysis. Examining the determinateness of equilibrium in a static neoclassical demand-supply model he defines an equilibrium to be indeterminate if “the successive moves undertaken in order to reach equilibrium will influence the nature of the final position” (Kaldor, 1934b, p. 41). He points out that indeterminateness can occur if the dynamics out of equilibrium do not occur infinitely quickly, and if some of the things that are given in the analysis, such as tastes and technology, change during the dynamic adjustment.

⁶Such authors include especially Kalecki (1971), Goodwin (1967), and Pasinetti (1981). Kalecki and Goodwin both eschewed the equilibrium method to focus on cyclical dynamics and Pasinetti focused on equilibrium balanced-growth conditions to examine why the economy would move away from them due to non-neutral technological and demand-side changes that resulted in unbalanced growth.

In his subsequent work Kaldor is highly critical of neoclassical equilibrium analysis. Writing on neoclassical economic theory, with its assumption of constant returns to scale, and given preferences, technology, and factor supplies, Kaldor writes:

The very notion of “general equilibrium” carries the implication that it is legitimate to assume that the operation of economic forces is constrained by a set of exogenous variables that are “given” from the outside and stable over time. It assumes that economic forces operate in an environment that is “imposed” on the system in a sense other than being just a heritage of the past, one could almost say an environment that, in its most significant characteristics, is independent of history. (Kaldor, 1972, p. 382)

He writes that even when attempts have been made to analyze growth and development using equilibrium theory, such attempts “have not succeeded in transforming it into a sequence analysis in which the course of development is dependent on the path of evolution” (Kaldor, 1975, p. 401). Kaldor’s most persistent and central criticism of neoclassical theory is its assumption of constant returns to scale, which he argues should be replaced with the assumption of increasing returns. He goes on to say that:

Once, however, we allow for increasing returns, the forces making for continuous changes are *endogenous* ... and the actual state of the economy during any one “period” cannot be predicted except as a result of the sequence of events in previous periods which led up to it. (Kaldor, 1972, p. 382, italics in original)

Despite the attention Kaldor gives to increasing returns to scale and to the role of history in his informal, verbal, discussions, when it actually comes to developing models of the economy, his analysis does not allow history to play a major role. His famous growth model with the technical progress function that relates the rate of growth of labor productivity positively to the rate of growth of the capital-labor ratio, representing some form of dynamic increasing returns or learning, also leads to a determinate equilibrium (Kaldor, 1961). His models with two sectors, an agricultural and a manufacturing sector, are used to show how the economy requires an equilibrium terms of trade between the two sectors for the two sectors to grow in a balanced manner, the growth rate being determined by the intersection of the manufacturing and agricultural sector growth curves (Kaldor, 1972; 1975). However, the equilibrium

in these models is “determinate” in the sense that it is independent of the path by which it gets to it. This is not very surprising, since these models do not exhibit increasing returns in manufacturing. In his last presentation of this model, Kaldor (1996) tries to incorporate Verdoorn’s Law (according to which labor productivity increases when the rate of growth of output increases) into the two-sector growth model by shifting the manufacturing sector growth curve outwards, resulting in an increase in the rate of growth. He also discusses other possible complications due to changes in expectations and speculative activity, but does not formally incorporate these features into his model.

It is only in his model of regional growth that history has a more prominent role. In this model Kaldor assumes that a region that goes ahead tends to forge further ahead, through a process of cumulative causation. The rate of (labor) productivity growth in this model depends positively on the rate of growth of real output (of the traded goods sector, on which Kaldor concentrates) through the so-called Verdoorn effect, which captures learning by doing and increasing returns. The rate of growth of output, in turn, is determined by the rate of growth of aggregate demand, which depends positively on the rate of growth of exports. The rate of growth of export depends inversely on the rate of increase in the domestic price. The rate of change in the price, in turn, is determined by the rate of change in the wage (positively), mark-up (positively) and productivity (negatively). It follows, therefore, that faster productivity growth leads to a more rapid growth of exports, hence output, and hence productivity, given other factors (such as the rate of wage change). Kaldor argued that the wage does not normally rise at the same rate as productivity (because relative wage across regions is relatively stable), so that some regions experience cumulative productivity increases and others, decreases. Kaldor’s model has been formalized by Dixon and Thirlwall (1975) who explicitly analyze the dynamics of the system. We will return to a discussion of this model and its subsequent formulations below.

Kregel (1976) argues that Keynes’s analysis in *The General Theory* and related articles contained three different equilibrium concepts, which can be distinguished according to how they deal with short-period expectations (relevant for the firms’ production decision) and long-period expectations (relevant for the investment decision). Static equilibrium assumes that short-period expectations are always realized, while long-period expectations are exogenous. Stationary equilibrium allows short-period expectations to be disappointed, but this disappointment does

not affect long-period expectations, which are still taken to be exogenous. Finally, in shifting equilibrium, the disappointment of short-period expectations may lead to the revision of long-period expectations. The first concept, the simplest one for presenting Keynes's theoretical structure, can be said to use the concept of logical time, since there is no actual reference to time in it. The second and third concepts examine the dynamics of expectations changes, the third more fully than the second (by endogenizing long-period, as well as short-period expectations). The third can be said to involve the notion of historical time. The static equilibrium concept aims to "tame" uncertainty to provide a simple formalization of the concept of effective demand and its role in producing unemployment equilibrium.

Dow (1985) provides a useful discussion of alternative meanings of time employed in economic analysis, distinguishing between four different concepts: historical, mechanical, logical and expectational time. Historical time, which is realistic, is irreversible. This she explains with the example of an egg: if an egg is broken, there is a new "state", "which cannot generate a return to the original state of the new egg" (Dow, 1985, p. 113). Mechanical time also considers a temporal sequence, but the transition from one state to another can be precisely reversed. Logical time (following Termini, 1981) does not refer to a temporal sequence at all, but rather a causal sequence. Here some variables are treated as exogenous and some are endogenous, and the exogenous ones can be said to determine or cause the values of the endogenous variables. Finally, expectational time (following Shackle, 1968, p. 67) refers to subjective perceptions of time by individuals in which expectations are formed and decisions are made. This conception, being strictly individualistic, must be interpreted in terms of one of the other three in order to examine interactions between individuals in economic analysis.

Not all post-Keynesians, however, find the Robinsonian distinction between logical and historical time to be useful. Eatwell (1997, p. 388) argues that "the term 'historical time' has no coherent analytically [sic] meaning and, far from providing the basis of a more concrete economics, is a source of theoretical nihilism." Eatwell argues that the parameters and relationships of a model are chosen because they are believed to be the major factors determining the variables to be explained. The solution of the model is its center of gravitation. All factors that can possibly affect the variables cannot be included; "a map on the scale of one to one would be useless" (Eatwell, 1997, p. 392). The factors left out, despite the fact that they exist in the real world, are excluded because they are thought to be of relatively small importance in the

sense that they do not produce significant and systematic deviations of the model's center of gravitation from the actual state of the world. If some historical data are considered important, their influence should be included in the model and in its logical conception of time.

Eatwell's defense of the logical conception of time and rejection of the validity and usefulness of the distinction between logical and historical time is motivated by the purpose of defending the neo-Ricardian model and its concept of center of gravitation from Robinson's criticism of it on the ground that it ignores historical processes.⁷ Whatever the motives, however, the charge of theoretical nihilism is an important one and should be considered carefully.

3. ALTERNATIVE INTERPRETATIONS OF THE ROLE OF HISTORY

Having discussed the views of Robinson and other post-Keynesians on equilibrium and history, we turn to subsequent formal attempts to incorporate history into equilibrium analysis. The first question is: what do we mean by incorporating history into equilibrium analysis? To fix ideas, we may begin with two standard types of mathematical models that are very frequently used in economic analysis, one treating time as a continuous variable, and the other as a discrete one. These will be taken to be benchmark models in which history is *not* incorporated into equilibrium analysis, into which history can subsequently be incorporated in different ways.

A general continuous-time model in which $x(t)$ is an n -dimensional vector, can be written in the form

$$\frac{dx}{dt} = F(x, \alpha) \quad (7.1)$$

a general first order n -dimensional differential equation system in which the vector α contains m constants; the time variable, t , has been suppressed. Assume that the solution to the equation $F(x, \alpha) = 0$ exists, is unique and is denoted by x^* , which can be called the equilibrium value of x for the dynamic system given by equation 7.1. Assume, moreover, that this equilibrium x^* is globally stable. This implies, starting with any initial value of x , say x_0 , the dynamic system given by equation 7.1 will converge to the equilibrium position, x^* . This in turn implies that the initial position, x_0 , which will determine the path of the system over time, does not affect the position of the final equilibrium: x^* depends on

⁷For an illuminating discussion of neo-Ricardian notion of the center of gravitation, and its limitations and relation (not entirely contradictory) to the ideas of Robinson and the post-Keynesians, see Harcourt (1981).

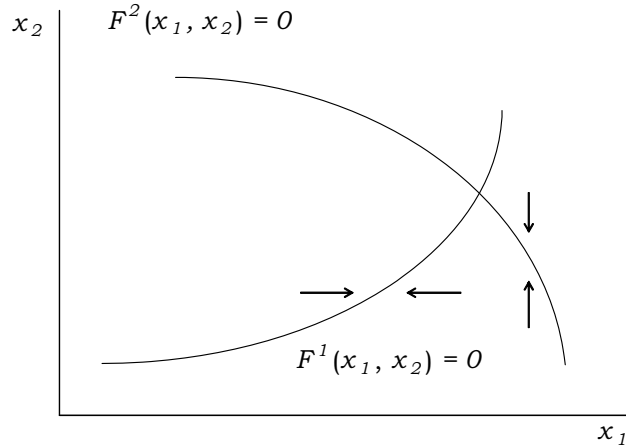


Figure 7.1. A two-variable dynamic system

the functions $F(\cdot)$ and on α , and on nothing else.⁸ A one-variable system can be depicted by measuring x on the horizontal axis, and dx/dt on the vertical axis. If the curve showing the function $F(x)$ intersects the horizontal axis only once and is downward-sloping at this intersection point, the equilibrium determined by $F(x) = 0$ is unique and globally stable. A two-variable dynamic system with the properties assumed here is shown in Figure 7.1.⁹

A general discrete time system involving the vector n -dimensional vector x_t ,

$$x_t = G(x_{t-1}, \alpha) \quad (7.2)$$

an n -dimensional, first-order difference equation system, α being an m -dimensional vector with given elements. Assume that the solution to the equation $x = G(x, \alpha)$ exists and is unique and is denoted by x^* , which is the equilibrium value of x for the dynamic system given by equation

⁸See, for example, Murata (1977) for further discussion of continuous time dynamic systems.

⁹The two equations are

$$\partial x_1 / \partial t = F^1(x_1, x_2)$$

$$\partial x_2 / \partial t = F^2(x_1, x_2)$$

where the sign pattern assumed for the diagram is $F_1^1 < 0$, $F_2^1 > 0$, $F_1^2 < 0$, and $F_2^2 < 0$, and where subscripts denote partials.

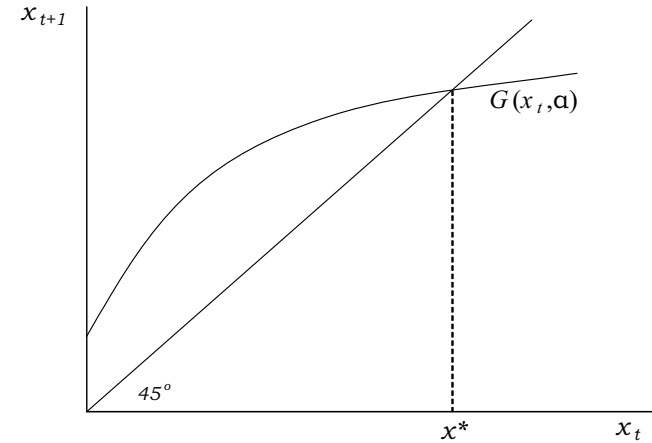


Figure 7.2. A one-variable dynamic system

7.2. Assume, moreover, that this equilibrium x^* is globally stable. This implies, starting with any initial value of x , say x_0 , the dynamic system given by 7.2 will converge to the equilibrium, x^* . This in turn implies that the initial position, which will determine the path of the system over time, will have no bearing on the position of the final equilibrium: x^* depends on the functions $F(\cdot)$ and on α , and on nothing else.¹⁰ A one-variable dynamic system with the properties assumed here is shown in Figure 7.2. It should be emphasized that adding a stochastic error term to the equation, as is often done in the economics literature, does not change the qualitative properties of the analysis.

I now consider a series of interpretations of how history matters, using these benchmark models where history apparently does not matter in the sense that the equilibrium does not depend on the initial condition or the path of the system, that is, on history.¹¹ For each, where relevant, I will: provide some illustrative recent examples of analyses that have tried to incorporate history, especially focusing on contributions from post-Keynesian economists; discuss the extent to which the ideas of Robinson and other post-Keynesians are related to them; examine

¹⁰See, for example, Azariadis (1993) for further discussion of discrete time dynamic systems.

¹¹Note that the *equilibrium* value is path independent, not the *solution* to the differential or difference equation systems, which, of course, depends on the initial conditions.

the central features of each approach, and how ubiquitous these are in reality; and comment on their analytical strengths and weaknesses.

3.1. Equilibrium versus path

The first interpretation is to focus on the time path, or the dynamics, of the economy when it is not in equilibrium, rather than on equilibrium states, but keeping the models unaltered. In terms of our benchmark models, therefore, if we are to take history seriously, we should not just examine how x^* is determined using what we can call the “static” system involving equations like

$$F(x, \alpha) = 0$$

and

$$G(x, \alpha) = x,$$

but actually analyze the full “dynamic” systems, given by equations 7.1 and 7.2.

This interpretation appears to correspond to Robinson’s own distinction between logical and historical economic arguments discussed earlier, the former referring to static analysis involving simultaneous equations and the latter referring to dynamic analysis in which the initial conditions are not in equilibrium, and the model examines how the interactions play themselves out over time. This discussion, however, draws attention to problems and ambiguities with Robinson’s distinction.

First, the solution to the static or equilibrium system, x^* , is the same as that obtained as the equilibrium solution to the dynamic system. Given this equivalence, the effect of a change in an element of the parameter vector α will be the same in terms of its effect on x^* in the static or the dynamic model. In this context it is difficult to agree with Robinson’s distinction between the effects of a change in a parameter in an economy, and a comparison of two economies, Alaph and Beth, one with a higher value of a parameter than the other. The only appropriate reason for the distinction is that the static and dynamic models are not truly equivalent. This can happen, for instance, because the dynamic model fails to specify the dynamics of a particular variable properly, such as an expectational parameter (as Robinson pointed out was often the case for neoclassical models). However, if the dynamics are properly specified, there should be no difference between the two formulations so far as the effects of parametric changes in equilibrium are concerned. It therefore seems more appropriate to compare two identical systems in terms of the logical/mechanical time distinction noted by Dow (1985) rather than in terms of the logical/historical distinction as done by Robinson.

To illustrate this, consider a simple version of Robinson’s growth model that uses the concept of logical time. The standard desired accumulation function, in which investment plans depend positively on the rate of profit, is written in linear form as

$$g^I = \gamma_0 + \gamma_1 r \quad (7.3)$$

and the standard saving function in which workers do not save is given as

$$g^S = sr \quad (7.4)$$

where g^I denotes planned investment as a ratio of capital stock, g^S , planned saving as a ratio of capital stock, s , the fixed saving rate out of profits, r , the rate of profit, and γ_i , ($i = 1, 2$) investment parameters, assumed to be positive.¹² The equilibrium rate of accumulation is determined by the goods market equilibrium equation

$$g^I = g^S \quad (7.5)$$

that determines the equilibrium value of the rate of profit

$$r = \frac{\gamma_0}{(s - \gamma_1)} \quad (7.6)$$

and the rate of growth of capital stock (assuming away depreciation)¹³

$$g = \frac{s\gamma_0}{(s - \gamma_1)}. \quad (7.7)$$

One can introduce time explicitly into the analysis, arguably using the historical method, by assuming that the rate of profit adjusts in response to the excess demand for goods (due to the rise in the price level for a given money wage). We may posit a simple adjustment equation of the form

$$\frac{dr}{dt} = \theta(g^I - g^S) \quad (7.8)$$

where $\theta > 0$ is a parameter denoting the speed of adjustment. The system traces the evolution of the r , g^I , g^S over time, as well as the dynamics of g , which can be taken to be the minimum of g^I and g^S , using the short-side principle. Provided that the investment curve has a flatter

¹²Robinson’s own presentation assumed a non-linear investment function, which allowed her to assume that at low levels of profits, investment would be zero, and yet have the investment curve intersect the saving curve from below, as required for stability: see the discussion below.

¹³Positive values for r and g require the assumption $s > \gamma_1$, that is, that the responsiveness of saving to changes in the profit rate exceeds the responsiveness of investment.

slope than the saving curve (an assumption that is also required for positive equilibrium values of r and g), or that $s > \gamma_1$, the equilibrium will be stable. The equilibrium values of the rate of profit and the growth rate are the same as the ones given earlier, in equations 7.4 and 7.5. Apparently the logical and historical (or, more accurately, mechanical) time analyses provide the same result regarding equilibrium. No difference is made whether we use the simultaneous equations method or the method that explicitly explores the dynamics of the relevant variables.

We may even introduce expectations explicitly into the Robinsonian growth model by assuming that desired investment depends not on the actual rate of profit but the expected rate, r^e , so that we replace equation 7.3 by

$$g^I = \gamma_0 + \gamma_1 r^e.$$

We also assume that r^e adjusts adaptively according to the equation

$$\frac{dr^e}{dt} = \theta(r - r^e)$$

where $\theta > 0$ is a speed of adjustment constant. Using equations 7.4 and 7.8 we obtain a dynamic system in two state variables, r and r^e , which is portrayed in Figure 7.3. The equilibrium is shown to exist, to be unique and be stable under the assumptions that $\gamma_0 > 0$ and $\gamma_1 < s$. Note that capital accumulation has been incorporated into the analysis and can be shown at any point as $g = \min(g^I, g^S)$, and the equilibrium rates of profit and growth are still given by equations 7.6 and 7.7. Thus, despite the explicit entry of capital accumulation and expectations, history does not matter, *contra* Robinson.

In terms of Dow's categories, Robinson's historical analysis can be said to involve the historical notion of time, while her growth theory with explicit dynamics, captured with the equations 7.3, 7.4, and 7.8, but in which the equilibrium growth rate is the same as in logical equilibrium analysis, shown by equations 7.6 and 7.7, can be said to be in mechanical time. Finally, her timeless equilibrium concept, captured in equations 7.3 through 7.5, can be said to be in logical time, despite the fact that she argues that there is no causation involved with this notion, contrary to what is stated by Termini.¹⁴

Second, the dynamic path may itself involve moving equilibria, so that it is not appropriate to call a dynamic path a disequilibrium path. This

¹⁴Apparently two different notions of causality are being employed here. Termini uses the notion to denote the relation between exogenous and endogenous variables, with the former causing the latter but not being caused by them. Robinson uses it in a temporal sense, and something that follows in time, and is affected by something else.

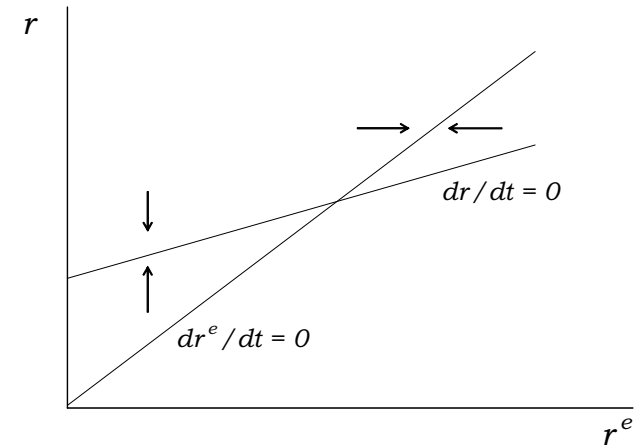


Figure 7.3. A dynamic system in r and r^e

can be illustrated using the continuous-time dynamic system shown in 7.1. Suppose, now, that we introduce some “fast-moving” variables into our analysis, denoted by y , which is of dimension l . Let us suppose that the dynamics of y are given by

$$\frac{dy}{dt} = H(y, x, \alpha) \quad (7.9)$$

where x is taken to be fixed. Suppose that for given x and α , the solution to $H(y, x, \alpha) = 0$ exists and is unique, and that solution, y^* , is a globally stable equilibrium for the system given by 7.9. Then, just like x in the system 7.1, starting from any initial y , the system 7.9 will tend towards the equilibrium value y^* . We can write this solution as

$$y^* = y(x, \alpha).$$

Now assume that we have

$$\frac{dx}{dt} = f[y(x, \alpha), x, \alpha]$$

that we can write in the form of 7.1. The dynamic path of x therefore involves a moving equilibrium of y . In Marshallian terminology the condition $dy/dt = 0$, with y^* , with given x (and, of course, α) can be called a short-run equilibrium, which moves over time to the long-run equilibrium at which $dx/dt = 0$, x^* . We can refer to the variables in vector y

as “jump” variables and those in vector x as “state” variables. In principle we can have a whole series of “runs” of this type, with some of the “givens” in one run becoming variables in another run. Examples of such systems abound in economics. For instance, some neoclassical synthesis Keynesian models take the expected price and the stock of capital, labor supply, and technology to be given, and determine the levels of price, output and employment in the short run, relax the assumption of a given expected price (and hence inflation rate) in the medium run, and allow the stocks of capital and labor supply, and technology, to change in the long run.¹⁵ Post-Keynesian macroeconomic models often take the stock of capital and the distribution of income (or wage share) to be given in the short run, and determine the degree of capacity utilization and other variables in short-run equilibrium, and examine the dynamics of capital stock and wage share over time in the long run, taking the economy to a long-run equilibrium in which the wage share and the stock of capital (or its rate of growth) become constant (see, for instance, Taylor, 1991). Thus, along the dynamic path of x , it is not accurate to say that the system is not in equilibrium, it is in an equilibrium of a different kind. Indeed, any state involving some “state” variables can be converted into an equilibrium state by referring to some suitable additional influences (involving “jump” variables), a proposition that Schlicht (1985, p. 46) calls the Hicks-d’Alembert principle.

Despite the fact that the distinction between equilibria and the path does not produce clear-cut conclusions, there are a number of reasons why a focus on the latter may be warranted.

One reason is that it allows us to examine what happens along the path (interpreted merely as a sequence of states or, as a sequence of moving equilibria) rather than what happens at the final equilibrium. Consider the evolution of the discrete time system given by 7.2 for two periods, starting from an initial position at x_0 . We obtain

$$\begin{aligned}x_1 &= G(x_0, \alpha) \\ x_2 &= G[G(x_0, \alpha), \alpha]\end{aligned}$$

This set of $2n$ equations allows us to solve for $2n$ variables (x_1, x_2) . In general the solution will depend on the value of x_0 , which implies that the past does matter, even though x^* is unaffected by x_0 . We can also examine the effects of changes in elements of α on (x_1, x_2) , effects that in general will be different from the effects on x^* . We can use this method for examining the evolution of x for T periods, and obtain the solution

¹⁵This is the treatment in, for instance, Blanchard’s (2003) intermediate macro text.

(x_1, x_2, \dots, x_T) , and represent it by its mean, x_M , which in general will depend on x_0 . The property that the solution values of x depends only on x_0 , and not on the entire prior path is the result of the deterministic framework used here. If, for instance, the dynamic equation has a white noise error term added to it, one would have to know the entire prior path to solve for the expected value of a value of x .

When is it important to examine the path, which is history dependent, in this manner, rather than focusing only on the final equilibrium, which does not depend on history? Obviously, when the speed of adjustment to the final equilibrium is slow, so that the system stays out of equilibrium for a “long” time. However, there are at least two problems with using this method. First, the values of x along the path are more difficult to calculate than the values of x^* . Even for the two-period discrete-time case one has to solve for twice the number of variables than one does for the equilibrium. The problem expands, although only linearly, as we consider more periods. It is for this reason that, in general, simulation analysis is more convenient than theoretical analysis when dealing with time paths.¹⁶ Second, it may be misleading to focus attention on a few years, for instance, in a two-period model, since many models have the property of overshooting or cycles, in which the direction of change from the initial to the next period may be quite different from the direction from the initial period to the final equilibrium.

Quite apart from the fact that explicit examination of the path gives a role to history, it is advisable to specify the explicit dynamics of the adjustment out of equilibrium rather than only focus on the equilibrium for a number of additional reasons. Thus, it is important to introduce “history” in this sense for reasons other than giving the past some importance in determining outcomes.

First, the story behind the model becomes clearer with explicit dynamics: the nature of causation becomes transparent, some of the criticisms of the logical-time (that they do not address the causation issue) approach are rebutted, and inconsistencies in models are more likely to be detected and removed. The popular macroeconomics text-book aggregate demand-aggregate supply model with short-run unemployment and price-taking behavior by firms has been frequently misunderstood and argued to be internally inconsistent by a number of critics, including Barro (1994), who attacked Keynesian macroeconomics for incorporating two mutually exclusive theories of firm behavior, price taking, and fix-price quantity adjustment. However, an analysis of the time path of

¹⁶This complements and adds to the arguments in favor of simulation modeling discussed by Gibson (2003).

the economy out of short-run equilibrium, in which price expectations of producers may not be fulfilled, has clarified the nature of the model, and argued that the Keynesian equilibrium depicted in the model is consistent after all (Dutt, 1997b).

Second, with explicit dynamics the equilibrium may well turn out to be an unstable one, so that it is inappropriate to conduct analysis as if the economy is always at equilibrium. For instance, neo-Ricardian economists have devoted a great deal of attention to examining multi-sector models of the type pioneered by Sraffa (1960) in which the rate of profit is inter-sectorally equalized. Steedman (1984) examines the dynamics in a Sraffian system in which capital moves between sectors in search of higher profits but finds, in general, that the process may be unstable: if higher profits in a sector attract capital to it and reduce its price, profits in that sector need not fall because the prices of intermediates in that sector also adjust.

Third, it reduces the chances of introducing properties of equilibrium states from *a priori* ideas that may seem plausible, but that are unwarranted given the structure of the economy being modeled. A common example is the set of models that assumes that full employment always exists in equilibrium, such as new classical models and neoclassical (and endogenous) growth models. The assumption of full employment in equilibrium may seem plausible on *a priori* grounds since it can be argued that if unemployment exists, the money wage will change, which will imply that the situation is not an equilibrium state. One fallacy of this line of thinking is that it does not examine whether a change in the money wage will actually result in appropriate dynamics that will take the economy to an equilibrium with full employment.¹⁷ Keynes (1936a) argued that this is not necessarily the case in his discussion of the effects of wage changes that could reduce aggregate demand through a variety of channels; the issue has been examined by a variety of subsequent writers, post-Keynesians (see Dutt and Amadeo, 1990) and mainstream (see Hahn and Solow, 1995). Another example of this problem is the assumption that the rate of capacity utilization must be at its planned or desired level in long-run equilibrium. Some critics of Kalecki-Steindl growth models with endogenous capacity utilization argue that an equilibrium with capacity utilization at anything but the “normal” rate is implausible. This is because at such an equilibrium firms will take actions (by changing their markups or their investment behavior) that will

¹⁷This example could therefore also be used as an illustration of the case of instability discussed in the previous point.

move the economy away from that position.¹⁸ The problem with this view is that plausible and empirically-realistic adjustment mechanisms may not be able to take the economy to an equilibrium at which the degree of capacity utilization is at its “normal” level, assuming that such a level exists and is unique. Firms enjoying monopoly power may not reduce their mark-ups when they hold excess capacity, and changes in investment behavior by firms lead to Harroddian knife-edge instability, and not convergence to equilibrium with normal capacity. The point here is not that the economy is actually an unstable one, but that one should not assume the result (that capacity utilization must be at its normal level in equilibrium) without investigating plausible stable dynamics that generate it.¹⁹

3.2. Parametric changes

A second way that history can enter the benchmark model, without changing the model itself, is by interpreting the parameters of the model as being historically determined. More generally, the structure of the models, its equations and parameters, can all be taken to be determined by historical circumstances, and given these circumstances, the model determines where the economy will end up. Therefore, history determines equilibrium.

Eatwell (1997) employs this interpretation in arguing that the equilibrium or center of gravitation of the classical/neo-Ricardian model is historically determined. This model determines relative prices for products produced by different sectors and one distributional variable (the real wage or the rate of profit), given input/output ratios in production, sectoral output levels and the other distributional variable. The last elements, the data, of the model are, in this interpretation, historically determined.

A problematic implication of this interpretation is that since all equilibrium models have a set of equations and parameters, all of them by definition give some role to history. Therefore, the interpretation is unable to discriminate between models that give some role to history and those that do not. Eatwell (1997), arguing that history does not affect equilibrium in neoclassical theory, claims otherwise. Although this theory does have parameters, he argues:

¹⁸For Kalecki-Steindl models see Dutt (1984; 1990) and Rowthorn (1982). For criticisms of such models because of their endogenous determination of the rate of capacity utilization, see Auerbach and Skott (1988) and Committeri (1986).

¹⁹The discussion of possible instability makes this criticism similar to the previous one.

The data of the theory, preferences, the technology and the size and distribution of the endowment exhaust the domain of economics. They are the axiomatic data that define the starting point of economic analysis. There are, of course, some models of the formation of preferences, for example, but these are simply formal extensions of the same set of data. No further data are required for the determination of prices, outputs and technique in use. Moreover, although the theory is of a market economy, it is apparently “universal.” (Eatwell, 1997, p. 393)

It is not clear, however, why we cannot take preferences, technology and endowments, if they are given in a model, to be determined by history in the same way that a distributional parameter, for instance, is determined by history in neo-Ricardian analysis.²⁰ One can argue that neoclassical models are more “universal” than other models that are more context-dependent (in the sense that all models do not always have the same set of parameters and equational structures), and that they incorporate less relevant institutional content that is affected by historical forces in comparison with other models. However, this is arguably a matter of what factors one considers to be relevant, and of how broadly or narrowly one defines neoclassical theory.²¹ Nevertheless, a case can be made that some models pay more careful attention to the historical and institutional details of particular economies, and derive the structure of the model and its relevant parameter values from such an analysis, whereas other models, including many neoclassical ones, use the same structure for all situations, paying insufficient attention to institutional factors that are shaped by historical forces.

A closely related sense in which equilibrium models are taken to incorporate history is when it is explicitly taken into account that their parameters are subject to *changes*, sometimes in ways related to some variables of the model, and often in ways that are not knowable (even in a probabilistic sense) in advance.²²

²⁰A theory of the formation of preferences would actually remove preferences from the list of givens, and therefore reduce the role of history according to Eatwell’s definition!

²¹Eatwell apparently defines it narrowly to include Walras-Arrow-Debreu general equilibrium models, but other models—which are neoclassical in the sense that they start with the assumption of individual utility-maximizing behavior—can and do incorporate a much larger range of parameters, including those representing power (as in cooperative games).

²²For reasons to be discussed later, the parameters do not then necessarily become variables, even stochastic ones.

A series of contributions have employed this interpretation to incorporate history into Kaldor’s model of cumulative causation. These interpretations start with a formalization of Kaldor’s regional growth model discussed earlier, which is written as a discrete time linear dynamic equation in one variable, the rate of productivity growth. A diagram like Figure 7.2 is obtained, although the curve is a straight line. The lagged rate of growth of productivity affects the current rate of growth of productivity because output growth affects productivity growth with a lag.²³ The basic model, if it is stable (this requires, among other things, that the Verdoorn coefficient, which relates the rate of growth of output to the rate of growth of productivity, is small) implies that, starting from an initial level of productivity growth, the model will converge to an equilibrium level of productivity growth. This equilibrium, of course, is path independent and the model therefore has no role for history.

Setterfield (1997a) argues that this model can be converted into one where history does play a role by allowing some of the parameters to change “endogenously.”²⁴ For example, he argues that as the economy grows by experiencing productivity growth and passes a certain technological threshold, the existence of technological interrelatedness, both within and between firms, can lead to lock-in, which will prevent the economy from adopting new technology. This will lead to a fall in the Verdoorn coefficient, and to a fall in the income elasticity of demand for exports, both of which will shift the curve representing the dynamic equation downwards, implying that the eventual equilibrium will be at a lower level of productivity growth than before. Institutional inertia in growing economies, especially those in labor markets, can also lead to such “endogenous” parametric changes, reducing the rate of growth. Setterfield claims that upon taking into account these technological and institutional factors, and the parametric changes that they imply, Kaldor’s model becomes “more generally hysteretic,” by which he means that their long-run outcomes depend on their path.

Setterfield’s model, however, has been criticized for its inability to take history seriously. Argyrous (2001) argues that the model cannot be called a historical model because the growth slowdown due to the parametric changes occurs inevitably. Roberts (2003, p. 12) points out

²³This follows the presentation of Setterfield (1997b). Roberts (2003) introduces the lag in the export function: lagged inflation affects the rate of growth of export, making the Verdoorn effect instantaneous.

²⁴Kaldor’s two-sector agriculture-manufacturing interaction model mentioned earlier can also be seen in this light, with the labor productivity parameter changing due to Verdoorn’s Law.

that, starting from an initial level of productivity, if the threshold level of productivity is below its equilibrium level with the initial parameter values, the model will inevitably hit the threshold level, and the parameters will change, implying a new equilibrium level, and the economy will reach this equilibrium level, which is independent of its initial starting point and the path the economy takes.

Setterfield (2001) argues that lock-in and growth slowdowns are not inevitable, and hence the long-run outcome to the growth path in the model is not deterministic. To make this argument more explicit Roberts (2003) situates the model within the framework of the “open systems-*ceteris paribus* approach.” The openness of this system implies that the system lacks extrinsic and/or intrinsic closure. Roberts (2003, p. 13) states that a “system lacking extrinsic closure is one in which exogenous factors are explicitly allowed to influence system outcomes in a non-defined way, whereas a system lacking intrinsic closure is one in which the same effects do not always inexorably follow from the same causes.” The *ceteris paribus* aspect of the approach introduces a closure into the analysis for modeling purposes, treating some relations to be constant over time while acknowledging that these relations may well be subject to “*a priori* unspecified, endogenous transformation over time” (Roberts, 2003, p. 14). Roberts uses these concepts to argue that the Kaldorian cumulative causation model may be subjected to a number of parametric changes, some when it reaches a threshold level of productivity, some when it reaches a threshold level of productivity growth, and some when it has been in a certain state for a given length of time. These thresholds are not known for certain, and moreover, what happens when the thresholds are reached cannot be predicted, since they depend on a complex set of political and social factors. The crucial issue here is not the precise nature of the thresholds, but the fact that there are no deterministic laws (even in a probabilistic sense) governing the nature and timing of the changes in the parameters of the system.

To appreciate why this is so, consider the following extension of the basic model given by equation 7.1 where the laws are deterministic. In that system, the equilibrium solution for the vector x depends on the parameters α , so that the equilibrium values can be written as $x(\alpha)$. Now we define a new dynamic system given by

$$\frac{d\alpha}{dt} = A[x(\alpha), \alpha] \quad (7.10)$$

that specifies the dynamics of α . This system is identical to the system involving x and y in 7.9, with x taking the place of y and α taking the

place of x . Starting from any initial value of α , if a unique and stable equilibrium exists, this system will arrive at it, and that equilibrium will be path independent. Making the parameters move over time does not, in itself, therefore give any role to history.

What may give some role to history is the fact that it may not be possible to write out a system given by equation 7.10, for the simple reason that the dynamics of α may be too complex to be modeled in any precise manner. It is not possible to know when elements in α will change (for instance, what are the threshold levels), and if they change, how much they will change by. The variables and relationships that can be modeled in systematic terms are included in x , while those that are too complex to precisely model are included in α . The evolution of these parameters over time cannot even be depicted in terms of known probability distributions, and cannot therefore be modeled even in terms of stochastic processes. In this interpretation, however, changes in elements of α will have clear and predictable effects in terms of the system given by 7.1.

What kinds of relations are less likely to be precisely knowable than others? Although generalizations are difficult because of the nature of the question, we can confine our attention to a few illustrative examples. It is arguable that events that do not occur on a regular basis, and which depend on a variety of complex factors, which include social and political factors, and changes that depend on the collective actions of very large groups or of a small group of people that affect society at large, are arguably less knowable than others. Events that do not occur on a regular basis are less capable of being captured with general laws. Events that are affected by a large number of factors are difficult to portray with a small number of relations between a small number of variables. Collective actions of large groups, or individual actions of powerful groups, are less capable of lending themselves to generalizations: small changes in circumstances may lead to major unpredictable actions and consequences. Another type of relation that may be difficult to generalize about are those involving expectations, which, if we follow Keynes, may be based on flimsy foundations.

The distinction between the two kinds of relations can be expressed in terms of Keynes's (1933; 1972, p. 262) distinction between an “atomic” environment in which elements work in relative isolation in a stable and homogeneous environment and an “organic” one, “of discreteness, of discontinuity, the whole is not equal to the sum of the parts, comparisons

of quantity fail us, small changes produce large effects, the assumptions of a uniform and homogeneous continuum are not satisfied.”²⁵

It should be noted that this discussion suggests that what elements of a model are considered to be parameters need not only be those that change little or very slowly over time, but may well be elements that change quickly, but in unpredictable ways. Thus, investment can be taken to be given in a simple Keynesian model not because investment is stable, but because it is difficult to theorize about. An implication of this observation is that the variables in the equilibrium model can change more slowly than these parameters change, which makes it all the more necessary to focus on the path of the economy out of equilibrium (as discussed in the previous section).²⁶

It may be recalled from our earlier discussion that Robinson (1956b, p. 57) anticipated the parametric-change interpretation of equilibrium models when she warned that economic equilibrium may contain forces that sow the seeds of their own destruction. It will also be recalled that her example of such forces relies on expectational changes operating in asset and goods markets. Although in this discussion Robinson did not explicitly discuss the role of history, her later (Robinson, 1962a, pp. 26-7) discussion of the difficulties of explicitly modeling, and the need of analysis in general terms of historical time reviewed earlier, suggests that her views are close to what is implied by this interpretation of the role of history in equilibrium models. Cohen (1993) interprets Robinson’s method in this manner in what he calls “open historical models” as employed in Robinson (1956b). Such models involve what Cohen calls a three-stage theoretical process that consists of first, building a closed, deterministic equilibrium model; second, embedding it in a specific historical and institutional context to see how the relevant forces work themselves out in reality in order to develop an open historical model; and third, confronting the open historical model with empirical data. This process Cohen contrasts with the standard two-stage theoretical process, which involves building a closed, deterministic equilibrium model and subjecting it to empirical tests. Although Cohen does not explicitly interpret “historical and institutional context” as being represented by parameters that themselves change over time, such an interpretation does seem to be a plausible one.²⁷

²⁵Here, Keynes, in discussing Edgeworth, argues that mathematical psychics, as opposed to physics, is “faced at every turn with the problems of organic unity.”

²⁶I am grateful to Mark Setterfield for raising this point.

²⁷Cohen does not explain why the historical and institutional context changes cannot be modeled with dynamic equations that lead to a determinate equilibrium

Four implications of the adoption of this interpretation of equilibrium models are worth noting.

First, since it is possible to think of all equilibrium models (all of which have some parameters) in this way, this interpretation does not provide a clear criterion for distinguishing between models in which history plays a greater role and those in which it does not (as was the case in the interpretation of parameter *levels* being determined by history). However, it is possible to argue that some equilibrium models include as parameters those whose changes are found to be more interesting and relevant in historical research than the parameters of other equilibrium models. For instance, it is possible to argue that changes in power relations between groups are more important in a particular historical context than changes in the rate of time preference, and therefore to conclude that models in which power relations affect a parameter allow history to play a greater role than models where the time preference rate enters as a parameter.

Second, this conception implies that the model builder recognizes that there are some limits to the extent to which the model can be extended to endogenize more and more parameters as variables. There may, in fact, be no virtue at all to making such extensions, when some of these relationships are too complex for the reasons noted earlier. In this sense, the recognition of the role of history may be expected to have an effect on the construction of equilibrium models.

Third, the recognition of the role of parametric changes implies that equilibrium positions analyzed by models should not generally be interpreted as depicting actual economies that are tranquil and not subject to shocks. Two important consequences follow. One, it is not appropriate to incorporate into the model behavior patterns of decision-makers that assume that the equilibria are tranquil states, or that the dynamic time paths of the model are in fact predictable by the decision-makers, even in a stochastic sense. A great deal of neoclassical analysis, and even some post-Keynesian analysis, assumes this, with arguably misleading consequences. An example of an erroneous claim is that agents do not need to maintain liquidity in equilibrium, since there is full certainty. Two, policy analysts who use equilibrium models should not expect their models

outcome, independent of the path. This is probably because he does not interpret the context in terms of parameters, as mentioned in the text. Had he interpreted them in that manner, the fact that these parameters change in an unknowable manner that cannot be translated into stable laws can be invoked to explain why such a dynamic model cannot be developed.

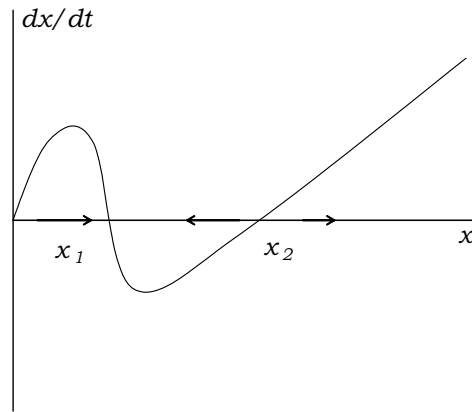


Figure 7.4. One variable with two equilibria

to provide precise results, or be surprised that their predictions are far off the mark in a quantitative sense.

Finally, and despite these implications, this interpretation allows the development of equilibrium models and the study of history and its role to proceed, to a large extent, along parallel lines, with a clear division of labor between economic theorists and historians. Economic theorists are left free to specialize in developing equilibrium models in which some historically-conditioned elements are included as parameters, and the effects of such changes on the equilibrium system (they would need to converse with historians about these matters), can be analyzed theoretically using the model. In this sense history does not enter economic theory. The next three interpretations of equilibrium models, however are those in which it does.

3.3. Instability and multiple equilibria

The next interpretation involves a fundamental modification of the systems 7.1 and 7.2, departing from the assumption that they have unique and stable equilibria. Examples of such systems are shown in Figures 7.4 through 7.6.

These figures imply that the dynamics of the economy, and perhaps its equilibrium, will depend on the starting point of the economy; in this

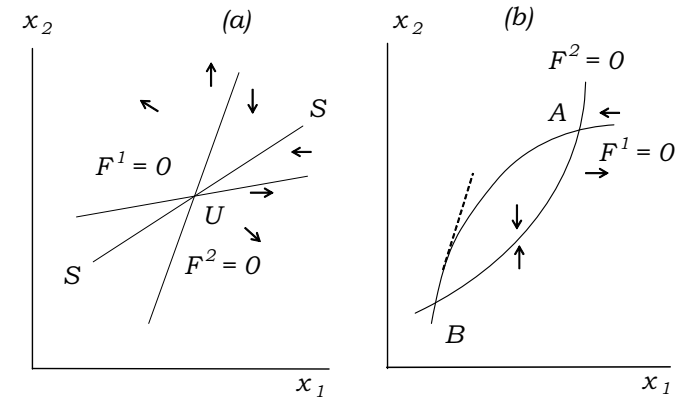


Figure 7.5. Interior saddle-point (a) and multiple equilibria (b)

precise sense they provide a role for history. Figure 7.4 shows a continuous time model with one variable in which there are two equilibria, one stable (at x_1) and another unstable (at x_2). Starting from an initial position with $x < x_2$, it will converge to the lower equilibrium at x_1 , but if it starts with $x > x_2$, it will expand indefinitely.

Figure 7.5 shows two continuous time systems with two variables. In Figure 7.5(a) there is one interior saddle-point equilibrium, U , and in Figure 7.5(b) there are two equilibria, of which A is possibly stable and B a saddle-point. In 7.5(a), if we start from a position above the separatrix, SS , the system will move continuously in the upward direction, with x_2 rising and x_1 falling and tending to zero, and the opposite occurs if we start from a position below the line. In 7.5(b), assuming that the upper equilibrium is stable, starting from near it the system will be attracted to it. However, starting sufficiently far from it (to the left of the separatrix shown by the dashed line), the system will be on an unstable downward path. Figure 7.6 shows two discrete-time systems. Figure 7.6(a) has one equilibrium that is unstable. In it, if we start from an initial value of x below x^* , x will fall steadily over time, while if we start from above that level, x will rise indefinitely. Figure 7.6(b) has three interior equilibria. The ones at x^* and x^{**} are stable, and the one at x_C is unstable. If we start from an $x < x_C$, the economy will converge to the lower equilibrium at x^* , while if we initially have $x > x_C$, it will converge to the higher

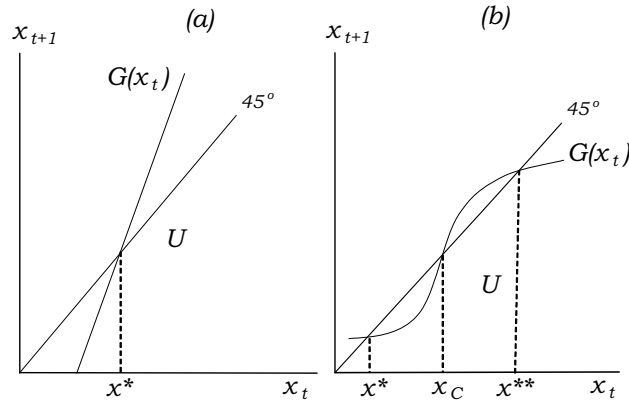


Figure 7.6. An unstable equilibrium (a) and three equilibria (b)

equilibrium at x^{**} . We will provide economic examples illustrating each of these different cases in our following discussion.

In the post-Keynesian literature this interpretation of the role of history in equilibrium models is particularly associated with the work of Kaldor. Kaldor's (1970b) analysis of cumulative causation, according to which higher productivity growth leads to even higher productivity growth through scale economies, has been portrayed as shown in Figure 7.6(a), to give history an important role. Kaldor's own discussion merely implies a positive relation between the rate of productivity growth in one period and the rate of productivity growth in the next period, but this does not necessarily imply that we have a model like the one shown in Figure 7.6(a), since the model of Figure 7.2, is quite compatible with his analysis. If the model is as shown in Figure 7.2, however, the long-run growth equilibrium is independent of the initial growth rate and the path that it follows. This makes Setterfield (1997b; 1997c) argue, that there is a tension between Kaldor's vision of growth as a historical process and his analysis of cumulative causation. As Roberts (2003) notes, however, in some of his other work, Kaldor seems to relate the word "cumulative" to unstable dynamics (see Kaldor, 1961, p. 249, for instance), and Dixon and Thirlwall (1975) state that Kaldor indicated to them that he implicitly had the unstable case in mind when he discusses the idea of cumulative causation in his analysis of regional growth. Thus, Kaldor's

model should be interpreted as being like the left-hand panel of Figure 7.6, with sufficiently strong Verdoorn or learning effects of the type discussed earlier.

Robinson (1962a) also discusses a number of ways in which the interaction between expectational changes and capital accumulation can lead to fluctuations and instability. In a situation she describes as inherent instability, she argues that when the rate of profit is rising, the desired rate of accumulation, for a given level of the rate of profit, will be higher, than when it is falling. The implication of this can be seen by amending her model to make investment plans depend not only on the rate of profit as before, but also the *change* in the rate of profit, so that the desired investment function is given by

$$g^I = \gamma_0 + \gamma_1 r + \gamma_2 \frac{dr}{dt}$$

in place of equation 7.1. Continuing with the standard saving function given by equation 7.2 and the dynamics of profit rate change given by equation 7.6 we find that the condition $s > \gamma_1$, is no longer sufficient for stability. It is also required that $\theta\gamma_2 < 1$: the speed of adjustment parameter, θ , which was not relevant for the question of stability in the basic model, now becomes relevant. Introducing expectations in this way can therefore quite possibly destabilize the economy, with large θ and γ_2 . It should also be noted that Robinson's (1962b, pp. 48-9) famous diagram with a desired accumulation and an actual accumulation curve reveals two equilibria, one unstable (the lower one) and the other stable (the higher one), thereby creating a role for history in the sense being examined here. If the economy starts below the unstable equilibrium, it will collapse, while if it starts above it, it will converge to the higher equilibrium.

Many other models in economics, too numerous to enumerate, lead to unstable and/or multiple equilibria. We confine our attention to a few additional classes of such models. A third class examines two regions that interact with each other through trade. An example of this model is Krugman's (1981) North-South model in which two economies with identical structures each produce two goods, a manufactured good that is subject to increasing returns or learning by doing and that uses capital and labor in production, and an agricultural good that is subject to constant returns to scale and uses only labor in production. The model can be depicted using Figure 7.5(a), where the two state variables denote the stocks of capital in the two regions. If one region, for whatever reason, initially has a higher stock of capital, it will have a comparative advantage in manufacturing production, enjoy the benefits of increasing

returns and learning by doing, and accumulate ever-increasing stocks of capital, while the other region exports agricultural products, is denied such benefits, and experiences a diminution of its capital stock. Uneven development therefore results, with the gap between the North and the South growing over time, determined by their historical patterns of capital accumulation and specialization. Similar models have been examined by Krugman (1991b) and Arthur (1994) and others, applied to a variety of circumstances, some explaining the emergence of some regions within countries as manufacturing centers, and others explaining patterns of uneven development due to manufacturing specialization, across countries.

A fourth class of models relates to what is referred to in the literature as “lock-in.” These models portray situations when individuals or firms are confronted with situations in which they can choose between alternatives, such as investing or not investing, or using one kind of technology or another, or moving to one place or another, and where the payoff to choosing one alternative depends positively on how many others have chosen that alternative, either because of positive externalities, information cascades, or other reasons. These models involve positive feedback because the relative payoff of one alternative increases when more individuals adopt that option. The system then gets locked into that option, even if there is nothing intrinsically advantageous about that option, or in fact there may be intrinsic disadvantages to that option (that is, its payoff may be lower if an equal number of individuals follow that option). Chance events can therefore make individuals choose one option, and the system gets locked into it. Thus, depending on starting conditions, equilibrium with lock-in into either alternative is possible. Examples of such cases are discussed by Schelling (1978), David (1985), and Arthur (1994) and can be depicted, for instance, with the use of a diagram such as Figure 7.6(a). Assume that x measures the proportion of agents who have chosen option A , and that the relative return to using that option over option B depends on the number who have chosen that option, with the relative return being the same if the same number adopt each option (for simplicity). Then, if the $x_t > x^* = \frac{1}{2}$, $x_{t+1} > x_t$, so that x will grow over time (and conversely for $x_t < x^* = \frac{1}{2}$).

A final class of models results in low-level equilibrium income or poverty traps. A discrete-time example is shown in 7.6(b), with three equilibria. If the economy starts with a level of per capita income, below x_C , it will converge to the low-level equilibrium at x^* . If it starts above x_C , it will converge to the high-level equilibrium at x^{**} . This kind of behavior can be seen in a fairly wide range of situations, some of

which are reviewed in Azariadis (1993), and can follow from technological nonconvexities featuring increasing returns and learning by doing, external effects involving technological complementarities, innovations, and human capital formation with externalities, as well as demographic transitions (where fertility drops rapidly with increases in per capita income) and subsistence consumption levels (implying that the saving rate is very sensitive to income at low income levels). There may even be no high-level equilibria, and the economy can take off indefinitely when it escapes the low-level trap as shown in the continuous time model of Figure 7.4 that can be obtained by combining a fertility trap with scale economies. There may also be cases without low-level equilibria, but with continuous declines at low levels of activity, as shown in the two-variable continuous time case shown in Figure 7.5(b). An example of this kind of behavior is found in two-sector dual economy manufacturing-agriculture models with intersectoral migration reviewed in Dutt and Ros (2003). In the models, x_1 refers to the stock of capital in manufacturing and x_2 to the manufacturing real wage. The crucial feature of these models is that the change in x_1 rises with the level of x_1 , either because of increasing returns to scale, or because of the loss of job skills due to underemployment. In this model a historical episode featuring contractionary stabilization policy can remove an economy from a high-level equilibrium to an unstable downward spiral due to a loss in scale economies or loss of job skills.

The mechanisms that lead to models of this kind are already clear from the examples we have discussed here. Increasing returns to scale plays an important role. More generally, it is the existence of what has been called positive feedbacks, which can take a very large variety of forms, ranging from positive externalities, market complementarities, imperfect information, uncertainty, and a variety of non-linearities that abound in the real world.

Models of this type have been criticized for a number of reasons in terms of their ability to adequately provide a role for history, and for other reasons.

First, they are criticized for their extreme knife-edge property: if some variables are below some critical point the model will behave in one way, and if they are above that point, they will behave in a completely different manner. Such extreme knife edges imply that small chance events can lead to dramatically different results. Thus, it is not so much history but the internal dynamics of the model that give rise to different outcomes. The fact that some countries forge ahead and others fall back may thus be due entirely to chance events, one region accumulates

slightly more capital, and the study of history does little to help us to explain why some countries forge ahead, except to tell about some chance events. The response to this can be that what appears as chance events at one level of abstraction can be treated as important events in history that can be systematically explored, at another level. Thus, one can think of small, chance events as allowing the North to forge ahead and block the development of the South. At another level of analysis, it is possible to study events in history that result in tendencies pushing the global economy to one side of the separatrix. Such a study using a modified version of Krugman's (1981) model of uneven development is conducted for the case of India and Britain in Dutt (1992b), arguing how specific policies followed by imperial Britain pushed India into becoming the South and Britain into becoming the North, altering the pattern of specialization that existed previously.

Second, and related to the first point, they can be criticized because history plays a role only as far as determining the initial condition. This gives a very small role to history, which is simply treated as the initial condition. This argument has been expressed in a number of ways. In ontological terms it has been argued that the multiple equilibrium models *select* among alternative equilibria that exist independently of the path, rather than being *created* by the path itself (Setterfield, 1997a, pp. 64-5).²⁸ Alternatively, the outcome of the system becomes determinate in the sense that it can be defined and reached in terms of the data of the system if we include the initial conditions in that data (Setterfield, 1997a, p. 65). These arguments, however, can be countered. First, chance events can come to the rescue, because they reduce the determinacy of initial conditions. If a deterministic model implies that we are on one side of the separatrix or critical point, chance events can lead to shifts that take us to the other side of the critical point. Models of lock-in with some role for chance events are provided in Silverberg *et al.* (1988) and Arthur (1994), for instance. Second, parametric shifts of the type we have discussed earlier, for the case of stable equilibria, can play a role in changing an unstable equilibrium case into a stable case, or vice-versa, or shifting the system from one side of the separatrix to the other. These parametric shifts in fact can be thought of as being endogenous in terms of a broader model that has not been formally written out (which, when written out can result in sharp changes as in models

²⁸This criticism is problematic, since all mathematical models in R^n must "select" some point that pre-existed in Cartesian n -space. It apparently confuses the issue of the pre-existence of outcomes and the issue of whether events will lead to an outcome which is known *a priori*.

exhibiting catastrophes), or that may be difficult or impossible to write in formal terms. An example of factors that can lead to reversals of past trends is the South pursuing protectionist policies, or encouraging appropriate technology transfers, which can lead to learning by doing in manufacturing. Whether such changes can actually occur depends on a variety of political factors (whether the South enjoys *de facto* sovereignty to pursue such policies, as discussed by Alam, 2000), sociological factors (the nature of the bureaucracy and the extent to which the state enjoys embedded autonomy, to use terms coined by Evans, 1995), and pure chance (as far as the country is concerned), that is, whether the conditions are right in the sense that the world economy is expanding fast enough to allow the Southern country to expand its manufacturing exports at the time of the policy shift.

Third, the role of history may be circumscribed by expectational factors. Krugman (1991c) analyzes a model in which expectational factors can reduce the determining role of the initial point to some extent. For instance, if there are positive feedbacks, it is possible that even if we are on one side of the critical point, individuals may expect a large number of decision-makers to go to the other side, and this may make the economy go to the other side, reversing the movement to a new equilibrium. Such expectational shifts can occur, for instance, due to the ability of the government to influence expectations even without actual policies that change payoffs. Three comments on this circumscription are in order. First, even in Krugman's model, there is a zone in which expectational factors cannot play a role: if the system has gone too far into one zone, history cannot be replaced by expectations. Second, the role of expectational factors can be argued to make the analysis richer, by reducing the knife-edge property that makes only initial conditions matter. Finally, expectational factors are likely to be more important in some situations and much less in others. If dynamic learning effects are important and take a protracted period to achieve, say in a North-South model, expectational factors will be very unlikely to make the system jump to the other side of the separatrix. In the case of market complementarities in which history might play a smaller role, expectational issues may be more decisive.

Fourth, although this is not so much about the role of history, such models imply starkly unrealistic outcomes. Setterfield (1997a, p. 68) argues that if Kaldor's analysis of regional growth is given the unstable interpretation, it is inconsistent with stylized facts: initially fast growing economies such as Britain were later transformed into relatively slow growing ones. Even if this is empirically true, in opposition to this

criticism it can be argued that chance events and endogenous parametric shifts as discussed above can alter conditions and thereby reverse the path of the economy, explaining such regime shifts.

Although, as discussed in the previous subsection, parametric changes, especially endogenous and unknowable ones, can introduce history into equilibrium models, multiple equilibrium models with unstable equilibria, especially those that can experience similar parametric changes, incorporate history in a more fundamental manner. The theoretical equilibrium model and historical analysis cannot proceed along parallel lines with each taking into account the other. This kind of analysis makes us look for possibilities of positive feedbacks and their consequences and embedding them into the models themselves.

3.4. Zero-root and Unit-root systems

If history can be incorporated into equilibrium models by introducing multiple equilibria, why not go further and allow for a continuum of equilibria? We now turn to models with a continuum of equilibria.

Starting with a simple discrete-time one variable model of equation 7.2, consider the linear form

$$G(x_t, \alpha) = \alpha_1 x_t + \alpha_{2t}$$

where α_{2t} can be stochastic or deterministic. For the general case in which $\alpha_1 \neq 1$ and in which the final value of $\alpha_{2t} = \alpha_2$, we get the equilibrium value of x to be

$$x^* = \frac{\alpha_2}{(1 - \alpha_1)}.$$

Here, past values of α_{2t} and x_t clearly have no effect on the equilibrium value of x . However, in the unit-root case, when $\alpha_1 = 1$, the value of x_t at T is given by

$$x_T = x_o + \sum_0^T \alpha_{2t-i}.$$

Thus, x has potentially an infinite number of solutions, depending on the initial value of x and all previous (and current) values of α_{2t} . If some change in the parameter α_{2t} in the past change the level of the variable x , this change would have an impact on the subsequent path of the system. In this sense history has a role in determining the subsequent path of the system.

The most prominent example of this type of system in economics is models of unemployment. Blanchard and Summers (1987) develop a model in which wage setting occurs in a pure labor insider setting, where

only the interests of union members are represented in wage bargaining and where insiders try to set the wage to employ all the union members, whose number is determined by employment in the previous period. The model implies that employment in any period is then determined by the level of employment in the previous period and the unanticipated movement in nominal money supply. A shock to the system that reduces the level of employment will make workers who are still employed have no desire to reduce the wage in order to increase employment by having the unemployed hired. A shock to the system that increases the level of employment will imply that some outsiders become insiders, and they will have no desire to increase the wage and lose their jobs.

It is clear, however, that the unit-root case is a special one in which $\alpha_1 = 1$. If $\alpha_1 \neq 1$, as we have seen, the system would tend to the value x^* , an equilibrium that would be stable if $\alpha_1 < 1$. Moreover, the equilibrium would be independent of past values of x_t and therefore history would play no part. In the Blanchard-Summers model, if there is some effect of unemployment on wage setting due to pressure from outsiders, then the system will revert to this one. If α_1 is close to unity, the time it takes for the system to lose its influence on the path, by approaching equilibrium, will become longer, but that does not change the qualitative property of the model. It simply supplies an argument to consider the path of the system (as discussed earlier), not just the equilibrium. If long-term unemployed workers exert no influence on wage setting because their skills atrophy, or because they become addicted to unemployment benefits or become completely discouraged and stop looking for jobs, we may return to the unit-root case. Nevertheless, it may be argued that the unit-root case is a very special one, that will be violated in most models.

Next, we turn to continuous time models with two variables. Suppose that the system of two equations is given in the form

$$\begin{aligned} \frac{dx_1}{dt} &= F^1(x_1, x_2) \\ \frac{dx_2}{dt} &= F[F^1(x_1, x_2)] \end{aligned}$$

where $F(0) = 0$. This kind of dynamic system is called a *zero-root* system because the characteristic roots of the Jacobian matrix of the system are zero. In this case the phase portrait of the system can be represented by a diagram like Figure 7.7, and the system is shown to have an infinite number of equilibria. In this case, the slightest change in the starting point of the system will imply a change in the equilibrium value of the system to which the system will tend, assuming that the equilibria are

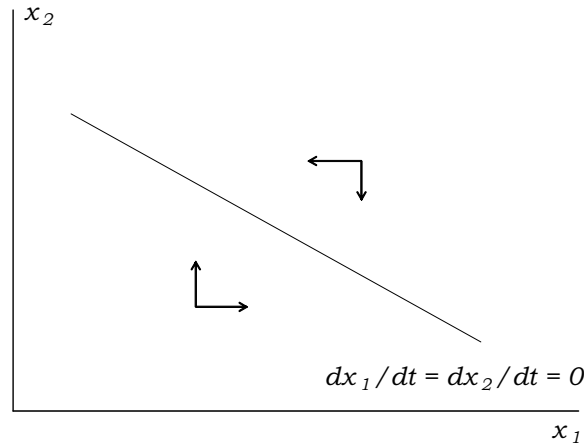


Figure 7.7. An infinity of equilibria

stable. In this sense, history, or the starting point, will determine where the system ends up. If we use stochastic influences into the analysis, stochastic shocks experienced over time will affect the final equilibrium position. The mathematics of a linear case of this model, in which the Jacobian matrix is singular, has been examined by Giavazzi and Wyplosz (1985).

There are a number of examples of zero-root systems in economics. We review some of them to understand how general or special they are. One is the case of an endogenous natural rate of unemployment discussed by Sachs (1987) and Isaac (1994). In these models the natural rate of unemployment (or what Isaac calls the reference rate of unemployment) adjusts to deviations of the actual unemployment rate and that rate, due to effects such as the erosion of job skills, the presence of insider effects and discouraged workers who drop out of the narrowly-defined labor force. In Isaac's version the unemployment rate depends on the profit share, and changes in the unemployment rate and deviations of the unemployment rate from its reference level cause changes in the profit share. In these models, expansionary fiscal policy has a permanent effect on reducing the rate of unemployment (as well as the reference rate). A similar model, in which the "normal" rate of capacity utilization is determined by movements in the actual rate of capacity utilization, is developed in a growth context in Dutt (1997a). In this model the "normal" rate of capacity utilization responds negatively to deviations of the

expected rate of growth to the actual rate of growth, with firms desiring to hold more excess capacity with relatively higher expected growth, in order to deter entry (see Lavoie, 1995). With expected growth reacting adaptively to differences between actual and expected growth rates, we have two different state variables adjusting to the same gap. Exogenous changes in income distribution change the actual and "normal" rates of capacity utilization. A third is a model of unemployment in which the rate of capacity utilization plays a role in the two simultaneously-operating mechanisms of price adjustment and capital formation, due to Van de Klundert and Van Schaik (1990). This class of models allows a decision-maker to have two different independent adjustment mechanisms to react to the same discrepancy, which makes different outcomes possible in the adjusting variables, depending on the initial condition. A fourth example introduces beliefs in a standard model of firm behavior in which a "small" firm (which ignores the effects of its own decisions on the decisions of other firms) does not know the product demand curve but forms conjectures regarding its position, revising its conjecture in a Bayesian manner over time as the firm updates demand realizations. In this model, analyzed by Hahn (1987), the dynamic process does not converge to a unique equilibrium, but the equilibrium depends on the starting point of prior conjectures. The intuitive reason for this is that the firm can end up in a position, which is not unique, in which, given uncertainty about the demand curve, the firm will not wish to alter its price, as in Negishi's (1961) kinked demand curve analysis. A final example is one in which changes in long-period expectations (which govern investment behavior) depend on changes in short-period expectations (which relate to prices and are relevant for the production decisions of firms), as discussed in Dutt (1997a) in an attempt to formalize Kregel's (1976) analysis of the interaction between short- and long-period expectations. The analysis implies that making the level of long-period expectations depend on the level of short-period expectations does not, in itself, allow history to play a role in the sense of a zero-root system: this outcome occurs if changes in one are related to changes in the other.

How special are these zero-root models? Although unit-root single-variable models in discrete time may appear to be a special case, higher-dimensional systems may not be so special, as the foregoing review of zero-root models suggests. These models can be classified into a number of types. First, there are those in which the actual level of a variable gets adjusted to some reference or "normal" level of that variable, and the "normal" level is also adjusted to the actual level over time. This is the assumption behind models of endogenous natural rates of unemployment

and endogenous rates of normal capacity utilization, for which a variety of plausible stories have been told in the literature. Second, there are those where there are two adjustment variables for agents, both adjusting with respect to a given gap. It is an open question whether such adjustment mechanisms are consistent with rational behavior, somehow defined, but they may be plausible if agents follow different rules of thumb for different types of decisions, or if different agents prefer different kinds of adjustment mechanisms. Third, there are those in which there are two separate state variables of a system that are related in such a way that *changes* in the value of one are functionally related to *changes* in the value of the other. This situation is found in the model in which changes in long-period expectations are related to changes in short-period expectations. This can occur when it is more reasonable to suppose that the level of one variable does not depend uniquely on the level of another variable as in a functional relation, but one in which changes in one variable gives rise to changes in the other, so that the *changes* are functionally related.

In terms of how adequately these models incorporate history into equilibrium analysis, there is one additional point to be made. Although in these models a shock to the system that alters the initial conditions without affecting any of the structural parameters of the model has a permanent impact on the final equilibrium, they do not exhibit remanence. That is, if the economy in these models is initially at an equilibrium, and is subjected to a shock, and this is followed by a second shock of the same intensity and in the opposite direction, the economy will return to its initial equilibrium (see Amable *et al.*, 1995, pp. 174-7). However, if some of the relevant parameters of the model (such as the speeds of adjustment parameters of the state variables) are time dependent, so that their values are different when the first shock is applied compared with their values during the reverse shock, the models could imply remanence. It is a different matter, however, to provide plausible reasons for why the parameters are, in general, time dependent.

3.5. Hysteresis

The term hysteresis has been used in a variety of senses in economics. To distinguish the term from other ways of how history matters in affecting outcomes, we use it in a specific sense, that is: systems that retain a memory of their time paths because of differences in the reaction of one variable to another due to changes in different directions (up or down),

because they represent different kinds of movement in time.²⁹ This is the specific sense in which the term was used in its early application in physics by Ewing in the study of electromagnetic fields (see Cross and Allan, 1988).

Simple systems, which have different “switch off” and “switch on” points for a dependent variable in response to changes in some independent variable in a relationship in the model, provide an example of models with remanence. As shown in Figure 7.8, let x_1 be the independent variable, the value of which causes changes in a binary dependent variable x_2 , in say a behavioral equation (which states whether a specific action is taken or not). As the value of x_1 increases from 0 to x_1^F (the superscript denoting the switch *off* point) and beyond, x_2 stays at the level 0 until x_1^N (the superscript denoting the switch *on* point) is reached. As x_1 takes the value x_1^N or higher, the system switches on and x_2 takes the value 1. If x_1 then decreases below x_1^N , but stays above x_1^F , x_2 remains at 1. It switches off when x_1 goes below x_1^F . Thus for $x_1 \in [x_1^F, x_1^N]$, x_2 can take the value 0 or 1 depending on what the prior value of x_1 was. Moreover, if the system starts from any point in the interval $[x_1^F, x_1^N]$, and is then shocked to take it to some level outside it, and then brought back to the initial level by a reverse shock, the value of x_2 may change. If we now introduce a number of such units, which can be called hysterons, and aggregate over them to get the total value of the dependent variable, given by $X_2 = \Sigma x_2$, and let the values $< x_1^F, x_1^N >$ be different for different units, then history will begin to matter in a more complicated way. The precise time path of x_1 determines exactly how many hysterons are in or out, and hence, the value of X_2 (which will be equal to the number switched on) at any time. The history stored by the system actually consists of the past maxima and minima of the independent variable (which determine how many hysterons are in or out). More general models do not need to feature bivariate dependent

²⁹There are some alternative definitions of hysteresis that are closely related to the one we have used here. Setterfield (1997a) defines it in terms of the cumulative impact on the alleged exogenous “data” of a model of forcing a dependent variable away from its original value and then back again. According to him hysteresis exists when the cumulative impact of this hypothetical change on the “data” is non-zero. This definition is actually broader than the one used here. Hysteresis of the type discussed here would also be hysteresis in terms of the Setterfield definition. However, the latter may exist due to the time dependence of some relations in the model as discussed earlier, without hysteresis in our sense. Nevertheless we define hysteresis narrowly because it makes clear the source of remanence while Setterfield’s definition is not clear on that issue.

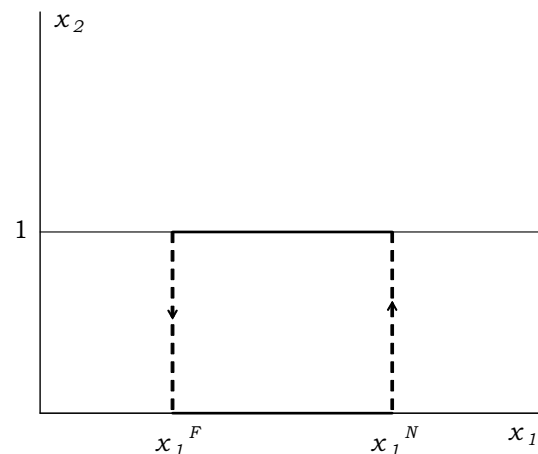


Figure 7.8. A simple system with hysteresis

variables but can include continuous variables (denoting the level of the action taken).

There are several examples of this type of model in economics, including that of the effects of exchange rate changes on exports (see Dixit, 1989, and Amable *et al.*, 1994), of labor markets and unemployment (see Cross, 1995) and of investment (Dixit, 1992).

The reason why hysteresis occurs in several types of decisions, such as investment and exports, can be understood by examining the case of investment decisions. Three properties of the investment decision (see Dixit, 1992, for instance) are relevant in this regard: first, it entails some sunk costs involving expenses that cannot be recouped by reversing the decision; second, the economic environment involves uncertainty; and third, the investment opportunity does not vanish, so that the act can be postponed. If there were no sunk costs the decision could be reversed costlessly. If there was no uncertainty, it would be perfectly clear whether, at any given time, investment is profitable or not. If it cannot be postponed, the decision-maker does not have the luxury of waiting. The simultaneous existence of these three characteristics is necessary for hysteresis, which makes decision-makers wait to take an action beyond the level at which the action would be taken in the absence of these characteristics. In Dixit's (1989) analysis of the response of exports to exchange rate changes the same three characteristics are at work. Cross

(1995) examines the reaction of firms changing their level of employment in response to aggregate demand shocks in the same way, with employment with hiring and firing costs interpreted as an investment decision. To the extent that other major economic decisions share these characteristics, hysteresis effects can be said to be widespread.

Hysteresis in this sense can be interpreted as a most appropriate way of formalizing the notion of historical time. We saw earlier that a crucial feature of historical time is the possibility that it is irreversible, and hysteresis in the sense discussed here allows precisely for such irreversibility, parts of a system that are switched on, for instance, need not be switched off when the system returns to its initial state. However, this hysteresis can also be interpreted as giving a limited role to history. A property of this kind of model is that although it has a memory of past shocks, that memory is selective in the sense that it remembers the non-dominated sequence of extremum values of shocks to x , and not everything that happened in the past. While it is implausible to expect a system to remember *everything* that happens in the past, it is not clear that it should remember only such non-dominated extremum values.

There is reason to believe that the examples that have attracted attention in the literature on hysteresis are only a small subset of reasons that make hysteresis possible. The examples discussed earlier stress three characteristics of events that can lead to hysteresis: sunk costs, uncertainty and postponability. To the extent that most economic decisions can be postponed and are taken in an uncertain environment, the last two characteristics are likely to be satisfied by most economic activities. What about sunk costs? Here the crucial issue is irreversibility, for which sunk costs provides just one cause.

Irreversibility arises in a wide range of situations. Some examples are due to the operation of physical factors: an egg that is broken cannot be put back together again. However, one needs to be careful about this: if eggs are produced every period, then it is possible to replace a broken egg with a new one. There are other physical and other related examples as well. A machine can be installed, but once installed, cannot be set aside or converted into something else (at least not very easily), except slowly through the process of depreciation or with losses incurred due to disposal in second-hand markets or as scrap. Knowledge can be gained in the form of a new technique or new product, but cannot disappear, unless the knowledge is forgotten after many years of disuse. Species that become extinct are lost forever.

The irreversibility of knowledge can be discussed as follows. Increases in knowledge in many models occur due to learning by doing, measured

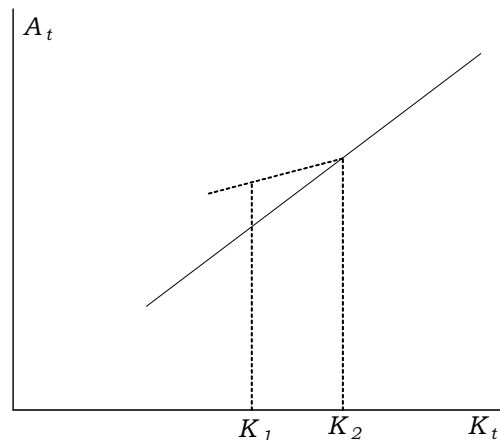


Figure 7.9. Irreversibility in dynamic systems

in terms of cumulative output or cumulative investment (see Arrow, 1962) for example. While some kinds of improvements in efficiency are clearly reversible, if they require large-scale operation, other kinds are irreversible since the knowledge obtained need not be forgotten. As shown in Figure 7.9, suppose that productivity, A_t , increases steadily depending on the value of K_t , the stock of capital, due to reversible and irreversible improvements in technology. If, when capital accumulation reaches the level K_2 and begins to fall due to depreciation, the reversible part of productivity improvement disappears while the irreversible part remains, the economy will move down the dashed line. Hence, the level of productivity of the economy will depend not only on the current level of capital stock, but its past peak level.

The examples multiply when we depart from the optimization framework used in the analysis of investment decisions and introduce the habits, norms and the use of heuristics in decision-making. Habits of some types are hard to break. A typical example is consumption habits. It may be easy to consume more, but after one is used to a higher standard of living, it may be very difficult to adjust back downwards. This was analyzed by Duesenberry (1949) in terms of ratchet effects. Another example is work habits: unemployment can lead to the loss of work habits and psychological depression, which may be very hard to reverse, especially after prolonged spells of unemployment. Social norms that are slow to change when the economy moves in one direction, may

change more rapidly when it moves in the other. An important example is norms that govern changes in the money wage. When employment falls wages may resist downward movements, perhaps due to the fact that individuals and groups resist reductions in their relative wages in a situation in which coordinated reductions in wages are not possible due to the decentralized nature of the bargaining process, while when employment rises there may be no such resistance to wage increases, as these same individuals or groups will not be averse to increases in their relative wages. The story can be depicted as in Figure 7.9, with capital stock replaced by employment and productivity replaced by the wage rate.

Heuristics that lead to biases when people make judgments in uncertain environments also provide explanations of irreversibility. The approach, developed by Tversky and Kahneman and others, points out that people use several kinds of heuristics, including representativeness and availability heuristics, which lead to biases in decision-making.³⁰ According to the representativeness heuristic, the likelihood that an object A belongs to a class B is estimated by the degree to which A resembles B . According to the availability heuristic the probability of an event is assessed by the ease with which instances of the event come to mind, through retrieval or visual simulation. The use of such heuristics can lead to biases, since the degree to which A resembles B to an observer, and the information that is retrieved, depends on his or her own experiences. Biases also result not just from the use of simple heuristics, but also from motivational factors, loss aversion and anchoring. Motivational factors lead to a common tendency to attribute success to ability and effort, and failure to bad luck or unfairness. Loss aversion implies that people are much more strongly affected by losses than by gains. Anchoring biases occur when quantities that people estimate are unduly affected by candidate values that people are led to focus their attention on, even when such values may be irrelevant for the quantity being estimated. All of this literature suggests that current state will affect how one reacts to changes in circumstances: the reaction of people to changes will depend crucially on the circumstances they find themselves in, and on the direction of change.³¹

³⁰See, for instance, Kahneman *et al.* (1982). For a brief discussion, see Shafir and Kahneman (1999).

³¹That the direction of change is relevant is immediately clear from motivational factors and loss aversion. That context also leads to similar outcomes, although somewhat indirectly, can be appreciated by noting that one's behavior at any particular level of the independent variable will depend on whether one started off from a higher or lower value of that variable (which represent different contexts).

This discussion suggests that hysteresis is omnipresent. It is indeed difficult to imagine major economic relations when such effects can be confidently ruled out. Consider a standard macroeconomic model with goods, assets and labor markets. As suggested by the models we have reviewed, we seem to have hysteresis effects in consumption, investment and export functions in the goods market. Hysteresis effects arguably emerge in asset demand functions because of the use of heuristics. We have hysteresis effects in wage-setting employment decisions and labor supply decisions. In the growth context these effects are compounded by hysteresis in capital stock changes and technological changes. Perhaps it is the *absence* of hysteresis in the real economic world that is a rarity!

This discussion also suggests that hysteresis introduces additional complications that are typically not emphasized in the literature, two of which may be briefly mentioned. First, the switch off and switch on points change over time, depending on the evolution of the system. Second, the amount of time spent in a state is likely to affect the degree to which there is irreversibility. Consumption habits, for instance, may be harder to reverse the longer one is used to higher levels of consumption.³² These considerations imply that the outcome of a process may depend on the path that the economy takes in a more complicated way than suggested by simple models of hysteresis that remember only the non-dominated extremum values of the independent variable.

We conclude by noting that although Robinson did not actually discuss hysteresis effects, which were not introduced into the economics literature until much later, she did point to cases of irreversibility of the type we have discussed here. Robinson points out that there are a number of reasons why the reaction of one variable to another may be very different depending on whether one is considering an upswing or a downswing:

So far as rentier consumption is concerned, [the]...lag in the reaction of changes in expenditure to changes in receipts may be supposed to be much more marked of a downswing than of an upswing, an unforeseen fall in receipts reduces a household's saving rather than the standard of comfort to which they are accustomed. If incomes rose and remained at a steady level thereafter, we should expect expenditure to be restored to its normal proportion after a year or two, but if

³²Moreover, the effects need never be completely obliterated with the passage of time, since higher consumption levels will lead to demand-induced increases in consumption, which will turn make possible higher consumption levels.

incomes fell and remained steady thereafter, the normal proportion might not be restored before a change-over of generations had occurred within the rentier families. . . [T]his difference in reaction time produces a ratchet effect." (Robinson, 1962a, p. 65)

On investment she writes that

[W]hen the rate of profit in investment, calculated on the basis of present prices and costs, has been rising, the desired rate of accumulation is higher, and when it has been falling, lower, than would correspond to the present rate of profit if it had been constant for some time. (Robinson, 1962a, p. 67)

The consequence of this is that

[F]irms are unable to settle down to a steady rate of accumulation. While the rate of profit is rising, the desired rate of accumulation is kept high, but as soon as the desired rate is reached, profits cease to rise, and the rate is no longer desired. Uncertainty, through the volatility of expectations to which it gives rise, is continually leading the firms into self-contradictory policies. Now it needs no chance shocks to set an upswing going. The model is inherently unstable and fluctuates even in otherwise tranquil conditions." (Robinson, 1962a, p. 67)

Regarding scale economies, Robinson writes that

[W]ith these types of economies the ratchet effect is very marked, and once the overhead investment has been made, a reduction in the scale of total output would cause losses on the investment, but not a rise of current cost per unit of output." Robinson (1956b, p. 340)

4. CONCLUSION

This chapter has examined the contributions of Robinson and some other post-Keynesian economists to the discussion of the relation between history and equilibrium, and looked at different ways in which history has been incorporated in equilibrium theory in recent years. For the latter task we have discussed five main ways in which this has been done: first, by examining time paths; second, by focusing on the determination of, and changes in, parameters by historical forces; third, with models with multiple and unstable equilibria; fourth, with models with a continuum

of equilibria; and finally, with models of hysteresis. To conclude, I summarize the main implications of the chapter, first, on the general project of incorporating history into equilibrium analysis in economics and second, on Robinson's contributions regarding history and equilibrium.

On the general project the main implications are as follows.

1. History can be and, indeed, has been, incorporated systematically into economic analysis in a variety of ways. Models that do so imply that the equilibrium states and dynamics of the economy are affected by earlier states of the economy, that is, its history.
2. These models suggest that economic models in which history does not play a role, that is, models for which outcomes are independent of the past states of the economy, are seriously incomplete depictions of real economies. Since the vast majority of economic models are of this type, it seems that economic theory has been erroneously shunted in a direction that has largely ignored history. While it is beyond the scope of this chapter to explore reasons for this denouement, it can be speculated that it is the result of the use of particular mathematical tools (involving single-valued functions to depict economic relations) and the desire to get unique, determinate results.
3. The different approaches by which history can be incorporated into equilibrium models are formally different, and have different strengths and weaknesses. However, some of the alleged weaknesses of some approaches appear to have been exaggerated by their critics (for instance, such as models with unstable equilibrium and unit roots). In fact, all of them make important contributions to incorporating the role of history in economic theory and can be treated as complementary. Moreover, many similar issues have been addressed using alternative approaches, such as the role of expectations and uncertainty, labor market institutions, the role of complex "non-economic" factors such as norms and habits, and the importance of capital accumulation, increasing returns, technological change.
4. Taking history seriously does not necessarily open up the way for theoretical nihilism or fatally ruin the method of equilibrium analysis. The models in which history matters have all started from simple equilibrium models and reinterpreted and/or extended them in some ways. In this sense equilibrium analysis can be argued to be much more resilient than its critics have sometimes argued.
5. Many specific implications for economic theory follow from the recognition of the role of history in economic analysis, of which we

have highlighted a few. First, claims about real economies based on unique equilibrium properties of simple-minded equilibrium models, such as full employment, the natural rate of unemployment, and perfect foresight (even in the sense of rational expectations) in equilibrium states, may have to be jettisoned. Second, such simplistic models cannot be used for precise predictions about the effects of policies and other kinds of changes in actual economies and for conducting mechanical policy exercises underlying the approach of economics of control. Economic models should be understood as what they really are: simple constructions that isolate a few important pieces of a complex reality, that evolves in history, in order to understand how these pieces fit together and possibly affect each other. The way is therefore opened up for a greater appreciation of the importance of history, but also for understanding that economic history and economic theory are inseparably interlinked.

On Robinson's contributions the main implications are as follows:

1. Robinson wrote extensively about the problems of equilibrium analysis, especially because it ignored the role of historical time. She also made these issues of central importance in her critique of mainstream, or neoclassical, economic theory.
2. Her discussion on these issues has a number of ambiguities and problems. These include: her difficulties in comparing between dynamic processes and equilibrium states and between changes over time and across economies; in analyzing the role of expectations and capital accumulation in historical analysis; in developing growth models in which historical time matters; and even claiming that historical time cannot be formally modeled and can only be analyzed in very general terms.
3. Despite these problems, our analysis has shown that Robinson had an astute understanding of how history created problems for equilibrium analysis, and how history can be better introduced into economic analysis.
4. She examined and anticipated several alternative approaches to introducing history into economic analysis, such as by introducing endogenous parametric changes, instability and multiple equilibria, and with various kinds of irreversibilities.³³ Although she could not

³³This has not been sufficiently recognized in the literature. Harcourt (1995, p. 1236) states that "[i]t is shameful that despite the great emphasis that has been put on path dependency in recent years (by Franklin Fisher and Frank Hahn amongst many

push these discussions very far, since the tools to deal with some of them (like zero-root models and hysteresis) had not become available to economists, a strong case can be made that she anticipated several of them.

5. She also had a good understanding of some of the mechanisms that make history important in economic analysis, especially the importance of expectations and uncertainty, and of irreversibility due to habits, technological change, and capital accumulation.
6. Robinson's analysis of these issues may have been less clear than that of other post-Keynesians like Kaldor, who made precise the meaning of path dependence and formally analyzed cumulative processes. But unlike Kaldor's almost exclusive focus on instability due to increasing returns, Robinson painted a richer and deeper picture that not only incorporated many mechanisms, but also a variety of methods by which history can be incorporated into equilibrium.

others) rarely is Joan Robinson (or Nicky Kaldor) ever given credit for identifying the issues and setting out the conceptual framework for the subsequent analysis."

8. Equilibrium, Stability and Economic Growth

Peter Skott¹

1. INTRODUCTION

As a student I found Joan Robinson's work exhilarating. But the excitement was combined with an element of frustration. As hard as I tried, I often reached a point where it seemed impossible to understand *precisely* what she was saying. Her writing was stimulating, and it created a legitimate space for the questioning of textbook orthodoxies. Her vision also seemed right. But there appeared to be a lot of details, both in her criticism of neoclassical theory and her constructive alternative, that still needed to be worked out. Alternatively, of course, the details might have been worked out already but deemed so obvious that the reader would not need to see them spelled out.

Re-reading her work I still find it wonderfully stimulating. But some of the problems also seem to remain and, somewhat hesitantly, I have decided to use this occasion to confront these problems, rather than to focus on aspects of her work that I fully agree with. My reason for doing so is a fear that some of her influential methodological positions may stand in the way of the further development and extension of her substantive vision of capitalist accumulation. Thus, my criticisms in this paper are motivated precisely by the fact that I share—and have been greatly influenced by—the Robinsonian vision, with its emphasis on aggregate demand, social and distributional conflict, and path dependencies.

2. EQUILIBRIUM

2.1. The impossibility claim

The irrelevance of equilibrium economics and the confusion of time and space in neoclassical economics are recurrent themes in Joan Robinson's writing. In one of her best-known articles she put it as follows:

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The neoclassical economist thinks of a position of equilibrium as a position towards which an economy is tending to move as time goes by. But it is impossible for a system to *get into* a position of equilibrium, for the very nature of equilibrium is that the system is already in it, and has been in it for a certain length of time. (Robinson, 1953a; quoted from Robinson, 1960a, p. 120, italics in original)

Indeed, this point is at the center of her critique of neoclassical economics:

The problem of the “measurement of capital” is a minor element in the criticism of neoclassical doctrines. The major point is that what they offer as an alternative to the post-Keynesian theory of accumulation is nothing but an error in methodology—a confusion between comparisons of imagined equilibrium positions and a process of accumulation going on through history. (Robinson, 1974; quoted from Robinson, 1978a, p. 136)

Elsewhere in the same paper she seems to locate the problem in the nature of simultaneous systems of equations. Thus, she claims that “it is not legitimate to introduce an event into a system of simultaneous equations” (Robinson, 1978a p. 130).

But is it *logically impossible* to get into equilibrium, and is it always illegitimate to use systems of simultaneous equations to analyze the effects of unanticipated events? The clear answer to both questions, it seems to me, is no.

Even if equilibrium is understood in a restrictive sense as a state where all expectations are fulfilled and no agent wants to change her behavior, there is no *logical* impossibility of getting into equilibrium. An “equilibrium” outcome cannot be ruled out on grounds of logic, even if the system has at some point been “out of equilibrium” and movements in time are strictly one-way. It is straightforward, for instance, to describe a simple hypothetical economy with two types of agents (berry pickers and fishermen, say) where the agents initially have mistaken beliefs about the relative price but where an equilibrium with fulfilled expectations and market clearing may come to be established.

Joan Robinson would probably dismiss the example as an idle and irrelevant thought experiment. But “irrelevance” is not something that can be decided on purely logical grounds. In other words, her real claim may not be methodological. It does not concern logical impossibilities. The real, implicit claim may be that *in the world in which we live* and

given the range of questions that she was interested in, it can be *misleading* to represent the economy as an equilibrium system, where equilibrium is understood as a state of market clearing and universally fulfilled expectations. But if her claim is qualified in this way, most people would probably agree. Agreement with this weak claim may lie behind Paul Samuelson’s joke “that the distance between me and Joan Robinson is less than the distance between Joan Robinson and me” (Turner, 1989, p. 128).

Clearly, important disagreements do exist between Robinson and mainstream economics. But these disagreements only become apparent in relation to the substantive and much more difficult questions about the adequacy and relevance of various theories and models with respect to carefully defined issues. Substantive questions of this kind cannot be settled by sweeping statements about logical impossibilities. All models involve simplifications. As Robinson has noted herself, we do not want road maps at a scale of 1:1, and it is neither controversial nor interesting to point out that conditions of strict equilibrium in the sense of fulfilled expectations will never be met in the real world. Thus, logical strictures about the impossibility of getting into equilibrium are largely beside the point—besides being, strictly speaking, wrong.

What about simultaneous systems? Surely it is correct that few real-world interactions are strictly simultaneous and that the introduction of an unanticipated event must lead to a *sequence* of causal changes rather than simultaneous interactions. This claim may be true but it is not very helpful. Even if the world is completely sequential, this real-world sequentiality does not imply that theories must also eschew simultaneity. Theories simplify, and as soon as there is simplification, the unconditional claim of sequentiality must go. Putting it differently, theories typically aggregate in time (events that do not occur at exactly the same moment are treated as if they did) as well as among goods and agents. Thus, there is no *a priori* reason for imposing strict sequentiality between the variables considered by the theory. In many cases a good theoretical approximation to the behavior of the real world may involve simultaneous equations. Here again, a purely methodological claim takes us nowhere. We need to spell out precisely where certain theories and models go wrong and why the simplifications relating to the treatment of time and dynamics in those theories may be particularly misleading. Better still, we need to formulate alternative theories that better capture

the salient features of the real world. Methodological claims do little to settle these substantive issues.²

The mixture of methodological and ontological considerations shows up in Robinson's explicit discussion of equilibrium in Chapter 6 of *The Accumulation of Capital*.³ After suggesting that the metaphor of equilibrium is treacherous, she proposes a new set of concepts to highlight the remoteness of simple model economies from actual economies. An economy, she suggests, may be characterized by *tranquility* "when it develops in a smooth regular manner without internal contradictions or external shocks, so that expectations based on past experience are very confidently held, and are in fact constantly fulfilled;" by *lucidity* if "everyone is fully aware of the situation in all markets, and understands the technical properties of all commodities, both their use in production and the satisfaction that they give in consumption;" and by *harmony* if "the rules of the game are fully understood and accepted by everyone and no one tries to alter his share in the proceeds of the economy." These concepts describe substantive characteristics of (hypothetical) economies, and Robinson concludes this short chapter by suggesting that it "is only necessary to describe these conditions to see how remote they are from the states in which actual economies dwell" (Robinson, 1969a, p. 60). Well, yes, but these very general statements still form an insufficient basis for a blanket rejection of "neoclassical economics," if for no other reason than that not all neoclassical theories seem to claim or require the fulfillment of these conditions of tranquility, lucidity and harmony. A sequence of Hicksian temporary equilibria, for instance, need not involve expectations that are constantly fulfilled. Her comments point in the right direction (that is, to the need for a careful assessment of the relevance of different theories with respect to features of the real world) but they still leave the task undone.

2.2. Equilibrium methodology

Robinson's impossibility claim has been highly influential. Indeed, it may be the main inspiration behind the emphasis in much of the heterodox literature on the need to replace "equilibrium" economics with

²Robinson's instrumental use of (seemingly) methodological arguments has been noted by Salanti (1996, p. 286).

³Kaldor (1972) is another prominent critique of equilibrium economics. But in Kaldor's case it is relatively clear that the term equilibrium economics is used as a shorthand for Walrasian general equilibrium theory. Robinson's criticism often gives the appearance of having a much broader target.

a "disequilibrium analysis" that is truly dynamic and historically relevant.⁴ It is difficult to disagree, of course, with the desirability of dynamic and historically relevant theories. But the equilibrium-disequilibrium focus may have obscured the real issues.

What do we mean when we talk about equilibrium? There appears to be a range of different definitions, and the resulting ambiguity is a fundamental problem for methodological critiques that have "equilibrium" as their focal point. Sometimes constancy or absence of inherent tendencies to change is implied by the term, but there are plenty of growth equilibria in which some quantities change. Thus, "constancy" will not work as a general definition. "Fulfilled expectations" will not work either: the fulfillment of expectations characterizes some equilibria but clearly not all (for example, Marshallian ultra-short-run equilibrium or Lucas's theories of equilibrium business cycles). Market clearing, finally, is a non-starter if one wants to talk of Keynesian equilibrium models, including formal *IS-LM* models with excess supply in the labor market.

If there is a unifying element in the various equilibria, it appears to be this: each equilibrium (or set of equilibria) corresponds to the predictions of the underlying theory. Putting it differently, associated with any theory—whether phrased in the form of mathematical equations or described verbally—there exists a set of combinations of initial conditions and outcomes that are consistent with the theory. This set of theory-consistent outcomes constitute the equilibria of the theory. Some theories predict stationary outcomes, and the associated equilibria therefore will be characterized by constancy; some theories predict market clearing but others do not, and the associated equilibria accordingly exhibit market clearing or non-market clearing, as the case may be.

Using this definition of equilibrium as *theory-consistent outcomes*, it makes no sense to criticize "equilibrium theory." To be against equilibrium, on this definition, is to be against theory. Equilibrium becomes a purely methodological term: we analyze the world using theories that must have a non-empty set of equilibria in order to be internally consistent. A theory without equilibria describes a system in which no outcomes can ever be consistent with the regularities posited by the theory.

Consider a couple of examples. An Arrow-Debreu-McKenzie theory posits a world in which all agents have well-defined preferences and in

⁴The argument in this section draws on Skott (1984).

which their choice sets are limited only by budget constraints. The internal consistency of this theory requires the existence of a set of “equilibrium prices” that make the desired actions of all agents mutually consistent. In the absence of such equilibrium prices it is a matter of pure logic that some agents must face additional constraints, aside from the budget constraints considered by the theory. Analogously, simple Keynesian models posit a certain relation between consumption and income and state that investment is determined by animal spirits. This theory predicts an “equilibrium” level of income and employment but, of course, some workers typically will be involuntarily unemployed at this Keynesian equilibrium. In fact, if the predicted employment level violates a binding full employment constraint, there is no Keynesian equilibrium and the theory ceases to be internally consistent.

Robinson’s historical-time models also have equilibria, on this definition:

The other type of argument [historical-time models, PS] specifies a particular set of values obtaining at a moment in time, which are not, in general, in equilibrium with each other, and shows how their interactions may be expected to play out. (Robinson, 1962a, p. 23)

The “particular set of values of the variables” may not be in equilibrium with respect to some (unspecified) restrictive theory, but the historical model obviously must permit these initial values, and the model, we are told, can be used to derive “how their interactions may be expected to play out.” In other words, the interactions specified by the historical model generate a set of model-consistent equilibria.

Methodological critiques of equilibrium economics, to summarize, are of limited value in the absence of a clear definition of the term equilibrium. Various, conflicting definitions coexist in the literature, and many discussions of equilibrium are characterized by a profound lack of clarity. Several, usually incomplete, definitions of equilibrium can be found in Robinson’s writings, but supporters of equilibrium theory also fail to provide clear definitions of the theory they defend. Blaug (1980, p. 101), for instance, argues that

The idea of equilibrium is, surely, nothing more than the prediction that the real-world observable counterparts of the endogenous variables of economic models will remain constant so long as the real-world counterparts of the exogenous variables remain constant.

This definition contains no less than three different components: (1) equilibrium as theoretical prediction, (2) the correspondence of theoretical variables to real-world counterparts and the direct applicability of the theory and (3) a constancy requirement. The second requirement effectively restricts the equilibrium concept to theories intended for direct empirical testing. Theories of, say, closed economies without public sector, which no one would want to apply directly to actual economies, apparently have no equilibria. The third requirement rules out, say, growth equilibria or inflationary equilibria, or, alternatively, raises questions of how much and what kind of constancy is required.

My very inclusive definition of equilibrium as theory-consistent outcomes is motivated by this absence of a narrow, generally accepted definition.⁵ This broad notion of equilibrium makes a methodological critique of equilibrium economics meaningless. I view this implication of the broad definition as a virtue: adopting the broad definition may contribute toward a re-focusing of the debate on the underlying issues, that is, on the adequacy of particular theories or theoretical approaches with respect to some specified class of issues.

The notion of equilibrium has been discussed by many writers. A survey of this literature is beyond the scope of this chapter. It should be noted, however, that some writers have taken a position that is similar to the one advocated in this chapter. Estrup (1977, p. 241; emphasis in original), for instance, argues that a

model without an equilibrium is no model at all—there must be something wrong in its assumptions or in its deductions....The classical equilibrium analysis, therefore, is not an analysis *of* an equilibrium, but an analysis *by means of* an equilibrium.

Katzner’s (1998) analysis also has affinities with the argument in the present chapter. Katzner identifies four methodological approaches:

⁵With relatively slight modifications, this broad notion of equilibrium can provide a general, descriptive definition of what economists mean when they talk of equilibrium. Associated with any non-vacuous and internally consistent theory is a *full* set of *weak* equilibria. This set is defined as the set of configurations of the conceptual variables of the theory which are feasible when the influence of all the postulated regularities are taken into account and the influence of all other conceivable disturbing factors is excluded. A subset of the full set of weak equilibria may be obtained by imposing additional regularity conditions and the term equilibrium is sometimes used in a stronger and more restrictive sense to describe those configurations which belong to the full set of weak equilibria and which also satisfy such additional conditions. A *restricted* set of equilibria in this *stronger* sense can be viewed alternatively as the full set of equilibria associated with a more restrictive, special theory Skott (1984, p. 336-337).

equilibrium analysis, disequilibrium analysis, non-equilibrium analysis and mutually interactive analysis. Although his terminology may be different from the one suggested in this chapter, the substantive differences seem minor. Thus, “disequilibrium analysis may still be viewed as ‘equilibrium analysis’ with an altered system of equations” (p. 18), and non-equilibrium analysis (his preferred approach and the one associated with historical time) must be “coherent.”

A model is *coherent* if it is internally consistent in the sense that, at every t , its relations representing simultaneously occurring behavior have unique solutions (that is, solution vectors) and, where those solutions represent inconsistent planned activity, they are resolved into unique realized variable values according to appropriate allocative and other rules of market operations. The realized values themselves are sometimes called *outcomes*, and a (necessarily kaleidic) sequence of such outcomes, one for each period t , is a realized kaleidic time-path generated by the model. Thus, a model is coherent whenever it produces unique outcomes at each t , and its coherence is an attribute of the structure of a model rather than of its outcomes. (Katzner, 1998, p. 332; emphasis in original)

The kaleidic time-path of Katzner’s non-equilibrium model represents the equilibrium time-path associated with the theory, using my terminology. Katzner imposes a uniqueness requirement as part of his definition of coherence. I see nothing incoherent or internally inconsistent in the non-uniqueness of equilibrium and therefore included no similar condition in my definition of theory-consistent equilibrium. But this appears to be the only substantive difference between the two definitions.

The argument in this chapter, finally, shares some common ground with Cohen’s (1993) analysis of Robinson’s methodology. Following Bliss (1975), Cohen suggests that equilibrium be viewed as simply an analytical stepping stone. Equilibrium analysis, in this sense, he argues, represents one of the stages in Robinson’s historical approach. The distinctive characteristic of this approach, according to Cohen (p. 233), is the recognition that “complications have to be reinserted before conclusions drawn from the model can be confronted with evidence from reality” (Robinson, 1969a, p. 64). The problems associated with reinserting the complications are discussed in section 4 below.

3. STABILITY ANALYSIS AND HISTORICAL TIME

Sometimes theories are nested. Marshallian short-run equilibrium is a special case of ultra-short run equilibrium; full-employment equilibrium is a special case of Keynesian equilibrium; multisectoral models may include special cases with balanced growth trajectories. The nesting of theories in this way makes it possible to examine the *stability* of the nested theory; that is, one can examine whether the more general theory generates an outcome that can be approximated by, or perhaps converges to, the outcome predicted by the special case. This stability analysis is conditional on the more general theory, just as the statistical test of a special hypothesis H_1 against a more general hypothesis H_0 , is conditional on H_0 . Hence the stability analysis (the significance test) is of little value if one has no faith in the more general theory (the more general hypothesis).

Robinson’s frequent criticisms of traditional stability analysis make sense within this terminological framework. She has been scathing in her comments on the “stability analysis” to be found in general equilibrium theory, and for good reason. *Tatonnement* processes do *not* qualify as serious stability analysis for the simple reason that no outcomes are specified during the *tatonnement* process. This is a fundamental methodological problem. A *tatonnement* process quite simply does *not* constitute a more general theory of decentralized market economies: the process does not allow for the possibility of outcomes without market clearing. In case of instability we are left without any predictions whatsoever about the outcome. The theory allows for no trade, no production and no consumption to take place until the process has been brought to a successful end and an equilibrium has been established.

The *tatonnement* process, in Robinson’s terminology, takes place in “logical time.” By contrast, a proper stability analysis must take place within a framework (a broader theory), that allows outcomes that are “out of equilibrium” from the perspective of the theory whose equilibria are being tested for stability.⁶ Or as she put it in “History versus Equilibrium:”

If we construct the equations for a single self-reproducing system and then confront it with an unforeseen change, an event taking place at a particular date, we cannot say anything at all before we have introduced a whole fresh system specifying how the economy behaves in short-period disequilibrium. (Quoted from Robinson, 1978a, p. 128)

⁶Since only nested theories can be examined for stability, it follows that there is no way to decide the stability properties of equilibria associated with the most general theory that has been specified: by definition, this general theory is non-nested

This analysis gives a different perspective on the methodological problem in neoclassical theories of market clearing. The problem is not the “impossibility of getting into equilibrium.” The problem arises from a failure to specify a coherent, more general theory that allows for non-clearing markets and within which the stability issue can be raised. The *methodological* error is the pretence that *tatonnement* processes in logical time may provide the required theory.

The unsatisfactory nature of *tatonnement* processes does not imply that stability analysis is impossible. In fact, the key message of Keynesian economics concerns stability: in the *General Theory*, Keynes developed (the outlines of) a theory that allows for outcomes with unemployment as well as for classical full employment. According to this theory the full employment position fails to be stable. The groundwork for this radical message is laid in Chapters 1-18, which effectively present an analysis of a fixed-money-wage economy; the (somewhat sketchy) stability argument follows in chapter 19.

Robinson (along with other post-Keynesians and old Keynesians) has echoed Keynes’s position and presented similar instability arguments (for example, Robinson, 1969a, p. 79; 1962a, p. 73-4; 1971, p. 91). In this light, moreover, the criticism of neoclassical analysis in Robinson (1974) is straightforward: without a demonstration that, contrary to Keynesian claims, market adjustments will in fact generate full employment, neoclassical analysis based on assumptions of market clearing is no “alternative to post-Keynesian theory of accumulation...but an error in methodology—a confusion between comparisons of imagined equilibrium positions and a process going on through history.”

As Robinson has also pointed out, Keynes had to “fudge” the stability argument in various ways (for example, Robinson, 1979a, p. 113). He treated expectations as well-defined, certainty-equivalent point expectations and, rather than dump the economy at some arbitrary initial position, he assumed that a fix-wage short-run equilibrium had been attained. Thus, despite Robinson’s protestations, it is hard to disagree with Hicks’s comment that Keynes’s analysis was only partly in historical time.⁷

⁷See Robinson (1977a, p. 1325). Keynes himself commented that in the *General Theory* he was “more classical than the Swedes, for I am still discussing the conditions of short-period equilibrium” (Keynes, 1973, p. 183). At a methodological level, moreover, Keynes expressed a belief in the usefulness of short-run equilibrium models:

The main point is to distinguish the forces determining the position of equilibrium from the technique of trial and error by means of which the entrepreneur discovers where the position is. (Keynes, 1973, p. 182)

But perhaps being partly in historical time is all we can hope for. All analysis is theory-driven. Explicitly or implicitly it stipulates and relies on various linkages and dynamic effects between variables, and non-vacuous theories must impose restrictions on the set of possible initial patterns. If a theory states that workers’ consumption is equal to their wage income, for instance, an analysis based on that theory cannot consider the implications of initial patterns in which consumption differs from wage income. The real question therefore is not whether an analysis is fully in historical time, it never is, but whether it is “sufficiently historical.”

How does one decide whether a theory is sufficiently in historical time?⁸ If, following Robinson (1962a, p. 23), we define a historical-time model as one which specifies “a particular set of values obtaining at a moment in time...and then shows how their interaction may be expected to play out,” the criteria seem straightforward: a theory can be insufficiently historical if the set of permissible initial values is too restrictive, *given the issues addressed by the analysis*. Thus, the ability of markets to generate full employment cannot be analyzed in a satisfactory way by a theory that presumes universal market clearing and that therefore does not allow initial conditions that involve unemployment. Keynes’s assumption of “short-run equilibrium” with fulfilled short-run expectations also raises questions. Expectations sometimes go wrong, except in a mythical golden age, and mistaken expectations must involve a divergence between outcomes and expectations in some short period. My own analysis in Skott (1989) therefore built up the analysis as a sequence of “ultra-short-run equilibria” in which expectations need not be fulfilled.

As pointed out in the contributions to this volume by Harris and Dutt, significant progress has been made since *The Accumulation of Capital*. Robinson’s analysis used golden-age models as stepping stones for an examination of internal contradictions in the growth process and for rather informal considerations of how the trajectory might be altered by various events. Subsequent work by post-Keynesians and writers in the

⁸The common metaphors used to illustrate the irreversibility of time are largely irrelevant in this respect, it seems to me. If, for instance, we want to understand precisely what happens when an egg is cracked, it is a strength rather than a weakness that video recordings of the event can be re-run at will. It is hard to see, moreover, how the possibility of running the recording backwards could count as a strong argument against the use of recordings.

structuralist tradition has pushed further in the direction of historical-time modeling of capitalist accumulation.⁹ Less well-known among post-Keynesians is the research project carried out by Carl Chiarella, Peter Flaschel and various co-authors (see for example, Chiarella and Flaschel, 2000). They insist on building models that are integrated (in the sense of including the major markets in a capitalist economy: labor, goods and financial), that are consistent (in the sense that all accounting restrictions are seen to be satisfied at all times) and that trace the dynamic implications of arbitrary non-market clearing initial positions. Robinson might have taken issue with some of the substantive assumptions built into the models they have analyzed so far. But the methodological approach should have met her approval—except, that is, for their heavy use of mathematics, an issue that I now want to turn to.

4. MATHEMATICAL MODELS

4.1. Powerless or redundant?

Robinson seems skeptical about the contribution of formal reasoning when it comes to stability analysis or, more generally, to the analysis of situations where expectations fail to be fulfilled. In Robinson (1962a), for instance, she concludes a verbal analysis of the effects of changes in wages and prices with the following comment:

These various effects of changes in money-wage rates play across the various real movements discussed above. This makes the operation of the model complicated and confusing. That, however, is a merit, not a defect, since it corresponds to reality. (Robinson, 1962a, p. 74)

This is a curious argument. The effects of changes in money wages clearly can be complex but that is no excuse for a vague analysis (“plays across”) that makes the operation of the model “confusing.” Why not try to make the analysis of the effects of changes in money wages as precise as possible?

Mathematical formalizations—including Tobin (1975), Dutt (1986-87), Chiarella and Flaschel (2000) and Flaschel and Franke (2000)—have clarified many of the dynamic interactions associated with changes in money wages. Formalization has made it possible to specify both the conditions for Keynesian instability and the types of instability that may arise much more precisely than would have been possible using verbal

⁹The structuralist modeling strategy is discussed by Gibson (2003).

reasoning. None of the models, to be sure, captures the full complexity of the real world. But why not accept the formal models as helpful tools? If stylized models depicting mythical ages can be helpful, why not expect that by using simplified dynamic models we can “hope to be able to gain insight into the behavior of the actual, complicated economy” (Robinson, 1969a, p. 64)?

Robinson’s reservations concerning the use of mathematics may be related to her general critique of “equilibrium economics.” Even if directed primarily at specific theories of perfect foresight and universal market clearing, a seemingly methodological criticism of “equilibrium economics” has a rather diffuse target, and Robinson and some of the post-Keynesian tradition that she inspired may have been deceived by their own rhetoric. Having (implicitly) identified mathematical modeling with equilibrium analysis and equilibrium analysis with a particular kind of theory, neoclassical theories of general equilibrium, they may have concluded that any kind of formal modelling should be avoided. Arguing along similar lines, Katzner (2001, p. 55) suggests that although formalization has been the target of much criticism, it is the kind of questions being analyzed and the substantive assumption content of current economics that are of real concern.

In any case, a number of quotations can be found in which Robinson suggests that, when not directly harmful, mathematical formalization may be largely redundant. Thus, Robinson argues that

[m]athematical logic is a powerful tool of thought, but its application in economic theory generally seems to consist merely of putting circular arguments into algebra. (Robinson, 1979a, p. 117)

Alternatively, formal analysis may be powerless:

disturbing events occur on disequilibrium paths. The resulting turbulence is beyond the skill of model builders to analyse. Historical analysis can be made only in very general terms. (Robinson, 1962a, p. 27)

It may be true, as argued by Harris (this volume) that Joan Robinson was not “averse to the use of mathematical modeling as such, if designed to eliminate errors in ‘thinking.’” Indeed, one can find quotations along these lines in her work. The overall impression from her writings, however, is one of deep skepticism with respect to the usefulness of mathematical modeling, and indeed this skepticism seems widespread within the post-Keynesian tradition.¹⁰ The following extended quotation from

¹⁰Formalizations of post-Keynesian theories do exist, of course. Indeed, Robinson’s analysis of the conditions for a “golden age” (or other mythical ages) can be

the survey of Robinson's economics by Gram and Walsh expresses the reluctance to formalize the analysis:

It is easy enough, at this stage in the development of dynamic models of capital accumulation, to write down the equations characterizing a steady-state growth path....But one hesitates to cast Robinson's golden age models in this mold, for there is more in her verbal descriptions than such formal structures adequately portray (which is not to say that we eschew or denigrate formal analysis). Perhaps the best one can do is to say that, even in a golden age, decisions in Robinson's argument are being taken (as one of our referees put it) in a state of Marshallian confusion (owing to Keynesian uncertainty). It just happens to be the case that events are unfolding in such a way as to be consistent with what are, in any case, very sketchy outlines of steady-state growth paths offered by formal growth theory. Marshallian firms, as it were, are leaving behind steady-state growth tracks, but those tracks do not in any very adequate way tell us why they are behaving in a manner consistent with these requirements of a golden age, and they are certainly not to be enshrined as a complete description of what is going on. (Gram and Walsh, 1983, p. 534, n. 14)

It is true that simple mathematical models do not provide a complete description of what is going on, but neither does simple verbal reasoning. Neither type of theory, in any case, is meant to give a complete description, and theories, whether presented verbally or mathematically, can and should be supplemented by historical and empirical studies. The advantage of formalization is that in many cases it will enable one to present and analyze more complex and more satisfactory theories and to do so with greater clarity and transparency. The use of mathematics therefore becomes particularly helpful if one wants to go beyond the golden age. And although an important stepping stone, the analysis of golden ages has limited value:

if steady growth is proposed as a hypothesis, it sinks at the first step but...it is useful in what Kornai describes as intellectual experiments, which are necessary to sort out the

and has been presented in simple mathematical terms; early formalizations include Worswick (1959) and Findlay (1963). Robinson appears to have accepted Worswick's formalization; her main objection concerns the incompleteness arising from Worswick's treatment of the real wage as exogenously fixed (Robinson, 1959b, p. 142). Robinson (1975a) also cites Harris's (1973) formalization approvingly.

questions involved in analysing complicated processes...I intended my golden age (which has often been mistaken for a hypothesis) to be used in this way. (Robinson, 1977a, p. 1330)

As she put it in *The Accumulation of Capital*:

It is important to remember, however, what complications have to be reinserted before conclusions drawn from the model can be confronted with evidence from reality. (Robinson, 1969a, p. 64)

4.2. Reinserting the complications

How does one go about "reinserting the complications?" Both *The Accumulation of Capital*, and *Essays in the Theory of Economic Growth* present complex verbal arguments. Golden-age relations are discussed alongside modifying influences, and matters are not helped by the fact that often the modifying influences and the interactions are only implicitly or partially specified. One example, referred to above, is the Keynesian analysis of the effects of changes in money wages. Here I shall briefly consider an example from Robinson's (1962a, pp. 22-87) analysis of accumulation.

The choice of technique may have figured prominently in much of Robinson's writings, but for present purposes nothing is lost by using a one-sector framework and assuming a fixed-coefficients technology.¹¹ Given the one-sector assumption, we have a well-defined accumulation function and Robinson's verbal argument implies that it takes the form

$$g = \frac{I}{K} = f(r^e) \quad (8.1)$$

where I is investment, K is the capital stock, g denotes the rate of accumulation, r^e is the expected future rate of profit on new investment, and $f' > 0$ (Robinson, 1962a, p. 47). Saving, S , is proportional to total profits and, normalizing by the capital stock, we have

$$\frac{S}{K} = sr \quad (8.2)$$

where r is the current rate of profit and s the saving rate out of profits.

¹¹ Aside from a few remarks on the effects of different types of restraints in a "restrained golden age," the choice of technique plays no role in the essay on "A Model of Capital Accumulation" in Robinson (1962a). In the preface to *The Accumulation of Capital*, moreover, Robinson comments on the intricacy of the choice-of-technique problem, noting that "the difficulty of the analysis is out of proportion to its importance" (Robinson, 1969a, p. ix).

The current rate of profit is determined by a market-clearing condition for the product market. In a closed economy without public sector, this condition requires the equality between investment and saving, that is,

$$sr = g. \quad (8.3)$$

In order to close the model, the specification of investment and saving is supplemented by assumptions concerning the formation of expectations, and most of the analysis focuses on the case of static profit expectations.

Assuming that the investment function f is strictly concave, we get the well-known “banana diagram” with two stationary solutions satisfying $r^e = r$. According to Robinson, the solution with low growth and low profit rates is unstable while the solution with high growth and high profit rates will be stable.

Two points should be noted. The stability analysis would seem to fall foul of Robinson’s own strictures: she has not specified a more general model that allows one to consider the trajectories following an initial position in which there is a discrepancy between desired investment and saving (Robinson, 1962a, pp. 48-9 and pp. 63-4). Thus, it is hard to see how one can be sure that when lags are introduced “near-enough stability is realized” (Robinson, 1962a, p. 64). The notion of static expectations with respect to the profit rate, secondly, seems peculiar. Under conditions of imperfect competition, it is implausible to assume that firms’ expected profit rate, r^e , is independent of their production and investment decisions. Thus, implicitly, we have an assumption of price-taking behavior (perfect competition) and as a corollary, the utilization of capital should be at the desired rate. This latter assumption is stated explicitly on p. 46: in the analysis of short-period equilibrium “let us suppose that competition (in the short-period sense) is sufficiently keen to keep prices at the level at which normal capacity output can be sold” (Robinson, 1962a, p. 46). Algebraically,

$$u = u^* \quad (8.4)$$

where u is the rate of utilization and u^* is normal (or desired) utilization. Using this notation, the rate of profit can be written $r = \sigma u q = \sigma u^* q$ where σ is the profit share and q the maximum output-capital ratio as determined by the fixed-coefficient production function.

To address the first point, explicit lags may be introduced. Thus, to accommodate lags in a simple continuous-time setting, the investment function in equation 8.1 may be replaced by

$$g^d = f(r) \quad (8.5)$$

$$\dot{g} = \lambda(g^d - g). \quad (8.6)$$

where $\lambda > 0$ is an arbitrary adjustment parameter and the dot indicates a time derivative; g^d is the desired rate of accumulation and g is the actual rate of accumulation. Equation 8.6 expresses the gradual adjustment of actual accumulation toward the desired rate and may be re-expressed using equations 8.5 and 8.3 as:

$$\dot{g} = \lambda[f(\frac{g}{s}) - g]$$

Thus, a locally asymptotically stable stationary point at g^* satisfies the conditions

$$f(\frac{g^*}{s}) = g^* \text{ and } f'(\frac{g^*}{s}) < s.$$

This is the “Robinsonian stability condition,” using Marglin and Bhaduri’s (1990) terminology: investment must be less sensitive than saving to variations in the profit share.¹²

Turning to the second point, the assumptions of price-taking behavior and utilization at the desired rate may be logically consistent but they are unattractive, both theoretically and empirically. Robinson acknowledges as much. She notes that “in reality, of course, markets for manufacturers are highly imperfect, prices are fairly sticky and changes in investment are generally accompanied by changes in output and employment” (Robinson, 1962a, p. 65). But no real attempt is made to analyze the implications of these features. We are left with the assertion that despite these and other complications “all the same, in a broad way, our analysis of long-run growth remains cogent....the characteristic features of restrained and limping golden ages or of platinum ages can be discerned under the restless surface of unstable growth” (Robinson, 1962a, p. 69).

One way to relax the desired-utilization assumption in equation 8.4 is to introduce a finite adjustment speed for prices and profit margins. Thus, let the profit share, σ , adjust to the difference between actual and desired capacity utilization

$$\dot{\sigma} = \nu(u - u^*) \quad (8.7)$$

where $\nu > 0$ is again an arbitrary adjustment coefficient. With slow price adjustment it is now instantaneous movements in the utilization rate u (that is, in output normalized by the predetermined level of capacity output) that ensure the equalization of saving and investment: both the

¹²The inequality is cast in terms of the sensitivities to changes in the profit rate, but in this model the output-capital ratio is assumed constant, and movements in the profit rate are therefore proportional to movements in the profit share. Multiplying both sides of the inequality by the value of the output/capital ratio gives the condition in terms of sensitivities to movements in the profit share.

rate of accumulation, g , and the profit share, σ , are predetermined at any given moment, and from the saving-investment balance in equation 8.3 and the definition of the profit rate, $r = \sigma u q$, we can write

$$u = \frac{g}{s\sigma q}.$$

Thus, we can define a new function ϕ and express capacity utilization as

$$u = \phi(g, \sigma) \quad (8.8)$$

where $\phi_g = 1/(s\sigma q) = u/g > 0$ and $\phi_\sigma = -g/(s\sigma^2 q) = -squ^2/g < 0$.

The assumption of slow price adjustment may be combined with slow adjustment of investment. Actual capacity utilization, however, should be allowed to influence investment and, as a simple extension of 8.5, the desired rate of accumulation may be given by

$$g^d = f(\sigma, u) \quad (8.9)$$

with partial derivatives $f_\sigma > 0$, and $f_u > 0$.

Equations 8.6 and 8.7, with equations 8.8 and 8.9, constitute a two-dimensional dynamic system in the growth rate of the capital stock and the profit share

$$\dot{g} = \lambda\{f[\sigma, \phi(g, \sigma)] - g\}$$

$$\dot{\sigma} = \nu[\phi(g, \sigma) - u^*].$$

The Jacobian is given by

$$J(g, \sigma) = \begin{bmatrix} \lambda(f_u \phi_g - 1) & \lambda(f_\sigma + f_u \phi_\sigma) \\ \nu \phi_g & \nu \phi_\sigma \end{bmatrix}$$

and, evaluated at a stationary point (g^*, σ^*) with $f[\sigma^*, \phi(g^*, \sigma^*)] = g^*$ and $\phi(g^*, \sigma^*) = u^*$, we have

$$\det(J) = -\lambda\nu(\phi_\sigma + f_\sigma \phi_g) = \lambda\nu \frac{u^*}{g^*} (squ^* - f_\sigma)$$

$$\text{tr}(J) = \left[\lambda \left(f_u \frac{u^*}{g^*} - 1 \right) \right] - \left[\nu \frac{u^*}{g^*} squ^* \right].$$

The Robinsonian stability condition (desired investment being less sensitive than saving to changes in the profit share) ensures that $\det(J)$ is positive. Saddle-point instability can therefore be ruled out, and local asymptotic stability depends on the sign of the trace. In the expression for the trace, the first term in square brackets may be either positive or negative. The second term, however, is negative and it follows that

local stability obtains if the adjustment speed for prices is fast relative to the adjustment speed of investment. Moreover, if the first term in square brackets is positive, complex eigenvalues and damped fluctuations must characterize the system for a range of ν values above the critical value that ensures local stability. Thus, Robinson's conclusion may be vindicated: a chance disturbance may generate fluctuations in the growth rate but "the wobbles around the desired rate grow less and near-enough stability is realized unless a fresh disturbance intervenes" (Robinson, 1962a, p. 64). The conclusion, however, is conditional on certain parameter values.¹³

These simple exercises in stability analysis could be extended and generalized in various directions.¹⁴ Of course, no generalization will give us the final word on the dynamics of capitalist economies. But that does not invalidate formal analysis of (selected) dynamic interactions outside steady growth. The models bring clarity and enhance our understanding. The simple example above demonstrates the logical coherence of Robinson's conjecture that movements in the profit share *may* keep actual utilization close to desired utilization. But it also demonstrates the possibility of other outcomes and, more importantly, helps to identify the conditions that give rise to the different outcomes.

4.3. Dangers of formalization

Before closing this section, it should be acknowledged that an emphasis on formal modeling techniques may involve significant dangers. Wor-swick (1959, p. 121) prefaced his formalization of *The Accumulation of Capital*, with the warning that

¹³If u deviates from u^* , the assumption of perfect competition needs to be reconsidered. This in turn raises questions concerning the determination of expected profitability since, under imperfect competition, a firm's future profit rates cannot be independent of its pricing and investment decisions. The model, finally, treats output adjustments as infinitely fast while prices adjust slowly. The existence of production lags make this ranking of adjustment speeds questionable. To avoid these and other problems, Skott (1989) reverses the adjustment speeds for output and prices in a model that includes labor and financial markets as well as an explicit analysis of firms' interrelated output and investment decisions. This model generates limit cycles around a locally unstable steady growth path.

¹⁴The model with slow adjustment in prices and investment is closely related to Steindl's (1952) argument. Flaschel and Skott (2005) and Asada, *et al.* (2005) analyze various extensions of the model, taking into account the interaction of the product market with labor and financial markets.

It is sometimes thought that the objection to the use of mathematics in economics is that it is too hard. The more serious objection, however, is that it is much too easy.

The ease of mathematical manipulation may lead to a neglect of those issues that are hard to formalize or, equally dangerous, to a distortion in the way we look at those problems that are being analyzed. Formal mathematical analysis may also lead to a focus on mathematical elegance and a refusal to deal with the messiness (or richness) of real history.¹⁵ In some cases, undoubtedly, a lack of mathematical tools can impose a focus on less complex, but perhaps more relevant interactions. Indeed, casual observation suggests that many important insights can be expressed in relatively simple terms and that there may be strongly diminishing returns to the application of ever more sophisticated techniques.

One may also note the paradoxical usage of mathematics in much of mainstream economics. Over the last 30 years, in particular, macro-economists have struggled to solve sophisticated problems of intertemporal optimization. These optimization problems represent grossly simplified and stylized versions of real-world optimization problems, the implicit presumption being that agents in the real world have already solved (or act as if they had solved) these more complex problems. All interactions between agents, on the other hand, are brushed aside by representative-agent assumptions. This is precisely how not to use mathematics. It may sometimes be relevant to include optimization in economic models as a stylized representation of goal-oriented behavior, but mathematical models are useful primarily because they allow a clear analysis of complex interactions between agents, each of whom may follow relatively simple (but possibly changing) behavioral rules.

These dangers of a technical fixation notwithstanding, a refusal to formalize arguments that *can* be formalized carries its own dangers. And arguably these dangers are even more serious. Without formalization the analysis easily gets bogged down in verbal reasoning that leaves the logical implications unclear. Moreover, the tortuous process of sorting out the logic of various systems using purely verbal reasoning may leave little or no resources for the task of piecing together and evaluating the relevance of the different theories.

¹⁵One clearly should not “praise the logical elegance of a system which becomes self-contradictory when it is applied to the questions it was designed to answer” (Robinson, 1978a, p. 127-8). A prime example is the application of Walrasian general equilibrium systems that presume universal market clearing to an examination of the ability of a decentralized market system to generate full employment.

5. CONCLUSION

Robinson’s relentless critique of capitalist inequities and her “hatred of injustice” (Harcourt, 1992) cannot fail to impress and inspire her readers. She clearly was right also to stress both the apologetic role of much economic theory and the pervasive influence of ideology on the way economic questions are being addressed by the discipline, a point that remains as pertinent as in her time despite significant changes in mainstream economics over the last 20 years. The main elements in her substantive contribution to the analysis of accumulation, finally, have stood the test of time: the evolution of capitalist economies cannot be understood, in the short or the long run, without an analysis of Keynesian issues of effective demand; social and distributional conflict, moreover, is central to the dynamics of the system, and path dependencies abound.

It is when it comes to her methodological positions that I have reservations. She may be right that much growth theory involves “a confusion between comparisons of imagined equilibrium positions and a process of accumulation going on through history.” But, as argued above, some of her detailed methodological arguments seem less than convincing. *Tatonnement*-based stability analysis is a mockery but perhaps this point could have been made differently and more clearly. Path dependence, furthermore, does not imply the absence of theoretical explanation. Agreement with her view that “in most economic reactions the path the market follows, while it is adapting itself to change, has a long-persisting effect upon the position that it reaches” (Robinson, 1969a, p. 58) is fully compatible with equilibrium analysis, as defined above. Path dependence will be reflected in the theory and the character of the associated equilibria.

The biggest problem, however, concerns Robinson’s legacy when it comes to formal modeling. She surely was right that “it is high time to abandon the mainstream and take to the turbulent waters of truly dynamic analysis” (Robinson, 1978a, p. 125). But without powerful analytical tools it is unlikely that the expedition will get very far. We should have no illusions that we can develop a “complete theory.” A complete theory “would be only another box of tricks. What we need is a different habit of mind, to eschew fudging, to respect facts and to admit ignorance of what we do not know.” (Robinson, 1979a, pp. 109, 119). But there is no conflict between the use of formal models with well-defined equilibria and the development of habits of mind that eschew fudging, respect facts and admit ignorance of what we do not

know. Critical economists cannot afford to leave the powerful tools of mathematical analysis to mainstream economists.

9. On Different Regimes of Accumulation

Amit Bhaduri¹

1. INTRODUCTION

Joan Robinson's aim of "generalizing the General Theory" in the long period setting, which had begun with her treatise on *The Accumulation of Capital*, (1956b), perhaps found its more mature expression in her essay entitled, "A Model of Accumulation" (Robinson, 1962d). The central purpose of this model was to exhibit a two-way relationship between the rate of profit and the rate of accumulation. This she achieved by assuming that the rate of accumulation depends on the expected rate of profit, rather than being exogenously given by the "animal spirits" of the investors, an assumption she had made in her earlier work (Robinson, 1956b). This new assumption combined with a classical savings function, where saving comes exclusively from profit, yields under plausible assumptions about the state of expectations in the economy, the required two-way relation between the rate of accumulation and the profit rate. Because, a higher rate of accumulation or investment generates more saving through more profit, so that for a given book-value of capital, the realized profit rate is also higher. At the same time, the higher realized profit rate raises expectation about the future rate of profit, which stimulates accumulation to a still higher level. This two-way positive feedback between the rate of accumulation and the rate of profit would be a stable, or convergent process, if the response of saving is stronger than that of accumulation to a change in the rate of profit. The same stability condition in a different guise, is required for the income adjustment process to be stable in the one-variable Keynesian system, when both investment and saving depend on income.

However, the specification of the accumulation function is still the subject of continued debate. On one hand, it would seem that both capacity utilization and the rate of profit should enter separately. But it is well known that when the mark-up is constant, the rate of profit depends only on capacity utilization so that the two arguments of the

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function collapse into one. The mark-up need not be constant however and as Bhaduri and Marglin (1990) have shown, can have a complex relationship to the level of capacity utilization. The chapter employs Liapunov's second direct method to establish that the exact stability condition depends on whether the economy is wage-led stagnationist or profit-led exhilarationist, when the mark-up and capacity utilization are treated as separate arguments of the investment function.

The chapter is organized as follows. The following section outlines the basic Robinson growth model as discussed in many of the chapters of the book. The case is made that both the profit rate and capacity utilization must enter the investment function separately to determine properly expected profits. The third section addresses the stability issue and finds that the change in capacity utilization with respect to the profit share matters as well as the direction and speed of adjustment in determining the stability of the system. A concluding section provides a heuristic rationale for the finding.

2. THE MODEL

Formally, saving S as a proportion of full capacity output Q is written as

$$\frac{S}{Q} = s\sigma u, \quad (9.1)$$

where s is the propensity to save out of profit Π , $\sigma = \Pi/Y$, the share of profit, and $u = Y/Q$, the degree of capacity utilization.

Writing K for the book value of capital, the actual or realized rate of growth, g^r , corresponding to the realized saving plan of the households is given as

$$\frac{S}{K} = g^r = s\sigma uq = sr \quad (9.2)$$

where $q = Q/K$, the full capacity output, and $r = \sigma uq$, the actual rate of profit.

However, the rate of growth warranted by the investment plans of the firms (this is how Robinson interpreted Harrod's warranted rate of growth), denoted by g , would depend on their expected rate of profit, r^e , which in turn would be influenced by the actual rate of profit r . Assuming no depreciation, we have

$$I/K = g = \psi(r^e) \quad (9.3)$$

and

$$r^e = f(r) \quad (9.4)$$

where both ψ and f are assumed to be increasing functions.

Therefore, from equation 9.3 g can also be written as an increasing function of the actual rate of profit, r , to yield

$$g = F(r) \quad (9.5)$$

with $dg/dr > 0$.

If the desired rate of growth by business, g , exceeds the actual rate of growth, g^r , implying investment exceeds saving, the rate of profit would increase through one of the two possible routes: either through higher capacity utilization, u , and an increase in the volume of sales; or, through prices rising faster than money wages to raise the profit margin, and consequently the share of profit, σ . Both these routes are shown explicitly in equation 9.1 (*cf.* Kaldor, 1956; Pasinetti, 1962a; Robinson, 1962d; Marglin, 1984). Thus, we may write the adjustment equation as

$$\frac{dr}{dt} = \mu(g - g^r) = \mu[F(r) - sr] \quad (9.6)$$

where $\mu > 0$ is the speed of adjustment.

It is easy to check that an equilibrium at r^* , if it exists at $dr/dt = 0$, would be stable provided saving is more responsive than investment to the rate of profit, that is,

$$s > \frac{dg}{dr} \quad (9.7)$$

with the relevant derivative evaluated at r^* .

In developing this model, Robinson relied heavily on the Keynesian multiplier mechanism. For investment exceeding saving, it postulates that the excess demand in the commodity market is eliminated as saving is brought into equality with investment through either higher capacity utilization, that is, income adjustment, or higher profit share, that is, adjustment in the distribution of income. These two different routes to investment-saving equality are treated usually as mutually exclusive—income adjustment operating below “normal” capacity output or full-employment, and adjustment in income distribution operating at full-employment or normal capacity, when supply bottlenecks come into operation.

The proposed dichotomy between price- and quantity-adjustment is untenable, in so far as both prices and quantities are likely to adjust endogenously to the pressure of excess demand in the commodity market, although probably at different speeds (for example, Gordon, 1981). It may more realistically be postulated that full employment or full capacity utilization are rather fuzzy ranges, and not precise points or levels. In that whole range, both price and quantity would adjust simultaneously. Moreover, insofar as price is influenced by cost, price may adjust along

with quantity even outside that range, because the money wage might adjust in an “imperfect” labor market, for various reasons.

This means that the rate of profit would be determined endogenously as a consequence of adjustments in *both* capacity utilization, u , and the profit share, σ . This is evident from equation 9.2, so long as there is a constant capacity-output to capital ratio, q , which assumes long-run neutrality of technical progress. When both u and σ adjust, the rate of profit, r , would increase provided the percent increase in profit (margin) share, σ , is not outweighed by a corresponding decrease in the volume of sales and capacity utilization, u , a problem that is important if u and σ move in opposite directions. Focusing exclusively on the rate of profit rather than on the constituent determinants, u and σ , would also mean that a rise in the profit margin be compensated exactly by a decrease in the volume of sales, along a rectangular hyperbola in the σ, u plane, with no change in the profit rate r or investment. This assumption is too rigid. It would, for instance, imply implausibly that investors are indifferent between a 20 percent capacity utilization and 50 percent profit share, and a 100 percent capacity utilization with a 10 percent profit share in making their investment decisions because both yield the same $r = 10$ percent profit rate (for $q = 1$). But with full capacity utilization, there is a strong incentive to invest for an even slight increase in demand; whereas with a 50 percent of capacity utilized, additional demand can be accommodated, and more profit made without additional investment.

To make explicit these complications, and make this model more plausible, we might refer to the distinction between a wage-led, “stagnationist,” and a profit-led “exhilarationist” regime (Bhaduri and Marglin, 1990; Marglin and Bhaduri, 1990). Consider, for example, an increase in the profit share due to a reduction in wages. In the exhilarationist case, both the profit share, and the degree of capacity utilization move in the same direction because, the stimulating effect of a higher profit share on investment more than compensates for the depressing effect of lower wages on consumption demand. In this case excess demand in the commodity market raises both capacity utilization and profit share, and the gap between the desired rate of accumulation by the firms, g , and the realized rate, g^r , tends to be closed through a higher rate of profit, as depicted by adjustment equation 9.6. In a profit-led exhilarationist regime, the rise in the profit rate provides the proper signal, so that equation 9.4 above remains correct, since both the profit share, σ , and capacity utilization, u , simultaneously adjust in the same direction.

However, in the wage-led stagnationist regime the validity of this model is more restricted, as σ and u move in opposite directions. From

equation 9.2, given the value of the full capacity output to capital, q , as constant, the rate of profit can increase with an increase in profit share only if

$$\frac{dr}{d\sigma} = uq\left(\frac{du}{u}/\frac{d\sigma}{\sigma} + 1\right) = uq(1 - \varepsilon) > 0 \quad (9.8)$$

that is, the elasticity of capacity utilization with respect to profit share, ε , is less than unity in absolute value. In the wage-led regime, this insures that the impact of a higher profit share (margin) on the volume of sales remains sufficiently small. The magnitude of the elasticity at unity provides a watershed between this mildly stagnationist case, and a pronounced one, in so far as no increase in margin can restore the profit rate in the latter case due to its strong negative impact on the volume, or capacity utilization.

3. STABILITY

In order to analyze the properties of different regimes of accumulation, one may revise suitably the investment function of equations 9.3 and 9.5. Treating σ and u as independent arguments of the function, however, implies that the investment-saving balance provides only one equation in two unknowns.² One of the two must be taken as given and, as noted above, the standard approach has been to assume quantity-adjustment (through u) below full capacity/employment and price-adjustment (through σ) at full utilization of capacity or employment. A more plausible alternative might be to postulate that both capacity utilization and profit share respond endogenously to the state of demand in the commodity market. In general, this dynamic system can be represented by

$$\dot{u} = \alpha(g - g^r) \quad (9.9)$$

and

$$\dot{\sigma} = \beta(g - g^r) \quad (9.10)$$

where $\alpha > 0$ and β are speeds of adjustment. Note that β can take either a positive or negative value. If positive, it implies prices rising faster than money wages and “forced saving” on the part of the workers, as postulated by the “Keynesian” models of distribution developed particularly by Kaldor. A negative value of β implies squeezing the share of profit through a faster increase in money wages compared with prices. Since the same excess demand with different speeds of adjustment drives both capacity utilization and the profit share in 9.9 and 9.10, this does not

²See, for example, Bhaduri and Marglin(1990) and Marglin and Bhaduri (1990).

yield a unique equilibrium point, but rather a locus of equilibria pairs, u and σ , similar to the IS curve in isolation from the LM in standard macro parlance. Consequently, it is the stability properties of this locus of zero excess demand ensuring that both \dot{u} and $\dot{\sigma}$ are zero that concerns us here.

To examine the stability property of the dynamic system consisting of equations 9.6, 9.9 and 9.10, define the Liapunov function, $V(t)$, as

$$V(t) = \frac{1}{2}(g - g^r)^2 \quad (9.11)$$

The Liapunov function in this case is essentially a Euclidean measure of the distance from the long-run steady locus.³ If that distance to the equilibrium is always decreasing with respect to time, the dynamic system is stable. That is, if

$$\frac{dV}{dt} = (g - g^r) \left(\frac{dg}{dr} - s \right) \frac{dr}{dt} < 0 \quad (9.12)$$

Using equations 9.2, 9.9 and 9.10, inequality 9.12 reduces to

$$\frac{dV}{dt} = q(g - g^r)^2 \left(\frac{dg}{dr} - s \right) (\alpha\sigma + \beta u) < 0 \quad (9.13)$$

Inequality 9.13 shows that for α and β positive that is, in the profit-led exhilarationist regime, the stability condition 9.7, for the earlier adjustment equation 9.6 coincides with the present dynamic system 9.6, 9.9 and 9.10. Note that β positive means that the Keynesian distribution theory holds to eliminate excess demand in the commodity market through forced saving by the workers. However, when this is not the case, and money wages rise faster than prices in response to excess demand, β is negative, the stability condition obtains only if

$$\alpha\sigma > \beta u \quad (9.14)$$

in absolute value.

When 9.14 is violated, the last term in parentheses in equation 9.13 is negative, so that contrary to the condition 9.7, the system can be stable if investment responds more strongly than saving to profit, that is, $dg/dr > s$.

³See Hirsch and Smale (1974) or Gandolfo (1977), Chapter 23 for some economic examples.

4. CONCLUSION

This chapter examines the stability of the savings-investment adjustment mechanism in the Robinson model under the assumption of a fixed capacity-output capital ratio obeying Harrod neutrality. In a more limited sense, the chapter can be interpreted as analyzing stability in the “short run” when the relatively slow moving output-capital variable q remains fixed. An alternative interpretation is no “bias” in technical progress; that is, q is constant. It might be noted in passing that all neoclassical models of exogenous as well as endogenous growth make this assumption of neutrality nowadays, in the guise of the so-called “human capital” approach. Thus while the assumption is restrictive, it is not particular to the Robinsonian model considered here.

In the simple Keynesian cross model, for which investment is given and producers respond to unintended inventory depletion by raising production, the necessary condition for stability is simply that the marginal propensity to consume (MPC) be less than one. If, however, investment is not fixed and depends on the level of capacity utilization, then the condition for stability is more complicated. If producers respond to an excess of investment over savings by raising production levels, capacity utilization will rise. Normally this will raise profits and therefore savings as more workers are employed. The workers must first produce the investment goods and then more consumer goods for the additional workers hired. As the geometric series of the multiplier process converges, the gap between savings and investment will close (Bhaduri, 1986, Ch. 2). But if the rise in capacity utilization causes investment to rise as well, it could be that the gap between investment and savings widens. The standard stability condition requires that the effect of rising capacity utilization on investment must not be so strong that savings is unable to catch up and the economy becomes explosively unstable.

Were there some other factor that could slow down investment, the standard stability condition would not be absolutely necessary. This chapter has shown that there is. So long as the economy is below full capacity, there is a plausible argument that the mark-up remains essentially constant and the profit rate and capacity utilization move in lock step. But in general, both capacity utilization and the profit rate will rise together. The standard stability conditions still demand that the combined effect of the two do not cause runaway investment.

However, it is also possible that the profit rate could fall with a rise in capacity utilization if a rise in u provoked an increase in wages that more than offsets the rise in capacity utilization on r . This can occur,

particularly, near full capacity utilization. When the mark-up is variable, the standard short-run stability condition does not carry over any longer.

Following through this sequence of a rise in wages near full capacity utilization, the wage increase will cause a savings-investment imbalance since profits fall and thus savings out of profits also falls in proportion. If the profit rate term is small, the increase in wages will mean that investment exceeds savings as a result. As production responds, we have an increase in capacity utilization as above. However, if the profit rate term is large, investment will be reduced. The wage increase will still call forth an increase in production, but this in part will be offset by a reduction in investment demand. If the drop in investment is large enough, the economy becomes exhilarationist and capacity utilization does not increase or even falls. Combined with the drop in investment, capacity utilization now falls. Both terms in the investment function are now pointed in the same downward direction. If we assume wages do not change back to the previously lower level, the combined effect of lower profits and lower u will cause runaway investment in the downward direction unless the effect of lower u is smaller on investment than on savings. The profit and capacity utilization terms act in opposite directions only in the wage-led stagnationist case, when profits are squeezed. Then, the standard stability condition is not necessary, since potentially runaway investment is restrained by the fall in the profit rate.⁴

To sum up, a rather counter-intuitive result may be extracted from this analysis. Given all other values, inequality 9.14 is more likely to be violated at a higher value of u , that is, when the economy is operating near full capacity, insofar as the speed of adjustment of capacity utilization is likely to be slower, lowering the value of α . Thus the Keynesian distribution theory, which hinges on the rather implausible notion of “forced saving” by the workers even at a high-level of economic activity, and on which Robinson relied, is not formally necessary. For the system can be stable in a wage-led stagnationist regime (for $\varepsilon < 1$ in absolute value in equation 9.8) even under “profit squeeze” provided, contrary to the usual Keynesian stability condition, investment responds more strongly than saving to profit. That too seems more likely when capacity utilization is high.

⁴A general conclusion of the chapter is that stability conditions are associated in general with the model for which they are derived. Thus, the results of this chapter do not contradict the findings of Skott’s chapter, for example, who examines the stability around a long-run equilibrium. In that model, the long run is defined by a target profits share.

10. Class Conflict and the Cambridge Theory of Distribution

Tom Palley¹

1. INTRODUCTION

The relationship between income distribution and growth is a fundamental concern of economics. Ricardo regarded the explanation of income distribution as the central issue of economics, writing that “(determining) the laws which regulate this distribution is the principal problem in political economy” (Ricardo, 1821, p. 5). Robinson was also deeply engaged with the question of income distribution. Her work on aggregate capital and the aggregate production function (Robinson, 1953a). played a pivotal role in launching the Cambridge capital debates of the 1960s, which challenged the intellectual coherence of the marginal productivity theory of income distribution. Robinson was also a lifelong admirer of Marx, and believed in the relevance of class and class conflict for economics and the determination of income distribution.

These twin concerns of Robinson contributed to the creation of an intellectual environment that launched the Cambridge theory of income distribution as an alternative to neoclassical marginal productivity theory. The Cambridge approach was originally developed by Kaldor (1956), and its key insight concerned the role of aggregate demand (AD) in determining income distribution. The core idea was that AD needs to adjust to the level of full employment output, and this is accomplished by adjustment in the pattern of income distribution. Pasinetti (1962b) subsequently introduced class into the analysis, distinguishing between capitalists’ and workers’ income shares and the AD impact of their differential propensities to save.

However, though adding class to the determination of income distribution, Pasinetti’s model is strangely devoid of class conflict in the traditional Marxian sense, that is, class conflict centered on the labor market and bargaining strength. In Pasinetti’s framework class enters through behavioral propensities, with the propensity to save differing

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across classes. This chapter adds traditional labor market class conflict. It is in this sense that it brings class back to Cambridge.

The balance of the chapter is as follows. Section 2 describes the sociological structure of the economy and its relation to income distribution. Section 3 recapitulates the Cambridge post-Keynesian (CPK) theory of income distribution. Section 4 describes the Kaleckian extension of the CPK approach that includes less than full employment outcomes. Section 5 incorporates labor market class conflict into the extended Kaleckian CPK model, while Section 6 provides comparative statics and stability analysis. Section 7 introduces the issue of ownership and its relation to income distribution. Section 8 concludes the chapter.

2. THE STRUCTURE OF THE MODEL

The key analytic contribution of this chapter is to distinguish the income distribution effects of labor market conflict from those of product market competition. Kaleckians have always recognized the significance of both labor market conflict and product market competition, but these two forces have been lumped together under the “degree of monopoly.” The logic by which the chapter disentangles labor market and product competition effects is illustrated in Figure 10.1, which shows the national income tree. National income consists of wages, paid to workers and managers, and profits. Managers are also identified as capitalists. Profits are partly retained by firms, and partly distributed as dividends to shareholders. Dividends are in turn shared between workers, who have part ownership, and manager-capitalists who own the rest of the firm.² The chapter treats the division of income between wages and profits as being primarily influenced by the extent of product market competition, while the division of the wage bill is determined by labor market bargaining power.

The model makes several important theoretical innovations. First, it introduces managerial pay, an area that has taken on great significance with the CEO pay and share option explosion of the last 20 years. Second, the concern with distribution of the wage bill introduces a second margin for income distribution effects, supplementing the traditional Cambridge focus on the profit share. Third, in standard Kaleckian models of growth and income distribution the economy is either “stagnationist” or “exhilarationist.”³ An economy is defined as stagnationist if

²This departure from the classical savings assumption muddies the functional definition of “workers” to be sure. The notion of what it means to be a worker in this context, however, is beyond the scope of the chapter.

³This terminology is attributable to Bhaduri and Marglin (1990).

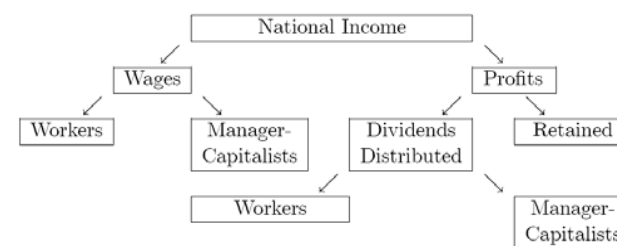


Figure 10.1. National income tree

improved income distribution (a lower profit share) raises AD ; it is exhilarationist if improved income distribution lowers AD . The presence of a wage distribution channel means that the economy can *simultaneously* exhibit stagnationist and exhilarationist tendencies.

This can be seen as follows: shifts in the wage distribution among workers, with a constant profit share, can increase AD , so that the economy is stagnationist. However, increases in the profit share can increase investment, so that the economy can at the same time be exhilarationist. This combination may best describe the US economy.⁴

At the policy level, the model identifies several locations on the income tree where policy can intervene. A major policy recommendation is that progressive policy focus on the distribution of the wage bill rather than the profit share. Progressive redistribution of the wage bill is always expansionary, whereas reducing profit share can be contractionary if the economy is exhilarationist. Second, the model offers insight into the effects of changes in the business sectors' dividend retention ratio.

3. THE CPK MODEL REVISITED

The CPK approach to growth and distribution was pioneered by Kaldor (1956). The standard short-run Kaleckian macroeconomic model (derived from Kalecki, 1942) is characterized by three features: (1) income distribution is exogenously given, (2) income distribution influences AD ,

⁴Gordon (1995) reports that the US economy appears to have exhilarationist tendencies in that investment responds positively to the profit share, while consumption is impacted by income distribution variables.

and (3) the level of output then adjusts to equal the level of AD .⁵ Putting the pieces together, the pattern of income distribution therefore influences the short-run level of equilibrium income.

Kaldor (1956) reversed this reasoning. Instead of assuming income distribution to be exogenous, Kaldor took output as exogenously given and equal to its full employment level. Given that AD must still equal output, Kaldor argued that in the long run income distribution would adjust. Rather than having output adjust to income distribution, as in the short-run Kaleckian model, income distribution adjusts to ensure a level of AD consistent with full employment income.

Assuming a positive propensity to save out of profit income and no savings out of wage income, the famous Cambridge equations for the profit share σ_{Π} and profit rate, r , are given by

$$\sigma_{\Pi} = \frac{\Pi}{Y} = \frac{I}{s_{\Pi}Y}$$

$$r = \frac{\Pi}{K} = \frac{I}{s_{\Pi}K}$$

where Π is profits, Y is output, I is investment spending, K is capital stock, and s_{Π} = propensity to save out of profits. These equations constitute investment-saving balance (IS) equations in which income distribution has adjusted to ensure AD equals output.

The Kaldor model is illustrated in Figure 10.2, which shows the profit rate, r , as a function of the investment rate, I/K . The important feature of Kaldor's analysis is that it examines the special case where the investment rate is consistent with full employment output. This rate of investment is denoted I^*/K in the figure. The figure is drawn as if $s_w = 0$.

Pasinetti (1962b) extended Kaldor's model by introducing two social classes, capitalists and workers. Like Kaldor, he too focused on the case of full employment steady-state growth. The key analytic contribution was to give a class structure to income distribution and savings behavior. The assumptions of the model are that capitalists receive just profit income, workers receive both profit and wage income, and capitalists have a higher propensity to save than do workers. Given these conditions, Pasinetti shows that the functional distribution of income and the profit rate depended exclusively on capitalists' propensity to save and the level of full employment investment spending. The simple logic of Pasinetti's result is that in equilibrium, workers' and capitalists' ownership shares

⁵In the short-run Kaleckian model the distribution of income is determined by the exogenously given mark-up.

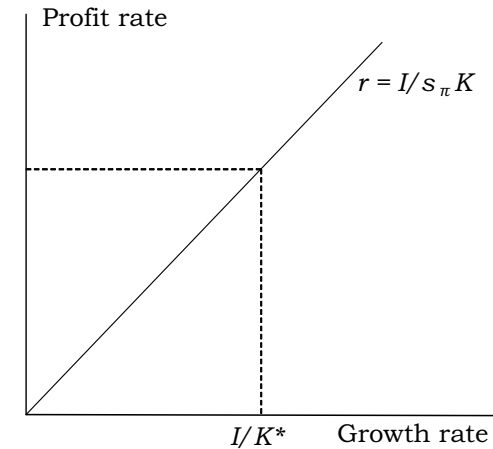


Figure 10.2. The Kaldor (1956) model

of the capital stock are constant. This means that the profits must adjust so that, given capitalists' propensity to save, capitalist saving exactly equals the share of investment they must finance to maintain their ownership share. The equilibrium conditions may be restated as

$$\sigma = \frac{I}{s_K Y} \quad (10.1)$$

$$r = \frac{g}{s_K} \quad (10.2)$$

where s_K = capitalists' savings propensity and $g = I/K$ for notational simplicity.

Pasinetti's model has been extended in several ways. The introduction of government saving leaves the result unchanged (Dalziel, 1991); so too does the introduction of life-cycle saving (Baranzini, 1982). However, the introduction of financial factors changes the model, and workers' propensity to save matters for steady-state income distribution. Palley (1996, 2002a) shows that in a world with bank-created inside debt (that is, an endogenous money world) the distribution of income depends on workers' saving propensity. This is because they pay interest on bank loans, which are costless to produce. This interest increases capitalists' incomes, necessitating a reduction in the profit share to maintain full employment investment-saving balance. Interestingly, the result does not hold in a loanable funds world in which capitalists make loans in the

form of real resources that are transferred to workers. Palley (1997) also shows that in a model with money and an inflation tax, workers' saving also matters because they are taxed disproportionately on their money holdings.

4. THE KALECKIAN EXTENSION

The Kaldor-Pasinetti approach analyzes the determination of income distribution under the assumption of full employment. This is a strangely un-Keynesian assumption, since Keynes (1936a) took pains to explain in *The General Theory* that he thought full employment was a special case.

Several authors (Rowthorn, 1982; Dutt, 1984, 1990; Lavoie, 1995) have contributed to the development of a more general Kaleckian model of growth and income distribution that extends the CPK model. The important contribution of these authors is to introduce less than full employment conditions. These extended models involve adding an investment function equation, and a mark-up or real-wage equation. The mark-up and real-wage equations perform identical functions, namely determining the profit share. This last feature reveals how Kaleckian models have difficulty distinguishing the distributional impact of labor market conflict from product market competition. Labor market conflict and product market competition are conflated and work through the mark-up, which impacts the price level, the real wage, and the profit share.

The logic of these models is easily illustrated. Let price be a mark-up over average wage costs and given by

$$p = \frac{(1+m)w}{a}$$

where p is price, m is the mark-up, w is the nominal wage, and a is the constant average product of labor, or labor productivity. In this case, the profit share can be shown to be

$$\sigma = \frac{m}{1+m} \quad (10.3)$$

Multiplying by the output-capital ratio, k , yields

$$r = \frac{mk}{1+m} \quad (10.4)$$

The output-capital ratio can also be expressed as a positive function of the rate of capacity utilization, u , so that we have $k = k(u)$, $k' > 0$. In addition, the mark-up is assumed to be a positive function of capacity utilization as well and the exogenously given degree of product market

competition, c , such that $m = m(u, c)$, $m_u > 0$, $m_c < 0$. To this mark-up schedule is added a Kaleckian investment equation given by

$$g = \alpha_0 + \alpha_1 u + \alpha_2 r + \alpha_3 \sigma. \quad (10.5)$$

Investment spending is a positive function of capacity utilization, the profit rate, and the profit share so that $\alpha_i > 0$. There has been much discussion of what constitutes appropriate specification of the investment function (see Lavoie, 1995). Drivers of investment spending might include capacity expansion, cost reduction, and technology adoption. The Kaleckian equation incorporates variables that legitimately relate to all of these drivers. Capacity utilization is directly relevant to the need for capacity expansion; the profit rate affects firms' willingness to adopt new technologies; and the profit share can be thought of as a proxy for cash-flow effects that have been found to be empirically important in microeconomic firm-level based studies (Fazzari *et al.*, 1988).

Substituting equations 10.3 into 10.5 yields

$$g = \alpha_0 + \alpha_1 u + \alpha_2 r + \alpha_3 \frac{m}{1+m}. \quad (10.6)$$

Now substituting into the savings-investment balance 10.2 yields

$$r = \frac{\alpha_0 + \alpha_1 u + \alpha_3 m / (1+m)}{s_K - \alpha_2}. \quad (10.7)$$

The full model post-Keynesian-Kaleckian growth model consists of equations 10.4 and 10.7. Equation 10.7 is a reformulated *IS* curve in which investment is endogenous and depends on capacity utilization and product market competition and is represented in (u, r) space in Figure 10.3. Equation 10.4 is the *MM* curve, a microeconomic profit rate equation that is derived from the pricing behavior and cost structure of firms. Together equations 10.4 and 10.7 jointly determine capacity utilization, u , and the profit rate, r . The slope of the *IS* schedule in (u, r) space is in principle ambiguous.⁶ Figure 10.3 illustrates the model for the case where the *IS* is positively sloped ($s_K > \alpha_2$). This is the more likely case given that the link between investment and capacity utilization is empirically weak. The mark-up equation is described by the *MM* schedule, and it is drawn as flatter than the *IS*, reflecting the fact

⁶ Differentiating equation 10.7 with respect to u we have:

$$\frac{dr}{du} = \frac{1}{s_K - \alpha_2} \left(\alpha_1 + \frac{\alpha_3 m_u}{1+m} \right)$$

where m_u is the partial of m with respect to u . This shows that the slope of the *IS* curve depends on whether $s_K > \alpha_2$.

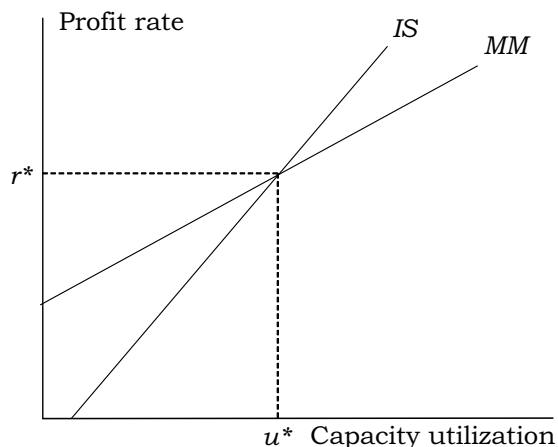


Figure 10.3. The Kaldor-Pasinetti-Kalecki model

that empirical evidence suggests the mark-up is fairly stable over the business cycle.⁷ The intersection of the *IS* and *MM* schedules corresponds to a (u, r) combination for which the goods market clears (that is, investment-saving balance holds), and for which the profit share and profit rate are consistent with the microeconomic pricing decisions of firms given a level of product market competition. The (u, r) solution in turn allows determination of mark-up, m from $m = m(u, c)$ the profit share σ in equation 10.3, the output-capital ratio, k , from $k = k(u)$ and the share of investment in output from equation 10.1.

Figure 10.3 illustrates some standard Kaleckian comparative static results.⁸ An increase in capitalists' propensity to save shifts the *IS* left, lowering the equilibrium profit rate and rate of capacity utilization. An exogenous decrease in the level of competition increases the mark-up and

⁷Domowitz *et al.* (1986) and Chirinko and Fazzarri (1994) find acyclical or procyclical mark-ups. Bils (1987) reports counter-cyclical mark-ups. When a real wage labor market closure (Dutt, 1992a) is used instead of a product market closure, the mark-up is implicitly assumed to be counter-cyclical since the real wage rises with capacity utilization indexCapacity utilization. In effect, the *MM* schedule is negatively sloped rather than positively sloped.

⁸Because of the inherent ambiguity of the slope of the *IS* curve, these results are only illustrative.

shifts the *MM* schedule up. This also lowers the equilibrium profit rate and rate of capacity utilization.

In principle, the financial factors alluded to earlier, concerning worker borrowing of inside bank money and the inflation tax, can also be included. These factors affect the *IS* schedule by impacting overall saving, and they allow financial factors to affect the determination of the equilibrium profit rate and rate of capacity utilization. An increase in worker bank borrowing shifts the steady-state *IS* schedule down, and lowers the equilibrium profit rate and rate of capacity utilization. The reasoning is that workers pay interest on their debts, which is distributed to capitalists who own the banks. This raises aggregate saving because of capitalists' higher propensity to save, necessitating a reduction in the profit rate, which lowers investment and capacity utilization.

5. BRINGING CLASS BACK TO CAMBRIDGE

Though having a class structure embedded in aggregate demand (the Pasinetti contribution), class conflict in the Kaleckian model is opaque. This is because it is made to operate through the mark-up, which in turn depends on the rate of capacity utilization. However, traditionally, class conflict over income distribution has been thought of as operating through the labor market.

One way of introducing labor market concerns is through an Okun's law relationship, whereby there is a monotonic negative relationship between capacity utilization and unemployment. In this case, the rate of capacity utilization can be thought of as a proxy for the unemployment rate, so that labor market class conflict operates indirectly through the rate of capacity utilization. This is the approach adopted by Dutt (1992a) in a model in which workers' target real wage is affected by the rate of unemployment.

However, this approach effectively conflates capacity utilization and unemployment rate effects. In effect, worker-firm conflict over wages in the labor market is treated as identical to firm-firm competition over the mark-up in product markets. This is a problem that has always been present in the Kaleckian model. Product market competition and labor conflict are distinct economic forces that have differential impacts and work through different channels.

The distinction between the profit-wage functional distribution of income and the distribution of wage income, identified in Figure 1, provides an avenue for distinguishing between these two effects. The model that is developed below argues that inter-firm competition affects the mark-up and the income shares, while labor market competition affects the

distribution of the wage bill across workers and managers. Modeling this requires re-specifying the *IS* relation so that it includes managerial pay and thus introduces labor market conflict into the model. The logic is that labor market conflict affects the wage distribution, and the wage distribution in turn impacts on *AD*. The mark-up side of the model, as represented by the *MM* schedule, remains unchanged.

In addition to decomposing the wage bill into wages paid to workers and manager-capitalists, the model also introduces profit retentions as a way of financing investment. Such retentions have firms saving on their own behalf to finance investment, and it can have important macroeconomic implications, yet, it has traditionally been ignored in Cambridge distribution theory analysis.

Aggregate income, wages, profit and ownership satisfy the following adding-up constraints

$$Y = W + \Pi \quad (10.8)$$

$$W_W + W_K = W \quad (10.9)$$

$$\Pi_W + \Pi_K + R = \Pi$$

and

$$z_W + z_K = 1 \quad (10.10)$$

where W is the wage bill, W_W is the wage bill paid to workers, W_K is the wage bill paid to manager-capitalists, Π_W is profits paid to workers, Π_K is profits attributable manager-capitalists, R is corporate retained profits, z_W is workers' ownership share, and z_K is manager-capitalists' ownership share. Profits distributed to workers and manager-capitalists are given by

$$\Pi_W = z_W(\Pi - R) \quad (10.11)$$

$$\Pi_K = z_K(\Pi - R). \quad (10.12)$$

Note that worker ownership of the capital stock has a critical impact on the overall distribution of income by affecting the distribution of profit, a feature that has been ignored in Cambridge models. It is an issue that is discussed further below. To these accounting relations is now added behavioral content. First, the ratio of workers' wage bill to that of manager-capitalists is given by

$$W_W/W_K = \gamma \quad (10.13)$$

where γ is treated as parametric for purposes of comparative static analysis. In practice, this ratio depends on the state of technology that determines the ratio of non-supervisory to supervisory labor.⁹ It also depends on bargaining power, union density, workers' militancy, labor market policies concerning employee rights at work, minimum wage laws, unemployment insurance compensation, and the scope of the social safety net. The effect of this distributive parameter is to create a channel for labor market distributional impacts that is separate and distinct from the impact of product market competition on the mark-up.

The second behavioral relationship concerns firms' profit retentions. This is assumed to be governed by

$$R = \beta(t, a)\Pi \quad (10.14)$$

where $0 < \beta < 1$ and $\beta_t > 0$, where β is the retained profit ratio, t is the dividend tax rate, and a is an exogenous shift factor. The level of retention is a positive function of profits. In addition, the retained profit ratio is positively related to the dividend tax rate, as a higher tax encourages firms to hold on to profits.

The *IS* schedule for the expanded model is then given by

$$s_W(W_W + \Pi_W) + s_K(W_K + \Pi_K) + R = I \quad (10.15)$$

where s_W is workers' saving propensity, and R is level of retained profits. Using the relations given by 10.8, 10.9, 10.10, 10.11, 10.12, 10.13 and 10.14 the *IS* schedule can be re-stated as

$$g = \bar{s}_0 k + \bar{s}_1 r$$

where $\bar{s}_0 = (s_W \gamma + s_K)/(\gamma + 1)$ and $\bar{s}_1 = [(1 - \eta) + \eta \beta - (s_W \gamma + s_K)/(\gamma + 1)]$. The term $\eta = [1 - s_W(1 - z_K) - s_K z_K] > 0$ attaching to $\beta(t, a)$ is the net increase in aggregate saving coming from an increase in retained profit. Retained profits increase corporate saving, but they diminish household sector saving by reducing distributed profit income. Substituting equation 10.6, determining g , into this last equation, we have an *IS* schedule in (u, r) space given by

$$r = \frac{\alpha_0 + \alpha_1 u + \alpha_3 m/(m + 1) + k \bar{s}_0}{\bar{s}_1 - \alpha_2} \quad (10.16)$$

⁹Technology is usually viewed as exogenous. Neoclassical Marxists, such as Bowles and Gintis (1990) and Skillman (1991) emphasize that technology is endogenously selected by capital, which controls the production process. This choice influences the ratio of non-supervisory to supervisory workers, a feature emphasized by Gordon (1996).

where $m = m(u, c)$ and $k = k(u)$. This equation can be compared with the simple version above, equation 10.7. The critical feature of this IS curve is that it embeds the labor market conflict parameter γ in both \bar{s}_0 and \bar{s}_1 , which affects AD . This is consistent with the logic of class conflict affecting AD , and is distinct from product market competition effects on the mark-up and profit share. Note, however, that these product market effects still enter through the term $\alpha_3 m / (1 + m)$. This is because investment spending, per equation 10.5, is assumed to be positively related to the profit share. The slope of the IS schedule is still ambiguous, and more likely to be negatively sloped if investment is very sensitive to the profit rate (that is, α_2 is large).

The full model now consists of equation 10.16, describing the IS schedule, and equation 10.4 describing the MM schedule. The general reduced forms for the MM and IS curves are given by

$$r = M(u; c^+)$$

and

$$r = I(u; \alpha_0^+, \alpha_1^+, \alpha_2^+, \alpha_3^+, c^+, \gamma^+, s_W^-, s_K^-, z_K^-, t^-, a^-)$$

The signs are the direction of shifts of each curve with respect to the indicated parameter. The graphical analogue of the model, under the assumption of a negatively sloped IS schedule, is the same as Figure 10.3.

6. POLICY

The stability of the model is analyzed in the appendix for the case where the IS is positively sloped in (u, r) space. The model can be either stable or unstable. Stability is affected by whether the economy is exhilarationist or stagnationist (see Bhaduri and Marglin, 1990). In the exhilarationist case, capacity utilization increases when the profit rate is above that needed for goods market equilibrium. In the stagnationist case, capacity utilization decreases when the profit rate is above that needed for goods market equilibrium. As shown in the appendix, stability also depends on the relative slopes of the IS (goods market) and MM (mark-up) equilibrium schedules.

Comparative statics analysis yields the following conclusions: an exogenous increase in investment, represented by an increase in the coefficient α_0 , shifts the IS schedule up. Both the profit rate and capacity utilization rate increase. This is consistent with the standard Keynesian construction of the macroeconomy. Increases in the coefficients α_1 , α_2 , α_3 , all of which increase the sensitivity of investment, also shift the IS up and result in a higher profit rate and higher rate of capacity utilization.

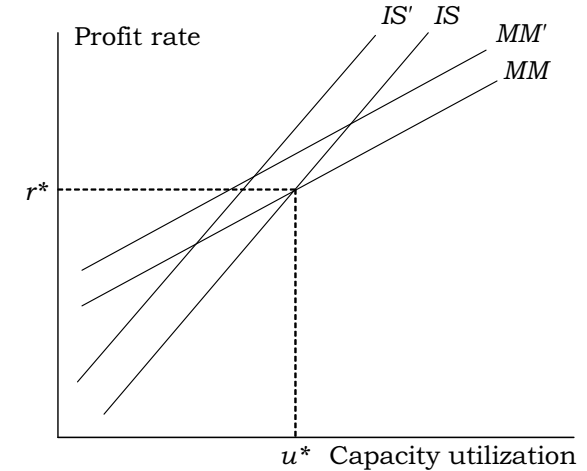


Figure 10.4. An increase in monopoly power

Increases in the propensity to save of capitalists or workers, s_W and s_K , shift the IS down. This lowers the profit rate and rate of capacity utilization. Increased saving is therefore contractionary, the standard Keynesian result.

Figure 10.4 illustrates the case of an exogenous increase in the level of product market monopoly power (that is, a decrease in c) that raises the mark-up, perhaps brought about by a merger wave. This shifts up both the MM and IS schedules, so that the effect on the profit rate and capacity utilization is ambiguous. Note, the IS shifts up because investment is a positive function of the profit share. If this profit share effect on investment is weak (that is, α_3 is small), the upward shift of the IS will tend to be small, and it is more likely that the profit rate and capacity utilization fall. This corresponds to a stagnationist construction of the economy, in which worsening of the functional distribution of income lowers AD and economic activity. Alternatively, if the profit share effect on investment is strong (that is, α_3 is large), then the IS shift will be large and it is more likely that the profit rate and capacity utilization will rise. This corresponds to an exhilarationist construction of the economy, in which worsening of the functional distribution of income raises AD and economic activity by stimulating investment.

Figure 10.5 illustrates the effect in worker bargaining power that raises γ and shifts the wage distribution toward workers. This shifts up the

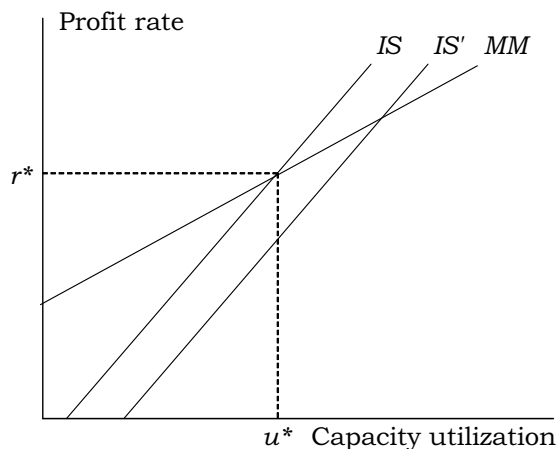


Figure 10.5. Redistribution to workers

IS schedule, leading to an unambiguous increase in the profit rate and capacity utilization.¹⁰ Distinguishing the wage share from the distribution of wages is a critical policy distinction. Improving the distribution of the wage bill is always expansionary. This is because it positively impacts consumption, but has no impact on investment since the profit share and profit rate are left unchanged. As such, improving the wage distribution should be the principal focus of progressive macroeconomic policy. In contrast, increasing the wage share can be contractionary if the economy is exhilarationist in character.

Finally, from a theoretical perspective, distinguishing between the wage share and the distribution of the wage bill allows the economy to simultaneously exhibit stagnationist and exhilarationist characteristics. This contrasts with existing constructions of the Cambridge growth and distribution model, which impose an either/or condition. The labor conflict channel, operating through the wage distribution, is always stagnationist. Shifts in the wage bill toward workers are necessarily expansionary. However, investment may be exhilarationist, exhibiting a strong dependence on the profit share. Shifts in the functional distribution from wages to profits, in that case, raise investment and economic activity. This dual construction helps make sense of developments in the US economy over the last 25 years. Changes in the distribution of the wage

bill, exemplified by the explosion of CEO pay, have been stagnationist and contractionary.¹¹ Side-by-side, shifts in the functional distribution of income toward profits may have been expansionary since there is some evidence that investment spending in the US is exhilarationist—that is, is positively influenced by the profit share (Gordon, 1995).

Increasing capitalists' ownership share, z_K , shifts the *IS* down so that the profit rate and capacity utilization fall unambiguously. This suggests that measures to change the distribution of wealth in a progressive direction, through wealth or inheritance taxes, may be expansionary. If saving falls in response to such taxes, this would make them even more expansionary. However, all bets are off if investment also falls in response to wealth and inheritance taxes. Then, they could be counter-productive and lower capacity utilization and growth. Lastly, consideration of ownership shares also suggests why worker pension plans can exert a long-run favorable impact in that they shift ownership and profit income over to workers, thereby having a long-run favorable impact on *AD* and the economy.

A final experiment concerns dividend taxes, t , and exogenous changes in firms' decisions about retained profit, as captured by the parameter a in equation 10.14 above. This experiment has implications for the debate over reducing double taxation of dividends. Increases in the dividend payout, resulting from lower taxes on dividends or a change in firms' decisions, shift the *IS* schedule up. They are therefore expansionary, raising the profit rate and capacity utilization. The economic logic of this effect is easily understood in terms of equation 10.15. Increased dividend payouts reduce firms' saving by a full dollar, but households only save a part of the increase in dividends. Consequently, aggregate saving decreases, and *AD* increases.

The above argument suggests that recent US tax changes reducing double taxation of dividends may be expansionary, to the extent they induce higher dividend payouts.¹² However, there is an important caveat to this. The justification for including the profit share, σ , in the investment function is that it proxies for some form of cash flow variable. In this case, the aggregate investment function is better stated as

$$g = \alpha_0 + \alpha_1 u + \alpha_2 r + \alpha_3 R/Y$$

¹¹There adverse impact on *AD* has been offset by rising household borrowing. However, such borrowing is an unsustainable process, and the stagnationist impulse must eventually come out in full (Palley, 2002a).

¹²This argument is in addition to the fiscal stimulus argument, whereby lower dividend taxes raise the government budget deficit.

¹⁰The necessary condition is that $s_W > s_K$.

with $\alpha_1, \alpha_2, \alpha_3 > 0$.

Investment therefore depends on retained profits as a share of GDP, rather than total profits. Now, if firms increase dividend payouts they will reduce investment spending. If α_3 is large (that is, the economy is strongly exhilarationist), the net effect could be to shift the *IS* down and lower the profit and capacity utilization rates.

The second caveat concerns balance sheet effects that are not modeled in the chapter. Changing dividend tax rates may just induce a shift between debt and equity financing, leaving net payments unchanged. In this case, there would be no change net corporate retentions, and only the government budget would be impacted. This would result in larger budget deficits, which are expansionary. However, these issues push beyond the scope of the current chapter, which has not addressed the government sector and its relation to the household and corporate sectors.

7. OWNERSHIP

A last issue is ownership, which is relevant for income distribution because it affects the distribution of dividend income. This is an issue that is important to Cambridge distribution theory but has not been addressed. The above analysis was conducted on the basis of constant ownership shares (unchanged z_K and z_W), the traditional assumption of Cambridge theory. However, ownership is endogenous, and may change as part of the adjustment process.

The reason why ownership matters is simple. Cambridge theory emphasizes how income distribution adjusts to bring *AD* into alignment with output. There are two ways to do this. One is to change the profit share, which redistributes income between wages and profit. The other is to change the pattern of ownership, thereby changing the distribution of profit income between workers and capitalists.¹³ Cambridge theory has

¹³This claim is easily understood by examining the expression for *AD* in the standard Kaleckian model, given by

$$y^d = c_w wN + c_w z_w m w N + c_k z_k m w N + I + G$$

where w is the wage level, G is the level of government spending, c_i is the propensity to consume out of i = wage, investment and profit income and z_i are the capital ownership shares of workers and capitalists. Aggregate demand consists of worker spending out of wages, worker spending out of worker income, capitalist spending out of profit income, plus investment and government spending. In the Kaleckian macro model ownership shares and the mark-up are constant, and output adjusts to *AD*. In the Kaldor–Pasinetti model, output is fixed at potential, and *AD* adjusts to ensure balance. This can be done either by adjusting the mark-up (m) or by adjusting ownership shares (z_k, z_w).

always operated under the assumption that income distribution alone does the adjustment *via* a changed mark-up—that is, by adjustment of the profit share. However, when there is investment-saving imbalance, ownership shares will also be changing. If capitalists are saving too much and there is excess saving, then their ownership share will be rising. The reverse holds when workers are saving too much.

The process of changing ownership shares operates through background financial variables. Thus, if capitalists have excessive saving, these savings can be thought of as being directed to equity purchases. This drives up the price of equities and reallocates equity ownership to capitalists. Consideration of these financial effects is beyond the scope of the current chapter. Instead, the intention is to point out that saving patterns impact ownership shares, and ownership shares impact the distribution of income and aggregate demand.

The addition of ownership concerns introduces an additional steady-state equilibrium condition. Now, in steady-state, capitalists must be saving just enough to finance their share of investment, thereby maintaining their ownership share. This imposes the following steady-state ownership condition¹⁴

$$s_K[W/(1 + \gamma) + z_K(P - R)] = z_K(I - R). \quad (10.17)$$

If capitalists receive no wage income the condition reduces to

$$s_K[z_K(P - R)] = z_K(I - R).$$

Dividing this last equation by Y solving for σ generates amended Pasinetti-style conditions for income distribution in an economy with corporate saving

$$\sigma = \frac{I}{s_K} Y + \frac{R(1 - 1/s_K)}{Y}$$

and multiplying by Y/K gives the profit rate, r

$$r = \frac{I}{s_K} K + \frac{R(1 - 1/s_K)}{K}.$$

Corporate retentions, R , therefore reduce both the profit share and profit rate. The logic is that corporations are saving on behalf of capitalists, thereby reducing the need for profit income to finance investment. This simple derivation also illustrates how the Pasinetti conditions are

¹⁴See appendix.

in fact a form of steady-state ownership condition. Appropriate substitution into equation 10.17 combined with simple algebraic manipulation yields

$$z_K = \frac{s_K k / (1 + \gamma)}{(\alpha_0 + \alpha_1 u + \alpha_2 r + \alpha_3 m) / (1 + m) - (1 + s_K)(1 - \beta)r}$$

where $k = k(u)$ and $m = m(u, c)$ as above. Expressed in general functional notation

$$z_k = z(u; s_K^+, \beta^-, \gamma^-, c).$$

From a partial equilibrium standpoint, increases in capitalists' propensity to save increase capitalists' ownership share. Increases in workers' share of the wage bill decrease their share, and increased firm profit retention ratios also decrease manager-capitalists' share. However, on top of this there are general equilibrium effects, because changes in ownership shares impact aggregate demand, capacity utilization and the profit rate that in turn feed back to influence ownership patterns. If an increase in capitalists' propensity to save drives down the profit rate and the utilization rate, this may induce negative manager-capitalist income effects that outweigh the effect of an increased propensity to save, so that the capitalist ownership share may fall. In other words, capitalists can conceivably save themselves out of ownership. This is the asset stock equivalent of the Kalecki's dictum that "workers spend what they earn, while capitalists earn what they spend."

8. CONCLUSION

The chapter has expanded the CPK model of distribution to include a labor market conflict channel that is distinct from the product market competition channel. This labor channel works through conflict over distribution of the wage bill, whereas product market competition impacts the profit share. Kaleckians have long emphasized the significance of both product market competition and labor market conflict for income distribution. However, these two forces have been conflated under the degree of monopoly, and the Kaleckian paradigm has not been able to disentangle them.

The addition of the new channel enriches the structure of the model, allowing it to simultaneously exhibit both stagnationist and exhilarationist tendencies. The model speaks to real-world concerns in that there have been significant changes in the distribution of the wage bill, as well as changes in the functional distribution of income. Both types of change matter for macroeconomic outcomes, and the model captures both types.

The distinction between wage share and wage bill distribution has important theoretical and policy implications. At the theoretical level, it explains why economies can exhibit both stagnationist and exhilarationist characteristics. Redistribution of the wage bill to workers always raises AD and economic activity by raising consumption. However, lowering the profit share can retard activity by lowering investment spending. At the policy level, this suggests that progressive policy should focus on altering the distribution of the wage bill, rather than the profit share as has been the traditional focus. Redistribution from managers to workers is always expansionary. Redistribution from profits to wages is expansionary if the economy is stagnationist, and contractionary if it is exhilarationist. In the latter case, this generates a growth versus equity trade-off. Unions may do a bit of both types of redistribution, that is, from managers to workers, and from profits to the wage bill. This is strongly expansionary if the economy is stagnationist, but the effect is ambiguous if the economy is exhilarationist.

This dual stagnationist-exhilarationist characteristic also helps make sense of developments in the US economy over the last three decades. The deterioration of the wage distribution has reduced AD (though this effect has also been masked by increased household borrowing), but this has been offset by the positive impact on investment from a rising profit rate and profit share. This helps explain why some pessimistic macroeconomic prognostications regarding the effects of worsening income distribution have not been realized.¹⁵

Finally, the model also addresses sociological criticism of Pasinetti's model regarding its lack of a managerial capitalist class that draws income from both profits and wages. The fact that both classes now have two different sources of income also allows for reconciliation between the Kaldor-Kalecki approach to saving behavior, and that of Pasinetti. Kaldor and Kalecki assumed different propensities to save out of wage and profit income, a pattern of behavior that can be justified on behavioral rule of thumb grounds. People tend to consume most of their wages, while leaving their savings accounts to compound. Pasinetti emphasized different propensities to save across classes, but classes saved at a common rate regardless of source of income. Now, it is possible to have behavioral rule of thumb saving within classes, and these rules can vary across classes. One possible configuration is $0 \leq s_{WW} \leq s_{KW} \leq$

¹⁵The effects of worsening income distribution may also have been masked by a series of non-repeatable adjustment mechanisms including consumer borrowing, a rising stock market, and disinflation that has reduced household mortgage burdens. These different channels of alleviation are examined in Palley (2002a).

$s_{WK} \leq s_{KK} \leq 1$, where s_{WW} is worker propensity to save out of wage income, s_{KW} is capitalist propensity to save out of wage income, s_{WK} is worker propensity to save out of profit income, and s_{KK} is the capitalist propensity to save out of profit income.

On the hundredth anniversary of Joan Robinson's birth, the Cambridge approach to growth and income distribution remains as relevant as ever. Though mainstream economists may be in denial about the major features of capitalism, the CPK model is not. Looking to the future, there is need for an empirical and analytic simulation agenda that builds on the theoretical framework provided by the Cambridge approach to growth and distribution. Such work could amplify the real world policy relevance of the Cambridge approach.

9. APPENDIX: STABILITY ANALYSIS

The stability analysis for the two-equation goods market-mark-up model is as follows. It is assumed that capacity utilization increases in response to excess demand in the goods market, and falls in response to excess supply. The profit rate adjusts *via* changes in the mark-up, and the mark-up falls through product market competition when above its equilibrium level. Conversely, it rises *via* product competition when below its equilibrium level.

These dynamics can be represented by the following adjustment equations:

$$\dot{u} = \phi E(u, r)$$

$$\dot{r} = \psi M(u, r)$$

where ϕ and ψ are arbitrary adjustment constants. Note that $E_u > 0$, $M_u > 0$, $M_r < 0$ and E_r is indeterminate. These equations can be linearized around a local equilibrium, u^*, r^* as

$$\dot{u} = \phi E_u(u - u^*) + \phi E_r(r - r^*)$$

$$\dot{r} = \psi E_u(u - u^*) + \psi E_r(r - r^*)$$

The exhilarationist case corresponds to $E_r > 0$. Graphical analysis of stability for this case is provided in Figure 10.6 and 10.7. In Figure 10.6 the MM curve is flatter than the IS curve, and the model is cyclically stable. There is some casual evidence that this configuration applies in the US, since investment spending has some exhilarationist tendencies, and firms' mark-up appears fairly constant over the business cycle.

The stagnationist case corresponds to $E_r < 0$. Graphical analysis of stability for this case is provided in Figures 10.8 and 10.9. In Figure 10.8 the MM curve is flatter than the IS curve, and the model is saddle-path

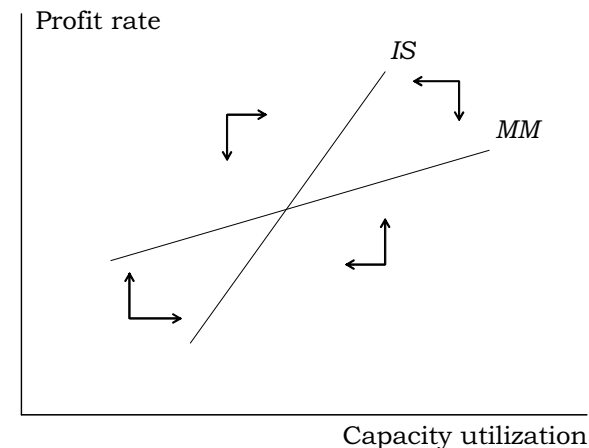


Figure 10.6. Exhilarationist dynamics (IS steeper than MM)

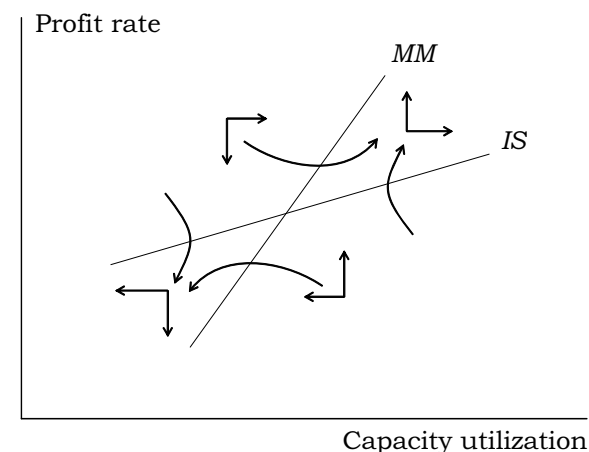


Figure 10.7. Exhilarationist dynamics (IS flatter than MM)

stable. In Figure 10.9 the MM is steeper than the IS , and the model may be cyclically stable or explosive.

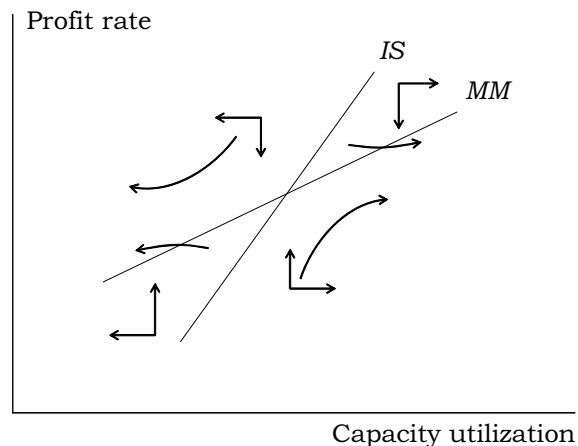


Figure 10.8. Stagnationist dynamics (MM flatter than the IS)

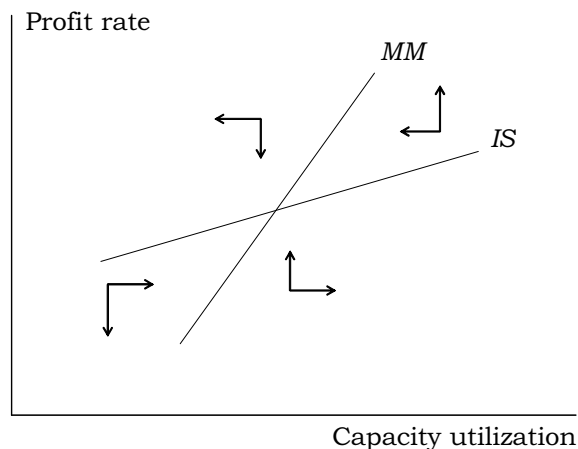


Figure 10.9. Stagnationist dynamics (MM steeper than IS)

11. A Robinson Model for Argentina

James Lovinsky and Bill Gibson¹

1. INTRODUCTION

Several chapters in this volume argue that Robinson opposed “equilibrium theory” on the grounds of its lack of realism. Harris, Skott, Bhaduri, Palley and Dutt provide analytical models along lines that Robinson would have presumably approved of. But the proof of the pudding is in the eating. In this chapter we address a real-world question, using a realistic Robinsonian model to see if there are in fact any practical advantages that derive from her iconoclastic approach. We see that there are.

The chapter shows that equilibrium models can indeed be calibrated to growing economies, so long as growth proceeds smoothly; when things go wrong, the equilibrium model is silent about what might have been the cause. The principal conclusion is that substituting “history,” that is the actual series for the fiscal and foreign deficits, in a model that closely follows Robinson in other respects, produces a very realistic image of the economy. The chapter also concludes that the long-run steady state is essentially irrelevant to the effort. Thus, if equilibrium is interpreted as a steady state, equilibrium has little practical value.

The chapter is organized as follows: section 2 provides a brief background of the Argentinian economy, followed by a description of the neoclassical and Robinson models in section 3. In the fourth section, the models’ simulation results are compared. A final section concludes. The social accounting matrix (SAM) to which the model is calibrated is available on the author’s web-site.²

2. OVERVIEW

By the first decade of the 20th century, Argentina had become the richest nation in Latin America. But its economy was not immune to the swings

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²The SAM and detailed results of the model simulations are available at www.uvm.edu/~wgibson.

of the business cycle and despite early prosperity, it suffered several recessions. There was a severe recession in 1890, another immediately following World War I, and finally a serious depression, along with much of the rest of the world, in 1929. Like many Latin American countries, Argentina went through a long period of state control in industry and utilities in the post-war period. This policy went hand-in-hand with the dominant Keynesian economic orthodoxy of the time and Argentina experienced a 30-year period of economic expansion in which GDP grew an average of 3.3 percent per year.³ Beginning in the mid-1970s and continuing through the 1980s, Argentina experienced serious bouts of hyperinflation, which finally peaked in 1989 at over 3,000 percent. It was accompanied by a steep real appreciation, as shown in Table 11.1.

The economy contracted by an average of 1.9 percent from 1980 to 1989, as seen in the table. The conventional wisdom is that inflation and instability of the 1980s was largely the result of government deficits that were made up by borrowing from international financial markets (Saxton, 2003). The general economic chaos brought on by the high rate of inflation forced political change. In 1989, Carlos Menem was elected president and began a rapid and fundamental transformation of the economy along the lines of the Washington Consensus.⁴ Inflation dropped off dramatically, as shown in the table. Initially these policies were successful and were followed by a period of rapid economic expansion throughout the 1990s, with the exception of reverberations from the Mexican “Tequila Crisis”.⁵ In 1994, an ambitious privatization process began, aimed at reducing growing public debt. The revenue certainly helped and Argentina’s debt did not increase between 1989 and 1993 (MECON, 2004). During the 1990s most state-owned enterprises (SOEs) were sold off and unemployment soared (Chisari *et al.*, 1999). After the social security privatization in 1994, fiscal deficits became the norm and it is sometimes argued that the explosion of public debt has its roots in the privatization effort (Baker and Weisbrot, 2002). Interest payments began to dominate the public budget.

The liberalization process was accompanied by a monetary currency board in 1991, the *Plan de Convertibilidad*, which established one-to-one convertibility of the peso to the US dollar (Galiani *et al.*, 2003; Damill *et*

³The data is from Heston *et al.* (2004) and Marquetti (2004).

⁴Liberalization had been first attempted under the military dictatorship (1976-1983), although incompletely. Menem came to power with populist campaign rhetoric (promising wage hikes, a productive revolution, etc.). Once elected, he adopted a thorough-going neoliberalism, especially after 1991, reversing the electoral mandate.

⁵After the third quarter of 1998, there was no positive growth until the second quarter of 2002.

Table 11.1. Argentina’s macroeconomic performance

	1950-59	1960-69	1970-79	1980-89
Real growth ³	2.4	4.1	2.8	-1.9
Real exchange rate ⁴	—	—	—	1.16
Real wage ⁵	—	—	—	80.6
Inflation ³	—	22.4	132.9	565.7
PSBR/GDP ⁶	—	—	2.9	10.2
Govt expenditure/GDP ⁶	14.2	12.5	10.9	11.4
Interest payments/GDP ⁶	—	—	—	1.4
Current account/GDP ⁶	-1.0	-0.4	0.9	2.0
Openness ⁷	8.4	8.9	8.5	11.4
		1989-91 ¹	1992-94 ²	1995-2000
Real growth ³		1.9	6.9	2.2
Real exchange rate ⁴		1.22	0.52	0.51
Real wage ⁵		74.1	142.4	143
Inflation ³		1,855.1	13.2	0.8
PSBR/GDP ⁶		9.3	12.8	12.4
Govt. expenditure/GDP ⁶		5.5	11.6	12.3
Interest payments/GDP ⁶		0.8	1.1	1.7
Current account/GDP ⁶		4.9	-1.9	-0.9
Openness ⁷		14.6	17.9	23.1

Source: Damill *et al.*, 2002; MECON, 2004.

1. Stabilization program in effect 1990:4-1991:1.

2. Convertibility plan in effect 1992:2-1994:4.

3. Percent change.

4. Pesos per US dollar.

5. Average wage in constant US dollars.

6. Percent.

7. Exports plus imports as a percentage of GDP.

al., 2002). Besides establishing the peso peg to the dollar, the law also prohibited the printing of money by government unless it was backed by dollars in the Central Bank. Capital outflow could force a reduction in government spending, with contractionary economy-wide effects.

The Menem policies stabilized the economy, restored positive growth rates, and re-established fiscal balance. The recovery was based on

renewed access to foreign capital that covered the shortfall in domestic savings. Investment, buoyed by shared international confidence and credibility of the regime, boomed. From the perspective of Robinson's model, the foreign and fiscal deficits effectively became exogenous variables, controlled by domestic policy and policy-induced expectations.

As a result of the external shocks and privatization of social security, debt began to rapidly increase once more (Cibils *et al.*, 2002). With an overvalued exchange rate, Argentine exports were increasingly uncompetitive in world markets and the growing trade deficit worsened in 1999 when Brazil, Argentina's main regional trading partner, devalued its currency (Stiglitz, 2002). The IMF supplied emergency finance up until October 2001, but thereafter declined, citing a persistent lack of fiscal reform.

In the early 1990s, domestic absorption rose dramatically as a share of GDP. A five-year expansion, beginning in 1990, was followed by a recession in 1995. Conventional wisdom blames the Tequila Crisis in Mexico, since Argentina was second only to Mexico in terms of capital inflow. A second external shock materialized in the third quarter of 1998 with the Asian and Russian financial crises. The devaluation raised the cost of external borrowing and helped to propagate a prolonged bank run and subsequent three-year recession. The economy then contracted again in 2001 and the government began to run primary budget surpluses.

The anchor of the price system in the early 1990s was the rapidly appreciating real exchange rate and this multiplied the vulnerability of the economy to external shock (Damill *et al.* 2002). The privatization effort had helped bring in foreign exchange and the country also benefited from significant support to the public sector from the IMF.⁶ The capital inflow to the public sector exceeded its dollar denominated liabilities. The overvalued exchange rate spurred imports and set the stage for a massive capital outflow. The private sector happily borrowed the dollars contracted by the government at a cheap rate. Clearly part of the problem lay in the *success* of the privatization effort, as Argentina's SOEs, the large, vertically integrated natural monopolies that controlled utilities (electricity, water and sewage, and communications), raw materials (minerals, petroleum, and gas), transportation system and banking system were sold off (Galiani *et al.*, 2003). "Many public enterprises were intentionally run down..." argues Cibils, "in order to create a sense of frustration among users of state services that would then lead to public

⁶The gross flows from all sources, the World Bank, IMF and Inter-American Development Bank averaged USD2.2 bn per quarter from 1995 to 2000.

support for privatization."⁷ Employment in the public sector (federal, provincial, and municipal levels) fell from 5.1 million in 1991 to approximately one million in 2000. On the other hand, employment in the private sector increased from about 8.1 million in 1991 to more than 12 million in 2000. Despite the rising unemployment, there was essentially no trend in the share of government spending in GDP since the early 1980s.

The trade deficit moved procyclically, achieving surplus only in the recessionary years of 1995 and 2000-01. Since net financial services were in structural deficit, the current account deficit averaged some 3.6 percent of GDP between 1993 and 2000. Net interest payments in the balance of payments increased steadily throughout the convertibility period and until 1998. Except for the recessionary years, capital inflows exceeded the current account deficit for most of the 1990s, allowing for some reserve accumulation. Foreign debt did build rapidly and by 1999 net interest payments were more than 100 percent of total exports. But after 1998, inflows began to decline, setting the stage for the full-blown financial crisis of the 2001-02, as banks began to fail.

Investment on the other hand shows an increasing trend as a share of GDP since the early 1980s. The financing, as already noted, was largely external. As the unemployed drew down domestic savings, foreign savings increased to fill the gap. The public sector only contributed to the problem with the PSBR as a share of GDP increasing from less than 1 percent in the early 1990s to almost 5 percent by 1999 largely due to rising interest payments (Damill *et al.*, 2002, Table 4a). By the end of the 1990s, it had become obvious that the convertibility plan and the currency board were not working, contributing to the instability caused by the overvalued peso. The cost of external borrowing increased as most lenders could see that lending to Argentina was a risky proposition (as indeed it turned out to be).

The devaluation of the currency in 2002 following the default on loans in late 2001 was implemented in a manner that significantly increased the damage done to the economy (Stiglitz, 2002). Strict limitations on cash withdrawals from bank accounts were imposed in December 2001 after a run and were followed in January 2002 by the freezing of almost all dollar-denominated bank accounts.

These accounts were then converted to pesos at an artificially high (as it turned out) exchange rate. Subsequent floating of the peso in February 2002 was followed by a rapid decline in the value of the peso. This, in turn, wiped out the savings of large parts of the middle class.

⁷From private communication; see Cibils *et al.* (2004).

Unemployment soared as a result of the foreign shock. GDP fell by 20 percent between 1999 and 2002, but recovery began in the second quarter of 2002. By 2003, the outlook was brighter. Exports rose 17 percent in the first seven months of 2003, thanks to improved terms of trade for agricultural commodities. Imports rose 41 percent in the first seven months after declining 56 percent in 2002. The official unemployment rate dropped below 16 percent in late 2003.⁸

While the multiple shocks of the last two decades were arguably of foreign origin, it is difficult to maintain that domestic policy miscalculation was not an important factor. However one sees this, it is clear that the foreign and fiscal deficits moved together and more or less independently of the rest of the macroeconomy. Since the early 1980s, the Argentinian economy has largely responded to changes in these two variables, buffeted about from one crisis to another. Modelling the process would seem to be a challenging task, no matter what the theoretical perspective.

3. THE MODELS

In what follows we present two explanations of the trajectory of the Argentinian economy; one relies on the insights of Robinson and Keynes, which hold that ultimately the paths of these two deficits determine the path of the economy through their interaction with the rest of the macrostructure. By contrast, the neoclassical model says that deficits do not much matter and that there are more fundamental determinants responsible for the growth path of the economy.

The neoclassical model used here is a replica of that described in the chapter by Harris. There is a homogeneous capital, an aggregate Cobb-Douglas production function and marginal productivity determines distribution of the product. Savings drives investment. This very small applied neoclassical model is remarkably easy to simulate. Since it is the factors of production that drive the model, the required parameters are few and are shown in the first panel of Table 11.1. The growth of the labor force, n , is taken as exogenously given at 1.54 percent on average. The share of labor $1 - \beta$ in post-war Argentina is on average about 41.5 percent, while depreciation is taken as 4 percent. This is a full employment model so that the real wage rate w adjusts endogenously; over the simulated period, it grows by about 1.7 percent, equal to productivity

⁸The official unemployment datum is only partially correct: In order to improve appearances, the government decided to include those receiving transfer payments as *employed*. When this benefit is excluded from the count, official calculations put unemployment at 19% currently, more than 20% in late 2003.

Table 11.2. Parameters of the model

Neoclassical		
Population growth	n	1.54
Capital share	β	0.585
Labor share	$1 - \beta$	0.415
Capital-output	κ	3
Depreciation	δ	0.4
Savings out of profits	s	0.04
Imported factor share	η	0.04
TFP growth	ϕ	0.007
Constant in production function	A	0.76
Robinson		
Tax rate on capitalists' income	t_c	0.15
Tax rate on workers' income	t_w	0.08
Savings rate	s_r	0.39
Wage adjustment coefficient	θ	0.1
Labor productivity growth	ξ	0.01
Accumulation function parameters		
Autonomous (intercept)	α_0	0.005
Coefficient on capacity utilization	α_1	0.023
Coefficient on expected profit rate	α_2	0.01

growth.⁹ Savings, s , is a constant share of profits, which are in turn calculated as output less payments to labor and foreign factor payments ηX . The share of the latter is guesstimated to be around 4 percent of total GDP.

The model is calibrated to the real wage of unity at the beginning of the period. The constant in the Cobb-Douglas production function, A , is set to produce this real wage, with an initial capital-output ratio of three. Thereafter, the savings rate is adjusted until the model's dynamic trajectory replicates the historical data. A savings rate of 0.4 or 40 percent of profits produced the fit shown in Figure 11.1.

Note that this is clearly a subjectively determined "best fit." Robinson never specified *which* history was to be better than equilibrium and

⁹These numbers are all derived from "actual" data as reported in Marquetti (2004).

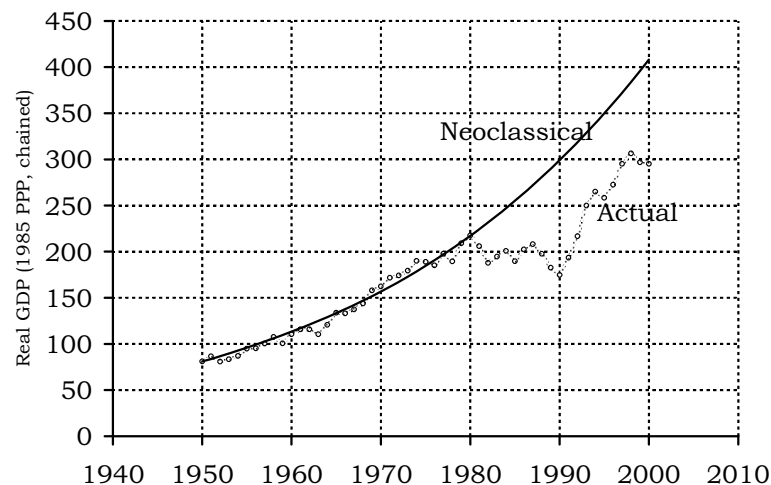


Figure 11.1. The neoclassical model

so judgement ultimately enters into the matter. A higher labor share ($1 - \beta$) would raise the savings rate required to produce this fit, as would a higher rate of imported inputs or depreciation. On the other hand, higher total factor productivity, ϕ , would reduce required savings or allow for more imports, or a higher labor share.

Notice that the model does very well for the first 30 years of the trajectory. As Harris (this volume) notes:

The neoclassical construction presents a simple and attractive “story.” It is useful to lay bare what that story is. Evidently, it conveys a striking image of the accumulation process as the “history” of a smooth and inevitable progression (convergence) towards an equilibrium that, even when disturbed by the supposedly exogenous factors of technical change and population growth, is essentially self-perpetuating. It is sometimes presented as a heuristic device, or a “parable,” not intended to be taken literally. Nevertheless, despite such reservations, it has been subjected to widespread adaptation and used as an explanatory device to explain actual historical trends in growth and development, and to provide policy prescriptions, in many different empirical settings.

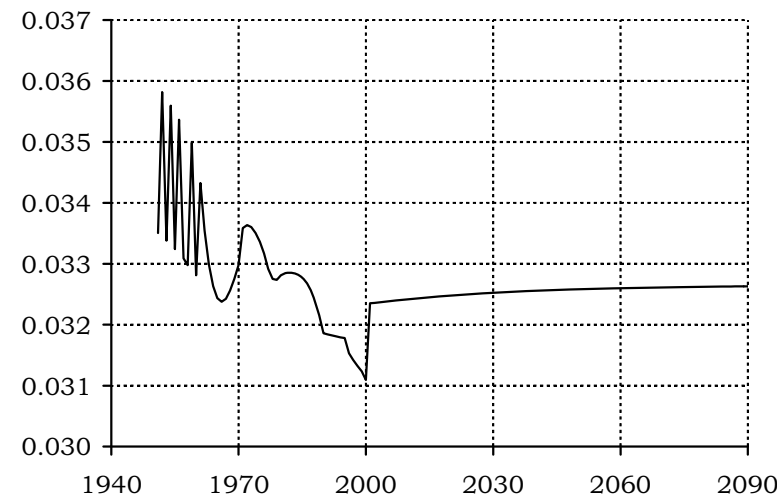


Figure 11.2. Output growth rate

Although the present exercise is also guilty of taking the model “literally,” it is still of interest to ask where the model “goes,” that is to what long-run equilibrium after the 50-year period shown in Figure 11.1. To answer this question, we simulate the economy for another 100 years. The results for the growth rate are shown in Figure 11.2. There the growth rate converges to approximately 3.26 percent¹⁰ But it certainly takes a while: the grid lines are 30 years apart.

Robinson reasonably ignored long-run computer-driven simulations, since they were not yet in fashion. But given the practical irrelevance of this “long run,” the critique of “equilibrium” is less trenchant than would be a critique of the model itself. Since tracking difficulties with the model present themselves long before the steady state is reached, it does not appear that its most objectionable feature is its “equilibrium” but rather the model’s own “history.”

The orthodox model evidently fits the data well for the first three decades, but then something goes terribly wrong. Whatever it is, it is progressively ignored. Eventually the real economy makes a feeble effort to return to its established growth path, but only in fits and starts, and during the last three years, turns away again. The effect of the debt crisis of the 1980s, for example, is evident in Figure 11.1 and after 1990,

¹⁰Even longer-run simulations confirm that this is indeed the steady state.

the economy tries to regain lost ground, but the crisis sets in again at the end of the decade. The neoclassical model as simulated here paints a picture of “lost opportunity,” with an economy driven substantially away from its potential by some kind of horrific shock to some of the fundamental parameters of the model, such as saving rate, total factor productivity or one of the other parameters in Table 11.1. The question is: *which one*? There is no obvious answer, certainly not one linked to the narrative above. Moreover, it could just as well be a combination of several parameters acting, insidiously, in concert. We have no clue as to what might have gone wrong; for that, we need Robinson.

The Robinson model as employed in this chapter is essentially a one-sector sequential Keynesian apparatus as described in Robinson (1962a) and discussed in many chapters of this book.¹¹ Like the neoclassical model, it is calibrated to the same (simplified) social accounting matrix. It is dynamic, but the long-run steady state plays no role. Expectations are incorporated in a fundamental way in the investment function

$$g = f(u, r^e) \quad (11.1)$$

where g denotes the rate of accumulation, u is capacity utilization and r^e is the expected future rate of profit on new investment. Both partial derivatives, f_u and f_{r^e} are positive. Capacity utilization, u , is

$$u = \frac{X}{Q} \quad (11.2)$$

where X is current period GDP and Q potential output or available capacity at the beginning of the period. The simulation model employs a linear version of f :

$$g = \alpha_0 + \alpha_1 u + \alpha_2 r^e \quad (11.3)$$

where α_0, α_1 and α_2 are calibration constants. The term α_0 is a catch-all constant, designed to capture the effect of the interest rate and other exogenous variables. The term α_1 is akin to the accelerator and is usually given a simple interpretation, namely when capacity utilization is high, there is a stimulus to more investment and vice-versa. But even with high capacity utilization, the expected profit rate term must validate the urge to invest. The strength of “animal spirits” depends on α_2 . All this is standard, essentially the same model as in the other chapters of this

¹¹See Taylor *et al.* (1980) for a similar exercise for Brazil. Gibson and van Seventer (2000) compare a multisectoral structuralist CGE with a neoclassical version, calibrated to the same database, for South Africa and find greater fidelity of the latter.

volume. *New*: The expected rate of profit is defined as last period’s after-tax rate of profit plus a random error term

$$r_t^e = \bar{r}_{t-1} + \varepsilon$$

where $\varepsilon \sim N(0, \sigma^2)$ and the bar indicates that the profit rate is after tax. The variance, σ^2 , of the error term determines the volatility of the modeled economy. Substituting

$$g = \alpha_0 + \alpha_1 u + \alpha_2 (\bar{r}_{t-1} + \varepsilon). \quad (11.4)$$

The nominal income-expenditure balance is taken from the SAM as

$$(wl + \pi + ep^*m)X = p(C_w + C_k + I + I_g + G + E) - ep^*M \quad (11.5)$$

where w is the nominal wage rate, l is the labor coefficient, π is profits per unit of output, e is the nominal exchange rate, p^* the foreign price of imports and m is the non-competitive intermediate import coefficient. Worker and capitalist consumption are given by C_w and C_k , while private investment is denoted by I and public investment by I_g . Current government expenditure on goods and services is denoted by G . Exports are given by E and competitive imports by M . Price, p , can then be expressed as

$$p = (1 + \tau)(wl + ep^*m)$$

where τ is the fixed and given mark-up. Consumption of workers on the right-hand side of equation 11.5 is given by

$$pC_w = (wlX + w_g)(1 - t_w) \quad (11.6)$$

where w_g is government wages, t_w is the tax rate on labor income. Capitalist consumption C_k is

$$pC_k = (\pi X + J)(1 - t_c)(1 - s) \quad (11.7)$$

where J is domestic interest payments on government debt and s is their savings propensity. Note that workers do not save in the simplified SAM; this is obviously unrealistic.¹² The fiscal balance is

$$pG + S_g + w_g + J + eJ^* = (\pi X + J)t_c + (wlX + w_g)t_w \quad (11.8)$$

where J^* is foreign interest payments and S_g is public sector savings on the current account. Finally, the foreign balance is

$$pE + S^* = ep^*(mX + M) + eJ^* \quad (11.9)$$

and where S^* is foreign savings.

¹²This is obviously more realistic for a country like Argentina than more advanced, industrialized countries. For a similar model in which workers do save, see the chapter by Palley in this volume.

Combining 11.5, 11.6, 11.7, 11.8 and 11.9 produces the savings-investment balance

$$s(\pi X + J)(1 - t'_c) + S_g + S^* = pI + pI_g.$$

The next step to convert this scheme into something manageable is to normalize by the gross value of production, $Y = pX$. The PSBR ratio is given as

$$\rho = \frac{pI_g - S_g}{Y}.$$

Normalizing foreign savings

$$\rho^* = \frac{S^*}{Y}$$

and the ratio of after-tax interest payments to GDP

$$j = J(1 - t'_c)/Y$$

we have

$$s\pi X(1 - t'_c)/Y + sj + \rho^* = I/X + \rho.$$

Next, note that since $I = \Delta K + \delta K$, with δ as the rate of depreciation of the capital stock, we can write

$$I/K = g + \delta$$

where g is the growth rate of the private capital stock $\Delta K/K$ in equation 11.3. Denoting the ratio of capacity to capital stock as $q = Q/K$, we can write

$$I/X = (g + \delta)/qu.$$

We then have

$$s\pi X(1 - t'_c)/pX + sj + \rho^* = (g + \delta)/qu + \rho$$

Define the *after-tax* profit rate (not including interest payments) as $\bar{r} = \pi X(1 - t_c)/pK$, and then write the savings-investment balance as

$$g = s\bar{r} + (sj + \rho^* - \rho)qu - \delta.$$

Note that if there is no foreign or government sector (and the rate of depreciation is ignored) this reverts to the standard Cambridge equation $g = sr$ seen throughout the volume. From the price equation, the after-tax rate of profit can be expressed

$$\bar{r} = \frac{\tau(1 - t_c)}{(1 + \tau)}qu = \bar{\tau}qu \quad (11.10)$$

where $\bar{\tau} = \tau(1 - t_c)/(1 + \tau)$ for notational simplicity. Setting this equal to g in equation 11.4

$$[(s\bar{\tau} + sj + \rho^* - \rho)q - \alpha_1]u = \alpha_0 + \delta + \alpha_2(\bar{\tau}qu_{t-1} + \varepsilon) \quad (11.11)$$

With q constant, this would be a stochastic process for u of the form:

$$y_t = \phi_0 + \phi_1 y_{t-1} + \varepsilon_t$$

with $\varepsilon_t = \alpha_2 \varepsilon$ and

$$\begin{aligned} \phi_0 &= \frac{\alpha_0 + \delta}{[(s\bar{\tau} + sj + \rho^* - \rho)q - \alpha_1]} \\ \phi_1 &= \frac{\alpha_2 \bar{\tau} q}{[(s\bar{\tau} + sj + \rho^* - \rho)q - \alpha_1]}. \end{aligned}$$

The condition for convergence is $\phi_1 < 1$, or

$$(s - \alpha_2)\bar{\tau} > sj + \rho^* - \rho - \alpha_1/q. \quad (11.12)$$

Hence, if foreign savings just covers the PSBR, and there is no autonomous growth ($\alpha_1 = 0$) or domestic interest payments, the condition reduces to the standard stability criterion for the simple model as discussed in the chapters by Harris, Bhaduri, Skott, Dutt and Palley. On the other hand, if the PSBR ratio is high or foreign capital inflow is inadequate, the model is more likely to diverge in the short run. A large α_2 can also cause the model to become explosive, but this is well known.

Robinson defined “equilibrium” of the model as when

$$r - r^e = 0$$

that is, “when the rate of accumulation which is generating just the expectation of profit that is required to cause it to be maintained” (Robinson, 1962a, p. 49). If q were constant, then the stochastic process could conceivably converge to $u_t = u_{t-1}$, which would satisfy the Robinsonian equilibrium in light of equation 11.10 that links the profit rate to capacity utilization.

Even with fixed-coefficient technology, so that there is no change in q , the model will not necessarily converge to the Robinsonian equilibrium so long as there are shocks to the system. An uptick in net exports, as for example occurred in 1970, will cause a rise in capacity utilization, which in turn drives up the current rate of profit. The increase in the gap between expected and realized rates of profits raises the rate of accumulation and the model accelerates, temporarily. As capacity begins to build, the rate of accumulation slows once again. The rate of profit declines with it and there is a second order reduction in investment, as r falls below r^e . But the decline in r then feeds into the formation of expectations, with a random component, and this helps restart investment again in the next period. But by this time, exports have ticked down again so the model begins to seek a new stochastic equilibrium. As the

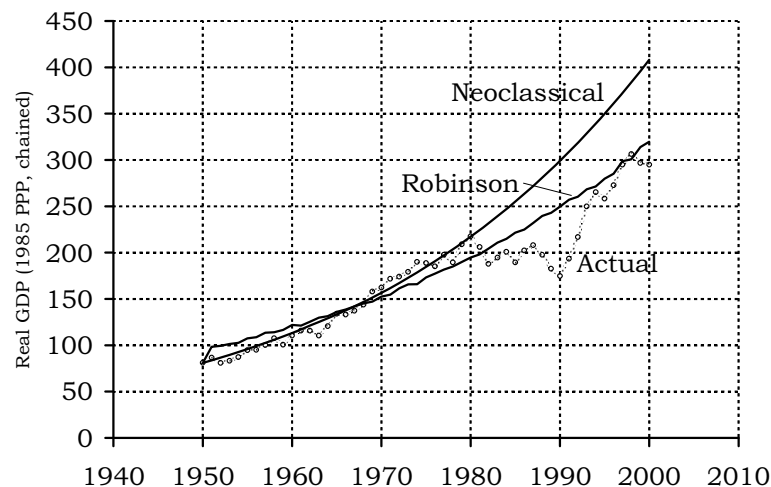


Figure 11.3. The neoclassical and Robinson models compared

structural parameters vary, the model lurches along with no particular place to go.

Indeed, if $\phi_1 = 1$, then u goes on a random walk. Since in the real world, all the terms on the right-hand side of 11.12 can change, there could be some point along the trajectory for which $\phi_1 = 1$. If this occurs, even if only temporarily, the final equilibrium then becomes path dependent as discussed in the chapter by Dutt. Of course, the condition $\phi_1 < 1$ says nothing about the stability of the long-run equilibrium, when q can vary. As capital accumulates, capacity also increases in step. Whether the level of demand, with its random component as just described, keeps pace or not is crucial. A stylized fact of development is that q falls over time, which according to equation 11.12, implies that stability is increasingly difficult to obtain (Foley and Michl, 1999).

4. COMPARISON

Figure 11.3 shows the results of the calibrated models, with government expenditure, including interest payments, exports and imports taken as growing at a constant, historically observed rate from 1950 to 2000.

As noted above, the neoclassical model does the best job of tracking the actual data through 1980, but fails progressively after that. The random component in the Robinson investment function causes it to

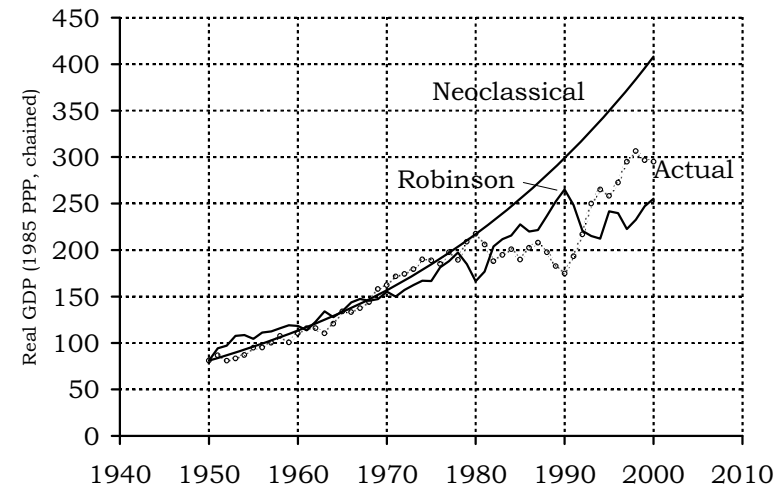


Figure 11.4. Robinson model with “history” for foreign savings

move somewhat more erratically and therefore more realistically. The volatility of the random component is set exogenously and different runs produce different approximations. The run shown in the figure is characteristic of the model’s behavior and is quite typical of the results it produces. The Robinson model does an adequate job of approximating the path of the actual economy until 1980, although not as good as the neoclassical model. Thereafter, a bias develops and the Robinson model also over-predicts the actual data, although not as badly as the neoclassical model.

The principal advantage of the Robinson model over the neoclassical is that it can be used for analysis. When we substitute *actual net export numbers* into the Robinson model in order to see how much the foreign sector influences the economy, we find that the variance of the estimated path increases significantly relative to Figure 11.3. Figure 11.4 suggests that foreign shocks were a major factor driving the economy since 1980, but the sum of squared residuals from the actual path increases somewhat compared with the Robinson trajectory of Figure 11.3. While the output variance in Figure 11.4 is greater, there is an obvious problem with the realism of the simulation. The peaks and troughs seem to be out of phase. It cannot be foreign shocks alone that determine the path of the economy during this period. The Robinson model predicts a recession in 1980, when in fact there was a small boom, and a boom in

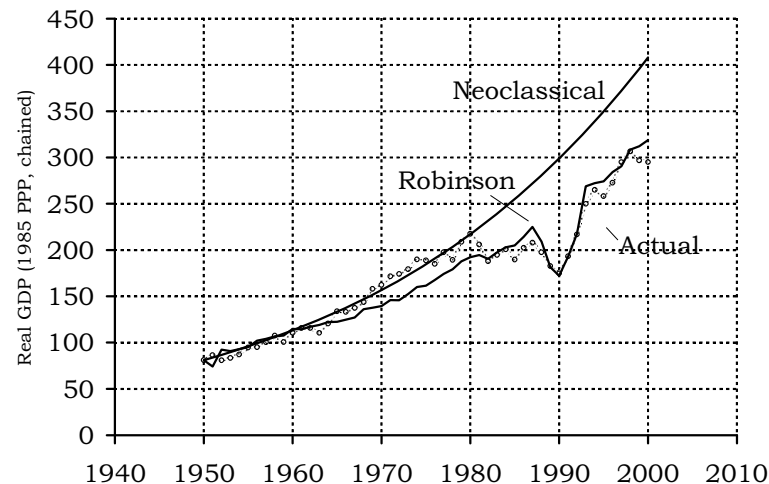


Figure 11.5. Robinson model with “history” for government

1990, while in fact there was a recession. This suggests that other macro variables also strongly influence the cycle. To investigate this hypothesis, we next substitute “history” for government in the model.

Figure 11.5 shows that the recession in 1990 was probably caused by the collapse in government spending that resulted from attempts to combat the hyperinflation, as shown in Table 11.1. The figure illustrates the significantly negative effect that large reductions in government spending can have on GDP. We learn from the Robinson model that, for example, a less violent approach to stabilization might have shielded the economy from a deep recession. In contrast, we were able to learn little or nothing from the neoclassical model about the possible causes of the downturn.

The model with the historical series for the government deficit predicts the 1980s the best, but only by seriously underpredicting the previous 30 years. If the analytical model is correct, the realism of estimate should be improved if we insert more “history.” Figure 11.6 shows how GDP growth is tracked by the Robinson model with historical series for both fiscal and foreign deficits. In the run shown, the model over predicts the 1980s, as do all the models, but still does a fairly impressive job over all, given the simplicity of the model.¹³

¹³The model with the historical series for the government deficit predicts the 1980s the best, but only by seriously underpredicting the previous 30 years.

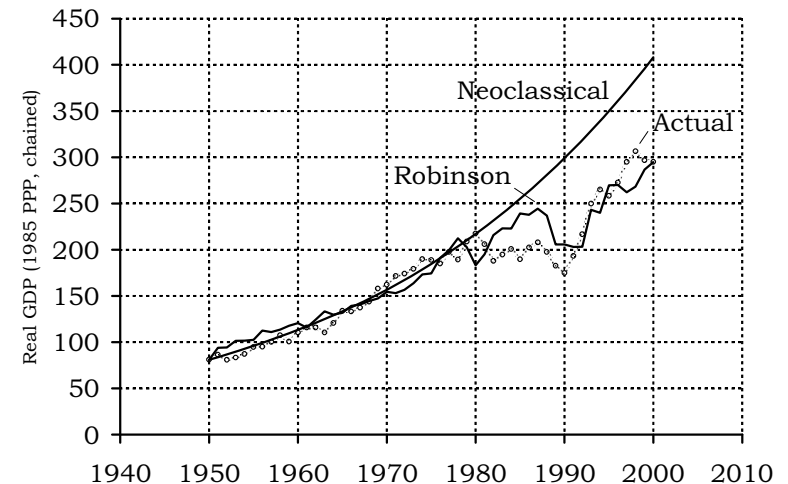


Figure 11.6. Robinson model with fiscal and foreign “history”

Our work, however, is not done. Theoretical growth models of the Cambridge-Robinson tradition should be led by investment, but the results so far strongly suggest that government spending and the foreign sector play a dominant role in determining the observed growth paths. “History,” however, can only carry the discussion so far; in particular it can obviously play no role in predicting *future* trends for the simple reason that history has not “happened” yet. We are left with the model itself and the question of interest is whether the model says that variables continue to move or just come to a stop.

Here we extrapolate the Robinson model to see. A number of assumptions are required, of course, to push the model beyond the year 2000. We assume that both the PSBR and foreign borrowing levels continue to grow at their in-sample rates, and then forecast a 20-year extrapolation path of GDP as is done in Figure 11.7.¹⁴

From the figure, it is evident that the economy recovers, although not as robustly as it does in the neoclassical model. That model converges to a long-run growth rate of 3.27 percent while the Robinson model grows at 3.07 percent throughout the post-sample period. The rate of capital accumulation in the neoclassical model is faster since there is always

¹⁴The assumptions here ignore the current debt dynamics in Argentina in which the government has run large primary surpluses since 2002.

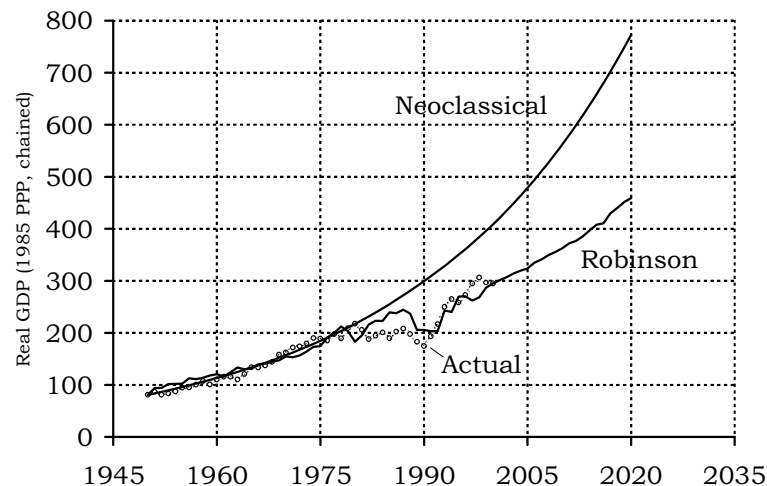


Figure 11.7. A twenty-year extrapolation

full employment and the real wage climbs by 330 percent as opposed to about half that for the Robinson model. The main reason of course is that savings is converted effortlessly into investment in the standard model, independent of what is happening on the demand side. The neoclassical capital stock accumulates to more than twice that of the Robinson model by 2020 and the share of profits in output remains constant. In contrast, the profit share rises steadily in the Robinson model owing to the relatively high levels of unemployment and the depressing effect unemployment has on the real wage in the model.¹⁵

At a more theoretical level, we conclude that the long-run steady state is essentially irrelevant to the project. Hence, the distinction between history and long-run equilibrium has no practical relevance in the simulation model. First, convergence to the steady-state takes a long time and second, there is no real-world mechanism that would drive the economy in the direction of stable equilibrium. Where the model goes after

¹⁵While during the boom years from 1950 to the 1970s, Argentina imported workers from neighboring countries, the crisis period of the 1980s and 1990s saw unemployment rise and it remains relatively high throughout the simulated period. The model only shows unemployment relative to the labor supply in the neoclassical model and therefore is not a realistic representation of the actual rate of unemployment.

an arbitrarily large number of periods is largely irrelevant to the ability of the model to track data in the sample period. In some sense an “end driven” or teleological process involves inverse path dependence, the reverse of hysteresis, in which the future path affects the current possibilities. Unstable forecasts are not aesthetically pleasing to most eyes, but in the case of Argentina, much of the post-1970 period seems to be best modeled by an unstable branch.¹⁶ Once the end of the sample period is reached, however, the model turns around, becomes more stable, since there are no exogenous shocks, and ambles on. That the forecast could proceed at right angles to the calibrated phase is perhaps a clear expression of what Robinson often observed about the present, a break between the unalterable past and unknowable future.

5. CONCLUSION

This chapter illustrates how a Robinsonian model may be used to begin to analyze real policy problems. In order to do so, it must obviously be augmented by a foreign and fiscal sector, especially when applied to an open economy such as Argentina. Still the model retains the fundamental flavor as discussed in many chapters of the book. With just one additional data series for the difference between the PSBR and the current account deficit, both expressed as a share of GDP, the model can address basic questions of causality that are beyond the grasp of the orthodox model Robinson criticized.

The arguments of this chapter make clear that the Robinson model substitutes an analysis of how capitalism actually works for a more idealized version. The equilibrium model so heavily criticized by Robinson is not well-suited to the analysis of causality in macroeconomic systems. It is, on the other hand, useful as a benchmark, demonstrating the consequences of sustained full employment and capacity utilization. In this way, the orthodox model serves to measure “lost opportunities” as a result of external shocks or inadequate internal policy.

If Dutt’s argument of Chapter 7 is correct, path dependence is a crucial feature of models in the Robinson tradition. The calibrated model developed here shows path dependence in that the extrapolation converges to a level of income per capita that is affected by the crises of the 1980s and 1990s, history ignored in the neoclassical model. But one can only speculate as to whether Robinson herself would have approved

¹⁶When it comes to the real-world experience of actual economies, unstable trajectories usually end with a significant change in policy if not institutions. Whether this will happen in Argentina as a result of the recent crisis there, is an entirely open question.

of this particular blend of “history” in the model since she never took such an explicitly numerical approach to the analysis of real economies. Certainly the silence of the neoclassical “equilibrium” approach irritated her, as extensively demonstrated in various chapters of this book. The argument here goes further inasmuch as the equilibrium approach is rejected not merely on theoretical grounds but on practical and empirical grounds as well.

Finally, a note of caution. This model is extraordinarily simplified, so much so that its only real use may be in the quasi-theoretical discussion of this chapter. But that said, the Robinson model provides a more secure foundation for larger-scale computable general equilibrium models that can adequately represent functioning economies.

Part III

Thematic Breadth

12. Beyond the Accumulation of Capital

Luigi L. Pasinetti¹

1. INTRODUCTION

Keynes's *General Theory* may not be a tidy—not even a logically coherent—book, but it certainly is a great, epoch-making book. It gave new life to economics in a way that no other work did in the twentieth century. The focus of Keynes's work was, initially, on the short run, but the crucial role his scheme placed on investments inevitably led to long-run analysis, reviving interest in economic growth. After a century of almost complete neglect,² Keynes (1936c) himself, soon after the publication of his masterpiece, encouraged those who, still timidly, made attempts in this direction. Roy Harrod was the first to take up the challenge. He first wrote “An Essay in Dynamic Theory” in 1939, in which he advanced the proposal of a scheme of economic growth grounded on Keynes's analysis. Immediately after the war, he further developed his ideas in a seminal book, *Towards a Dynamic Economics* (1948), in which he highlighted the phenomenon of growth in modern economies—by which I mean those economies that grew out of that dramatic historical event that was the Industrial Revolution—as the result of three distinctive, but interconnected, factors:

- growth of population;
- accumulation of capital;
- technical progress (that is, the growth of knowledge).

In some way, all three factors can be traced back to the works of the major economists since Adam Smith (1776). But the emphasis on each of them has varied enormously in time. The unprecedented explosion of population in eighteenth century Europe was the first phenomenon to impress, and actually to scare, the (classical) economists. Capital accumulation became prominent in the intellectual disputes and as a background to the social unrest of the second part of the nineteenth

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²Schumpeter (1912) makes here the necessary hedging of “almost.”

century and twentieth century. Technical progress, after a long period of neglect, has begun to emerge in the economic literature, in all its importance, only in recent times.

In this chapter I leave aside the disputes on population growth and recall arguments, already presented elsewhere (Pasinetti, 1983), on the nature and consequences of capital accumulation. I then try to move beyond the growth of physical capital and focus attention on the third factor in Harrod's list. After recalling some crucial characteristics that differentiate capital goods from consumption goods, I turn my attention to knowledge, which, as compared with traditional goods, falls into a special category of its own. Knowledge is *immaterial* and this constitutes its vital difference as compared with the *material* status of traditional goods—both physical capital and consumption goods. The unique nature of “knowledge” bears crucial implications for economic theory but even more importantly for institutional analysis, especially in respect to some key institutions, such as property rights and the efficiency (or inefficiency) of the free market mechanism, which is based on property rights.³

But let me first recall very quickly the main arguments that have been highlighted with reference to the second factor in Harrod's list, that is, the accumulation of capital (Pasinetti, 1983).

2. ACCUMULATION OF CAPITAL

The Accumulation of Capital, is the title Joan Robinson chose for what she considered her “magnum opus.” She was proud to repeat the title of the major work of another female economist, Rosa Luxemburg, though not sharing, and in fact harshly criticizing, her approach and conclusions.⁴

The importance of capital accumulation has emerged in relatively recent times in economic life. For millennia, humankind has produced the goods they need out of labor and natural resources (essentially through the cultivation of land). At the end of the eighteenth century the Industrial Revolution changed the economic scene drastically, owing to the appearance of a new “factor of production,” capital, in the sense of a set of capital goods. Unlike most of the goods generally produced before,

³Arrow (1962) was one of the first economic theorists who addressed the problem of market failure in dealing with information.

⁴When a translation of Rosa Luxemburg's book, *The Accumulation of Capital*, was published in English, in 1951, Robinson was pleased to preface it with a long “Introduction,” in which she expressed her admiration for, but also her disagreements with, the author.

they are not used for consumption; they are instrumentally employed as means of production. The capitalistic transformation consisted precisely in the invention and progressive use of machines operated by non-animal and, even more fundamentally, non-human, forms of energy.

While this process has brought with it a higher level of efficiency in production, not all society derived equal advantage from it. The distribution of the benefits that came from the use of these means of production has been typically unequal. Moreover, they caused a crucial social change: workers were compelled to leave their homes at pre-established times and go to work in factories, owned by capitalists. The social consequences of this new organization of production have been at times dramatic. They caused a deep social divide between the capitalists on the one hand, who owned the means of production and organized the process of production, and the proletarians on the other, who could only offer their manpower in alien factories. The antagonism between these two classes, exacerbated by the increasingly wealthy conditions of the former and the miserable conditions of the latter, has been a common ground of disputes in the last two centuries in all modern economies (though with different degrees of intensity and with a persistent, but slow, tendency to improve the conditions of the working class).

Due to its higher efficiency, the existence of the capital factor and its accumulation over time have become an absolute necessity for industrial production. Without capital goods there cannot be competitive production. And without competitive capitalist production there cannot be demand for labor (that is, provision of labor employment).

The two factors (though with some degree of possible substitution) are essentially complementary. Capital (even imagining forms of robotization) needs labor, but, most of all, labor needs the complement of capital.

Can we capture the complexity of this intricate economic process and at least the most important social implication that it has generated, by using a simplified economic model? The balance of this section attempts to do so, following an article also related to Robinson, in the *Cambridge Journal of Economics* commemoration issue on the occasion of her death (Pasinetti, 1983).

Suppose for simplicity a two-sector (closed) growing economic system. At any point of time there is a certain working population, $N(t)$, a certain level of technical knowledge, which is here captured by the levels of labor coefficients, $l_i(t)$, and capital good coefficients $k_i(t)$ (with $i = 1, 2$). These latter coefficients refer to capital, which is completely worn out during the period, and that must be replaced; in other words this is a

pure circulating capital model. The level of per capita consumption demand is expressed by the coefficients $c_i(t)$. By calling $x_i(t)$ the overall quantity of good i produced, we may represent the physical economic system, in a closed input-output fashion, as a homogeneous system of linear equations. The suffix (t) , which appears in system 12.1, means that each variable and coefficient are subject to change at a pace that in principle can be different in the two sectors (no hypothesis of proportional growth required). We call the period of production “year.” At the end of each “year” there is exchange between consumers and producers, that is, goods are demanded and producers supply precisely what is demanded (the Keynesian principle of effective demand holds).

To make our argument simple, let us suppose that good 1 (call it corn) is a “pure” consumption good, while good 2 (call it iron) is a “pure” intermediate commodity (a capital good). Accordingly we have:

$$\begin{bmatrix} 1 & 0 & -c_1(t) \\ -k_1(t) & 1 - k_2(t) & 0 \\ -l_1(t) & -l_2(t) & 1 \end{bmatrix} \begin{bmatrix} x_1(t) \\ x_2(t) \\ N(t) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} \quad (12.1)$$

Thus $c_1(t)$, the consumption per capita demand for corn, is positive, while $c_2(t)$, the consumption per capita demand for iron, is zero.

Before proceeding, let me specify two problems concerning the complementarities between capital and labor. First, as is usual in input-output models, the ratios of capital to labor coefficients are taken for what they are in any particular year. There is no substitution *at each point of time* among the two factors. The two factors are complementary. Therefore the ratio of technical coefficient $k_i(t)$, to labor coefficient $l_i(t)$ is, *at a given time, t* , constant in each sector. We must, of course recognize that this ratio may change, and in fact it did change, in history. But precisely historical considerations tell us that any change of this ratio requires *time*.

Thus we have:

$$\bar{v}_i(t) = \frac{k_i(t)}{l_i(t)} = \frac{K_i(t)}{L_i(t)} \quad (12.2)$$

with generally $\bar{v}_i(t) \neq \bar{v}_j(t)$

$$\bar{v}_i(t+1) \geq \bar{v}_i(t). \quad (12.3)$$

While the ratio of capital $K_i(t)$ to labor $L_i(t)$, v_i , in each sector, is fixed at any time, t , we allow the growth of the ratio over time to model the process of mechanization that has historically occurred in each sector, though at a different degree.

This raises the second, very important, problem, which concerns a basically different role played by the two kinds of goods—the consumption goods vs. the capital goods, respectively. In the case of consumption goods, the economic system suffers no consequences from the way they are used. The owners of consumption goods are free to make any decision they like.⁵ A consumption good can be entirely consumed, it can be hoarded for future use; it can be given away to the external world; it could even be destroyed, with no consequences whatever on the working of the economic system. Not so in the case of capital goods, which must be kept in existence, used for the whole period of production, and then entirely replaced as means of production, to prevent the halt of the whole production process.

It is here that we find the source of endless discussions, which have been generated by the appearance of “capital” among the factors of production. Short reflection will convince anybody that the delicate and critical point here concerns the *ownership* of the means of production. While there is no difficulty in producing arguments in favour of private ownership for the consumption goods, the private ownership of the means of production is a more questionable issue, simply because in an industrial system any decision on the use of capital goods has consequences that affect society as a whole. Yet, the source of ownership of capital and of consumption goods, in a free society, appears to be the same. If we find it legitimate for any single individual to decide to hoard and to dispose of his/her savings in the form of gold bars, why should one object to any use of his/her accumulated savings in the form of physical capital goods? An uncontroversial answer to this question has not yet come from the economists.

This special *social* status of capital goods has undoubtedly raised the problem of how to exercise the rights of property on a factor of production, which appears to have a “social function” to perform. Since the beginning of the Industrial Revolution, when the problem of capital first emerged, there has been a vast spectrum of proposals. At the one extreme, Marxists, Ricardian-socialists, and others have argued that the means of production should be owned by the community as a whole and not by single individuals. At the other extreme, liberals or simply anti-statalists have claimed the primacy of private ownership, supported

⁵ We should use here a subtle, but important, qualification. A consumption good, if necessary for subsistence, can never be considered a “pure” consumption good. For simplicity and to make the argument clear it is convenient to consider the consumption good as *above* subsistence. This is the same device used by Sraffa (1960, pp. 9 and ff.)

by arguments stressing the efficient allocation of resources induced by property rights. In between the two extremes, there have been various proposals for a mixed participation to the ownership and, more importantly, to the control of the means of production.

But the basic question remains far from being closed.⁶ Of course, as economists, we must be careful not to mix up economic analysis with ethics. Yet, it must be recognized that topics such as property rights, “social function” of the means of production, equity in the distribution of income and wealth come at the centre of the economists’ concern.

3. THE SOCIAL DIMENSION OF OVER-ALL DEMAND

At this point, having started from Keynes’s and Robinson’s perspective, we may enquire a little further. Does the industrial character of an economic system also reveal some further social dimension? System 12.1 has already shown that the production process is driven by the principle of effective demand. We may now ask whether the level of demand may entirely be left to independent individual decisions, or whether there are other social implications that are worth considering.

The answer to this question is straightforward: as a homogeneous linear system, the closed model of equations 12.1 has non-trivial solutions only if the determinant of the coefficient matrix is equal to zero, that is, only if:

$$c_1(t)k_2(t)l_1(t) - c_1(t)k_1(t)l_2(t) - c_1(t)l_1(t) - k_2(t) + 1 = 0 \quad (12.4)$$

or, after a few re-arrangements,

$$c_1(t) \{l_1(t) [1 - k_2(t)] + k_1(t)l_2(t)\} + k_2(t) = 1. \quad (12.5)$$

Condition 12.5, which may be called “the macroeconomic effective demand condition for full employment” (Pasinetti, 1981), suggests an additional dimension of social relevance. When the economic system is looked at from the demand side, an overall condition emerges, which, to

⁶It may be interesting to mention that, on purely ethical grounds (not on grounds of economic analysis), the Catholic Church came to the decision of making pronouncements on social matters, in a series of Encyclical Letters, since Leo XIII’s *Rerum Novarum* (1891). Up to now, the position it has taken has been to assert: 1) the legitimacy of the private ownership of the means of production, 2) some sort of restricted status of this ownership—since capital has a “social function” to fulfill, which confers on labour a “primacy over capital,” 3) the recognition, and disapproval, of the fact that free market economies have historically generated an inequitable distribution of income and wealth in favor of the “capitalists” (John-Paul II, 1981).

be fulfilled, puts a single macroeconomic constraint on individuals’ behavior. This macroeconomic condition *mainly* (or, after an operation of hyper-integration, *only*) concerns the demand for consumption goods.⁷

Each single individual is indeed entirely free to choose the preferred basket and the quantity of consumption goods, but, on the aggregate, demand must satisfy constraint 12.5. In this sense the demand for consumption goods bears an important social consequence concerning the achievement of full employment of available labor. We come up precisely with the problems raised by Keynes (1936a), on the importance of achieving that level of macroeconomic demand necessary to ensure full employment.

4. ACCUMULATION OF KNOWLEDGE

But the Industrial Revolution also brought with it a third important factor: technical progress. This is defined in a broad sense as the systematic introduction of better, more efficient, techniques and methods of production, the creation of earlier unknown goods and services, the discovery of new sources of energy, through the development of science, technology, and organized learning. As noted above, we had to wait until Harrod (1939, 1948) to see technical progress explicitly introduced as a source of economic growth in a formal model. Yet its treatment has been largely underestimated even among Keynesians, let alone among neoclassical economists. The former concentrated their attention on the relationship between economic growth and income distribution in macroeconomic terms; the latter focused on the variation of the proportions between capital and labor, framed within a macroeconomic neoclassical production function. By following Harrod, they both did acknowledge technical progress as a factor of growth, but they tended to remain at the macroeconomic surface of it, treating it as if it were exactly symmetrical to population growth (see Robinson, 1956b on the one side, Solow, 1956 on the other). Both approaches, though in a different way, failed to single out those very fundamental features of technical progress that differentiate it from the other sources of growth. As a consequence, they missed completely the process of structural dynamics, which is inherently inseparable from any growth generated by technical change (see Pasinetti, 1962a, 1965). Only in the last two decades or so has the

⁷An operation of hyper-integration (see Pasinetti, 1988), would allow condition 12.5 to be exclusively dependent on the *overall demand of consumption good 1*, since $k_2(t)$ would itself be absorbed into the process of vertical integration.

economic profession realized the vast potential of this factor, as an independent engine of economic growth, and started seriously to put some research effort into it.⁸

The main problem for an economist in dealing with learning, knowledge and technological change is the difficulty of grasping and in fact penetrating the intricacies of their intrinsic characteristics. Technological changes have something to do with the proportions between capital and labor. But technology cannot be reduced only to the underlying phenomenon of mechanization, while—in a dynamic context—mechanization itself is something that goes beyond the increase of the capital-labor ratio (see Pasinetti, 1981).

Knowledge is deep-rooted in human minds, but, in order to spread, it needs the invention of means of communication: speech, writing, printing, magnetic support, efficient and fast duplication, etc. Schumpeter had early intuitions on this topic. He made a clear distinction between invention (the discovery of new knowledge), innovation (the actual industrial application of the discovery), and diffusion (the spread of innovations throughout the economic system).⁹ But Schumpeter lacked an analytical framework appropriate to the purpose. He remained awe-stuck with the Walrasian equilibrium model, which stands in contradiction to his insights about the processes of creative destruction (Schumpeter, 1943).¹⁰ His vast cultural background helped him to recognize that the determinants of technological change do not exclusively depend on economic factors. The process is of utmost complexity.

In order to capture in a simple model the economic consequences of Harrod's third source of economic growth, consider a pure labor economy.¹¹ There are two main justifications for this simplification. First, the strong connection that exists between technical progress and labor, when the latter is intended in a broad sense as an expression of human activity. Second, the analytical advantage of focusing on a single factor, without, at the outset, facing too many complications. If the supposition appears too extreme, one may after all consider it as an economic system with capital goods that has been vertically hyper-integrated, so as to represent only original inputs (labor) and final outputs (consumption) (see Pasinetti, 1973, 1988).

⁸See, among others, Dosi *et al.* (1988) and Aghion and Howitt (1997).

⁹See Schumpeter (1912).

¹⁰See *History of Economic Analysis*, where he defines Walras as the “the greatest of all economists” (Schumpeter, 1954, p. 827).

¹¹See Pasinetti (1993).

A pure labor economic system, which produces m consumption goods, can be framed as another simple input-output model:

$$\begin{bmatrix} 1 & 0 & \dots & 0 & -c_1(t) \\ 0 & 1 & \dots & 0 & -c_2(t) \\ \vdots & \vdots & & \vdots & \vdots \\ 0 & 0 & \dots & 1 & -c_m(t) \\ -l_1(t) & -l_2(t) & \dots & -l_m(t) & 1 \end{bmatrix} \begin{bmatrix} x_1(t) \\ x_2(t) \\ \vdots \\ x_m(t) \\ N(t) \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ \vdots \\ 0 \\ 0 \end{bmatrix} \quad (12.6)$$

Despite the absence of inter-industrial relations, the system is interconnected by over all effective demand. Workers contribute their labor, from the supply side, only to the sector in which they are employed. But, from the demand side, they contribute to the purchase of all goods and services produced: thus equations system 12.6 is truly an economic “system,” and not merely a set of independent sectors, since these are all interrelated by effective demand.

Technical progress in this simple model is embodied both in the labor coefficients, $l_i(t)$, and in the per capita consumption coefficients, $c_i(t)$. New knowledge affects not only the technical methods of production, which become more productive, but also the patterns of consumption, which become more variegated and sophisticated over time. Both labor and per-capita consumption coefficients are supposed to systematically vary over time each at its own pace, due to the effects of learning both in technology and in consumption. For analytical simplicity we may assume that the rates of change are exponential:¹²

$$l_i(t) = l_i(0)e^{-\rho_i t} \quad (12.7)$$

$$c_i(t) = c_i(0)e^{r_i t} \quad (12.8)$$

with $i = 1, 2, \dots, m(t)$. The notation $m(t)$ implies that the number of goods and productive sectors is variable over time. We also have:

$$N(t) = N(0)e^{gt}$$

where $\rho_i \neq \rho_j, r_i \neq r_j, \rho_i \neq r_i$ and where ρ_i is the rate of change of labor productivity, r_i is the rate of change of per capita consumption, and g is the rate of change of population.

Three important aspects of change in technological knowledge are evinced, even at this simple analytical stage. First, the most obvious

¹²Let me stress analytical simplicity. More complex dynamic paths may also be modeled, including those implying changes in time of the rates of change themselves (see Pasinetti, 1981, 1993).

effect of technical progress is to decrease labor inputs per unit of outputs: labor coefficients l_i tendentially diminish over time. The uneven patterns of these decreases produce the phenomenon typically defined as *structural change*.

Second, technical progress does not affect only the productive side of the economic system. It also affects the demand side, whose evolution is governed by what have become known as Engel curves.

Third, technical progress does much more than simply change the *existing* labor and consumption coefficients. It is also able to introduce newly invented methods of production and newly found consumption goods. The economic system is moving in what Robinson called historical time, where the future is qualitatively different from the past.¹³ In our simple model, this feature is captured by an *expansion* of the square matrix of system 12.6, with new rows and new columns keeping on being added: the number of sectors and goods thus are themselves a function of time.

An economic system conceived in this way becomes a truly dynamic economic system, in the sense that not only does the economy grow, but it also undergoes changes in its structure, as a direct consequence of the combination of technical progress and the evolution of demand.

Far-reaching implications of this crucial combination are well illustrated by the macroeconomic condition for full employment. Setting the determinant of the coefficient matrix in system 12.6 equal to zero:

$$\sum_{i=1}^m c_i(t)l_i(t) = 1 \quad (12.9)$$

or through 12.7 and 12.8

$$\sum_{i=1}^m c_i(0)l_i(0)e^{(r_i-\rho_i)t} = 1. \quad (12.10)$$

This way of writing macroeconomic condition 12.9 shows explicitly that to maintain full employment over time not only must the persistently changing condition 12.10 be satisfied in any *single* period of time (let us say at $t = 0$). It must also be kept satisfied in *each* subsequent time period, t . This is a very complex task imposed by condition 12.10 especially since all sectoral proportions are continually changing.

All this suggests the kind of complexity intrinsic in an industrial economy with technical progress, that is, with Harrod's third source of economic growth, and the kind of difficulties that arise from the task of

¹³See the chapters by Harris, Dutt, Skott and Lovinsky and Gibson in this volume.

keeping the full employment condition satisfied over time. It thus appears how naive it would be to think of pure *laissez faire* policies as sufficient to settle every imbalance and lead the system to equilibrium growth. As was implied by Keynes's work in the 1930s, it should be recognized that in a dynamic advanced economy the fulfillment of the macroeconomic condition of full employment cannot be met, if not as a matter of pure chance, by simply adding up the independent individual decisions of all economic agents. When the structure of technology and the structure of consumption change incessantly over time, a macroeconomic activity of monitoring—and sometimes correcting—the economic system considered as a whole becomes necessary, if full employment is to be maintained.

There should not be excessive difficulties in introducing in the present scheme functions dealing with technical progress itself. This approach to technical progress was adopted, among the Cambridge economists, by Nicholas Kaldor (1961) with his "technical progress function." In a parallel fashion a theory could be developed on the evolution of consumption coefficients, as a modern and refined development of what more than a century ago was pioneered by Ernst Engel.

5. ON THE NATURE OF TECHNICAL KNOWLEDGE

After this brief enquiry into the quantitative and qualitative implications of technical change, we may look more deeply, as we did with capital goods, into the extent to which this source of growth impacts upon institutions. As noted, knowledge itself can be both a final product and an input of production. However, in sharp contrast with many consumption goods and physical capital goods, knowledge preserves an *immaterial* dimension that makes it a very special category of good. This intangible dimension of knowledge makes it assimilable to a public good, rather than to a private good. Public goods are goods with some intrinsic characteristics that prevent them normally from being traded on the market place. The vast literature on public good identifies two features that are relevant also in the case of knowledge, namely *non-excludability* and *non-rivalry*.¹⁴

¹⁴The notion of knowledge as a public good has been around since the beginning of economic science: see Smith (1776) and, more surprisingly for English readers, Cattaneo (1861), besides Schumpeter (1912). Recently the idea has been picked up, first, by non-mainstream theorists (see Nelson, 1959, Pasinetti, 1962a, 1965) and lately by scholars in the field of the new growth models (see, for all, Romer, 1990).

Non-excludability concerns possession. A traditional (material) good can be offered on the market place because it can be appropriated. Selling (or buying) a good that is appropriable confers to the owner exclusive property, which coincides with its exclusive physical possession. Hence, when possession is transferred, also property is transferred. On the other hand, when a good is non-appropriable, or non-excludable, the person who owns it cannot prevent others from gaining the same advantages that come from its original possession. This has the important economic implication of allowing the use of the non-excludable good without the need of buying its property from the owner, and thus without the need of demanding this kind of good on the market place. Can technical knowledge be seen in this way? If an individual obtains from another individual a piece of technical information, is she assured of having free use of that bit of information? Though we may leverage our answer with some qualifications (for instance, on the kind of means used to transfer the information, the degree of tacitness implicit in the use of technical knowledge, etc.), there can be no assurance that the new owner will make an exclusive use of that good. Technical knowledge could thus be defined a *quasi*-non excludable good.

The other feature of public goods, non-rivalry, concerns the fact that a certain good can be used or consumed or enjoyed by one individual without undermining the possibility to offer it, at the same time, to other users. Physical goods are usually rival goods. If I eat a hamburger, nobody else can eat it at the same time. On the contrary, two or many more people may listen, let us say, to a broadcasted Mozart's Fifth Violin Concerto without each of them interfering with the enjoyment of the others. From an economic point of view, a non-rival good is usually produced with fixed costs of production: once the non-rival good is produced, there are no substantial costs involved in making it available to additional customers (and to a certain extent in replicating it). Technical knowledge is an almost perfect example of a non-rival good. The blueprint of a new device—once invented—can sometimes be used by millions of people times over, with no extra cost.

From a purely abstract point of view, both features will tend to promote the diffusion of technical knowledge, once produced, among all the members of the community. Quite obviously, the economic system as a whole can gain great advantages: knowledge can be shared by all interested people without incurring the costs typical of a material good.

From a social point of view, the fact that knowledge embodies the above two features (especially non-excludability) means that it may become a powerful means of production. Knowledge can spread to other

people, regardless of the intentions (selfish or otherwise) of its original possessor.

It is precisely owing to the characteristics that emerge from being immaterial that the knowledge factor becomes such a formidable source of economic growth. As in the case of capital goods, it plays a social function; in fact a crucial social function for the economic system as a whole. Without knowledge, no economic system could be set in place, and without *new* knowledge no true economic *dynamics* can take place. Owing to its properties of a quasi-public good, technical knowledge may play its social function as a necessary input of production. But, unlike capital goods, it does not entail the usual costs of reproduction required by material goods. This vast potential implicit in technical knowledge, to be realized, requires that each single individual in the community is well open to, and adequately trained in, the process of human learning. Thus openness to novelty and spread of education may become a heavy responsibility for the whole community. Only with this social awareness may the production, acquisition and diffusion of knowledge become the *primary source* of the wealth of nations.¹⁵

6. INSTITUTIONAL PROBLEMS DUE TO ACCUMULATION OF KNOWLEDGE

While the accumulation of knowledge, owing to the above described features of non-excludability and non-rivalry, may represent a formidable engine of economic growth, it may at the same time raise serious institutional problems.

The first question to ask is the following: can we be sure that the institutions regulating our economic systems, as they have been inherited from the past, and on the way adapted piecemeal to the emerging new circumstances, are still appropriate to the problems of today, let alone of the future? More specifically, can we single out the best organizational methods for an economic system where the improvements of knowledge have become paramount? A straightforward answer to these questions is not easy, and probably not even possible. It is uncertain which institutions are most appropriate, for several reasons. First, the choice on how to organize an economic system implies decisions that concern human behavior at large, and on this matter economics cannot claim exclusiveness: there are also other social and moral sciences that may have much to contribute. Secondly, dealing with human behavior means facing problems encroaching on human freedom and ingenuity. There may be more than one way to skin a cat, and human beings are ready

¹⁵See the final sections of Pasinetti (1981) and (1993).

to use them all. Thirdly, in a highly dynamic system, as the one we are considering at this stage, what may still be the best organizational method today may turn out to be obsolete tomorrow. The forces that underlie the process of economic growth normally require an evolution of the institutional set-up itself.

The emergence, on the national and international scene, of the accumulation of knowledge as a major factor of economic growth poses a real challenge to economists and social scientists comparable (and perhaps superior) to the challenge that was posited by the emergence of capital accumulation.

Two centuries ago, when the growth of wealth, which was brought about by the Industrial Revolution, was largely based on mass production of physical commodities, economists discovered and began to analyze what they believed to be a “marvellous” institution, which would allow turning self-interested egoistic behavior—“private vices” as Mandeville dared to call it—into “public virtues.” Adam Smith (1776) is now considered (in spite of his cautious qualifications, which have largely been forgotten) the major upholder of the great merits of the market mechanism. An economic system organized on the basis of the market institution was taken (even forgetting Smith’s qualifications) as being able to operate without the need of “moral sentiments.” His incidental image of an “invisible hand” became the symbol of the selfish behavior of individuals turned into a social device capable of acting for the good of the whole community.¹⁶

Since the advent of the general equilibrium models, in the second part of the nineteenth century and in the first part of the twentieth century, theoretical economists have successfully confirmed, though under severely restricted conditions, the optimality properties of the competitive market price mechanism. Leon Walras, Vilfredo Pareto, Ken Arrow, Gerard Debreu, and others have singled out a set of remarkable properties that, when supported by ideal conditions (notably convexity and perfect competition), can make the market mechanism an efficient institution for *static* resource allocation.

Not surprisingly, after the collapse of the real-socialist economies with their ideological Marxist background, mainstream economics is at present taking the free market mechanism for granted. This mechanism has become a pillar of current economic theory and the two almost do

¹⁶How the “invisible hand” was taken out of Smith’s context and used as the key metaphor to develop the general equilibrium model with an approach that resembles that of physical sciences is explained in detail in Ingrao and Israel (1990). For the importance of “moral sentiments” in Smith economic theory see Rothschild (2002).

not seem to be separable from each other. The theory needs the postulate of private property underlying markets organization and, in turn, the legitimacy of an economic system based on market institutions is strengthened by theory.

But this association of institutional solutions and theoretical propositions may bear serious consequences. If economists and policy-makers are convinced that the market mechanism is *the best*—or even more *the only*—feasible efficient social institution, they will tend to extend such a mechanism to any aspect of economic (and even non-economic) life. This is bound to happen regardless of the fact that many aspects of the economic life may not fulfill the postulates on the basis of which the market mechanism has been shown to be an efficient institutional device.

At this point of our argument, it becomes relevant to go back to the properties of knowledge, briefly summarized in the previous section. Non-excludability and non-rivalry do not match the strict requirements of an efficient market institution. Yet, the reaction from mainstream economics is by no means to acknowledge the obvious market failures of the traditional market organizations, when knowledge becomes predominant, and the consequent need to look, in dealing with it, at alternative institutional solutions. The trend is precisely the opposite.

The special character of knowledge is recognized, but mainstream economists forcefully propose to build—and have become strong promoters in building—an artificial legal system to make knowledge what actually it is not: namely a private or quasi-private good. In other words, the advice seems simple, but powerful: let us not change our market institutions. Instead, let us artificially change the characteristics of knowledge, so as to fit it into our pre-conceived institutional framework based on private property and the market price mechanism.

The advantage, it is claimed, consists in making knowledge a normal tradable good. This would remove the risk of market failures, and, at the same time, would allow extending to the production of knowledge those Pareto optimal outcomes that are typically associated with material goods. Given its basic properties of non-excludability and non-rivalry, the efforts of turning knowledge into a private good have moved in two directions.

First, there has been an enormous effort at strengthening and extending *intellectual* property rights and the patent system of protection (which in the US now fully includes typically immaterial goods such as software). This is obviously a system of man-made, and in fact highly artificial protection. Ideas can fly from head to head and be used by

many people, without the need for signing a legal contract of ownership. Among other things, when a payment of property rights becomes necessary, in order to be entitled to the actual application of an idea, transaction costs will dramatically increase, depriving knowledge of the vast potential that could come from its diffusion. Moreover the enforcement of a legal system of protection may prove very costly in the case of intellectual property, given the immateriality of knowledge, as against the simpler and immediate procedures entailed by the rivalry characteristics of physical goods.

Secondly, there has been (at least formally) a great effort at breaking up monopolies (since the analytical proofs of market price efficiency only refer to perfectly competitive conditions) in those dynamic sectors that heavily depend on the improvement of knowledge (think of the so-called hi-tech sectors). Antitrust laws have been strengthened, and authorities specifically devoted to monitor market competition have been set in place or further expanded. The recent cases of law suits against the dominant position and monopolistic practices exercised, in particular, by a major computer-software corporation seem the inevitable reflection of this willingness to preserve the free market mechanism even in those cases in which the spontaneous organizational tendency is towards a monopolistic market structure (mainly because of decreasing costs of knowledge-based products).

From a purely methodological point of view, the crucial question to ask is whether this is the only possible approach to the institutional problem raised by the accumulation of knowledge. Should the tide of the market institution be considered so important as to submerge all market-adverse aspects of knowledge or is there a possibility of looking for alternative solutions?

We are starting to perceive nowadays that a pure market approach to the process of human learning and diffusion of knowledge might give, in the long run, more trouble than advantages. An increasing share of our social time is being devoted to legal disputes concerning intellectual property rights. Quite apart from the huge bills that lawyers are making out of these legal battles, it would be difficult to consider all this a positive-sum game for society as a whole—far less can it be considered a factor of economic growth. On the contrary, it appears a serious obstacle.

But it is, most of all, on the international scene, that the market approach to the process of growth and diffusion of knowledge is raising, and will inevitably go on raising, the more serious problems. In the near future, knowledge may well turn out to be (if it is not already) the crucial source of economic growth for those countries that have remained

behind and have a huge gap in technical knowledge. But we know that knowledge is highly concentrated in the developed world! What can the result be of artificially making it a private good? The poor countries that could take advantage from the acquisition, at no cost for anybody, of knowledge already in use in the more advanced countries could no longer be allowed to reap these advantages after a process of privatization has taken place. They might be (and in fact have been) asked to pay heavy royalties for the use of already existing and well established knowledge. How can this be justified? Obviously, in the Western world the majority report still argues that higher royalties also means higher incentives to innovation, and hence to economic growth. But there is also the other side of the coin, namely the risk of building up an artificial knowledge-barrier that might force the majority of the world population into permanently inferior conditions.

Questions of this kind may probably force economists, lawyers, and policy-makers to look at the institutional problem raised by the process of human learning and most of all at the international diffusion of knowledge from a different perspective. Namely, to try to accept the very peculiar character of human knowledge (to which technical knowledge is only a subset) and enquire into the possibility of exploring a broader set of institutional mechanisms, which may be more appropriate to the acquisition and diffusion of knowledge.

This is not an easy task for those economists and policy-makers that are firmly convinced of the irreplaceability of neoclassical economic theory. In this respect, a Keynesian approach to economic theory and policy can really be at a strong advantage. In other works (Pasinetti, 1986, 1994), I argued at length that while neoclassical economic theory is an almost perfect expression (and consequence) of what may be called the pure exchange (static) paradigm, which has generated the most sophisticated forms of general equilibrium models, the classical-Keynesian theory provides a feasible alternative that can be placed at the basis of a (more relevant) production paradigm. While the former focuses on the principle of pure rationality and deals with those types of goods that are scarce, the latter focuses on the principle of human learning and deals with those types of goods that are reproducible.¹⁷

In presenting a “pure labor (production) model” above, the aim is to capture the basic implications of the accumulation of knowledge. My

¹⁷The term “rationality,” in economics, is generally used restrictively to signify the existence of logical coherence in the decisions of individuals (theory of rational choice), so as to allow them to maximize gains in a stable environment. See, among others, the classic article of Lange (1945-46).

contention has been that this simple model represents precisely the minimal set of requirements of the “production” paradigm, to which classical and Keynesian economics belong.

The remarkable and novel feature of building a theory based on the production paradigm is that it does not commit itself to any particular institutional set-up and remains open to many organizational solutions to what I have called the “institutional problem.” It seems therefore a paradigm capable of providing a theoretical framework that is more respectful of the peculiar nature of knowledge. The approach is also more open to the investigation of institutional solutions that, while taking advantage of the market mechanism, can absorb alternative institutional rules, when necessary and efficient, besides providing an overall framework for implementing macroeconomic policies.

7. FINAL REMARKS

Keynes has always argued that an economic theory exercises its influence at all levels, even down to very pragmatic matters. “Practical men, who believe themselves to be quite exempt from any intellectual influences, are usually the slaves of some defunct economist” (Keynes, 1936b, p. 383). Neoclassical economics is playing this intellectual influence quite extensively today. Its approach has spread to all levels, from economics to psychology, to sociology, to policy.

While neoclassical economists agree that a knowledge-based economy is qualitatively different from any other economy of the past, in their analysis they have not been inclined to change the premises of the exchange-based, static, paradigm they have adopted, even in front of failures of the existing institutions that they have, so successfully, helped to promote.

Yet, the present importance of the knowledge factor in our societies is suggesting a reconsideration of what the appropriate economic paradigm may be in order to deal with this factor of growth, besides promoting the appropriate type of institutions. In this respect, a Keynesian theory of the evolution of a “monetary production economy,” which focuses on human learning, seems to have a role to play. Among other things, it does not commit itself in principle to any existing type of institutions and deals with economic relations that are open to the introduction of alternative types of individual behavior (not only the utility and/or profit maximizing one, though by no means excluding it), and to alternative institutional organizations (not only those of a free market economy, though again not excluding them).

Schumpeter (1954), who was fascinated by the beauty of the Walrasian economic model to the point of defining it as a beautiful Benz, admitted that with the introduction of technical progress this stunning car would simply not work. Joan Robinson, who was not at all fascinated by the Walrasian model, became very pessimistic, at the end of her life, about the possibility of substituting this beautiful, but no longer working, analytical vehicle: “it is not easy to be optimistic...today” she sadly repeated (for example, Robinson, 1979b, p. 143).

Two decades after Robinson’s death, I think, there is more room for hope. The recent striking emergence of technical progress, the third of Harrod’s factors, in the debates of the economic profession could open up, in spite of everything, a new, unexpected and quite wide door to the Keynesian/Harrodian theories of economic growth. Conveying this message of hope might be the best tribute to Joan Robinson, in a volume devoted to her memory.

13. Robinson on Credit, Money and Finance

Louis-Philippe Rochon¹

Mrs. R. would sit on a hassock, smoking with a long cigarette holder (it appeared to me to be very long), wearing a peignoir, her greying hair pulled into a tight bun in the back, her intelligent eyes set in an expansive brow, focused on me. The scene bore a vague resemblance to Picasso's portrait of Gertrude Stein: the same heavy solidity and presence. —Alvin L. Marty (1991)

1. INTRODUCTION

Through her many original contributions, Joan Robinson left a rich legacy, which has had a considerable impact on economic theory. Economists, and post-Keynesians in particular, are much better off today because of it. As Eichner (1987) wrote in his dedication to his book, Joan Robinson showed us all the road out of the “valley of darkness” that is neoclassical theory.

Joan Robinson was a monetary economist in the full sense of the word. She understood deeply the importance of the non-neutrality of money and its impact on neoclassical theory. She understood above all the importance of money and the need to incorporate credit and money in any discussion of output and production. This may not be at first very evident. After all, Robinson is known foremost for growth theory, imperfect competition or the capital controversies: rare are articles that dedicate any thought to her contributions on money. Yet at the same time, it should come as no surprise. A follower of Keynes and Kalecki, she was also close to Kahn and had read Marx. The importance of money would, predictably, filter through.

Yet, her contributions to the discussion of bank credit and money are limited. She did not specifically write on the subject in any systematic way, and her thoughts are scattered over several papers and books. Moreover, the meaning and role of money evolve through time. Robinson's earlier contributions are rather conventional and offer little that

may be of interest to modern readers.² One can find a few interesting passages here and there, possibly the seeds of her later views. But starting with *The Accumulation of Capital*, (AC), Robinson offers a rich, institutional approach to credit and money in the spirit of a “monetary theory of production.” The substantial evolution in her own views might explain why many post-Keynesians have had little to say about her, and has also probably caused some confusion.

As we gather passages and quotations from various places and consider the several chapters devoted to credit and money in the AC, what stands out is her attempt at providing a clear heterodox alternative to the existing monetary dogma and, in some ways, to the dominant Keynesian view on the topic. I believe that Robinson foreshadowed Kaldor (1970b) by as many as 14 years. Rochon (1999; 2001) and Gnos and Rochon (2003) have argued that Robinson had a theory of endogenous money that in many ways was close to the present-day Franco-Italian *circuitists* (see also Graziani, 1989). In this respect, Robinson could be considered the founder of the post-Keynesian theory of endogenous money. There are some who would disagree. Parguez (2004), for instance, while recognizing that she had some interesting views, argues that she was not consistent in developing them, an argument that will be addressed here. Despite his position, there are a number of other post-Keynesians who recognize Robinson's original insights. Lavoie, for instance, was an early defender of Robinson's views on credit and money and one of the few who recognized her innovative and radical departure from monetary orthodoxy. Seccareccia now often refers to her work in his writings on endogenous money.

This chapter is divided into six sections. The following section considers the evolution of Robinson's thought on money. Section three raises the issue of whether Robinson was indeed a monetary economist and examines two articles that survey Robinson's (1956) writings on money, but reach diametrically opposed conclusions. The fourth section explores the influence of Rosa Luxemburg on Robinson. Section five asks how we can explain the fact that her views were largely ignored by post-Keynesians. The final section concludes that Robinson's writing on credit, money and finance amounted to an endogenous theory of money.

²By “traditional” I mean that her early discussion was focused on the traditional role and function of money. Robinson interpreted money more as a stock than a flow, which is the focus of her later contribution (see below). The emphasis is an important one. Seeing money as a stock leads to a discussion of the allocation of a given quantity of money. But seeing money as a flow suggests its dynamic nature, very much along the same lines as the theory of endogenous money.

¹Laurentian University. The author would like to thank Claude Gnos, Geoff Harcourt, Marc Lavoie, Cristina Marcuzzo, Ed Nell and the rest of the participants of the conference for their comments. The usual disclaimers apply.

2. CREDIT, MONEY AND FINANCE

Despite some disparate passages, it is possible to separate Robinson's views into two phases, with the *AC* as a dividing line. Her pre-*AC* views are largely conventional, devoting much of her attention to issues related to Keynes's liquidity preference and therefore the allocation of money as an asset. There is thus a given stock of (exogenous) money, independent of the demand for it. This said, there are a few exceptional paragraphs, but overall, her views are consistent with the conventional exogenous/stock approach to money.³

In the *AC*, and after, however, Robinson is no longer interested in the allocation of a stock of money, but rather the flow aspects of money. She sees the supply of money as dependent on the demand for credit. As a flow, Robinson is able to link the creation of money with output in a coherent endogenous/flow approach. Even though money is "always and everywhere" endogenous, Robinson may have recognized in particular its importance for a discussion of long-run accumulation and growth (Rochon and Rossi, 2005). Indeed, if growth in a monetary economy requires money and credit, then Robinson would have certainly recognized the need to develop a theory of credit and money parallel with a theory of growth.

Reading through the *AC*, the reader is immediately struck by the attention Robinson gives to monetary details. In fact, the role and nature of money, credit, and finance permeate this book. Her attention to monetary details is an extension of her focus on long-run growth and her vision of the economy as repetitive cycles of production and accumulation based on debt. Money is created by debt, circulates and returns to entrepreneurs who pay off their initial debts, at which time money is destroyed. The expenditures of one agent are the proceeds of another. Consider the following passage, albeit published after the *AC*:

If we could, so to say, stain a particular volume of X units of expenditure and trace it through its future course, we should see it generating income and expenditure on consumption, gradually leaking into saving as it flows its own way....The process of investment, through saving, is always recreating, with a time lag, the finance that it is absorbing. The new

³An example of this is her view of the quantity theory of money. In 1933, Robinson writes that the quantity theory of money is a "tautology devoid of causal significance" (Robinson, 1933b, pp. 33-4). She specifically rejects the usefulness of arguing in terms of the changing velocity of money, claiming that it "is of very limited significance" and is a "completely hollow statement" (Robinson, 1933b, p. 403).

wealth has partly taken the form of gross undistributed profits to firms, and has partly accrued to rentiers. Some is held in cash, some in securities and some has repaid bank loans. (Robinson, 1965c, p. 133)

As the above passage shows, Robinson is clearly interested in "tracing" the flow of money as it circulated through the economy. This passage is one of the many that forms the basis for the argument that Robinson had clearly spelled out a theory of endogenous money, one that closely resembles the modern day theory of monetary circulation (see Graziani, 1989). Inspired by many of her close relationships with colleagues at Cambridge and, I believe, by Rosa Luxemburg, Robinson was interested primarily in the "notes now circulating" in the "pipe-lines of circulation" (Robinson, 1956a, p. 226). Robinson saw money both as a flow and a stock variable. For her, the flow aspect of money explains its existence and creation/destruction, while the stock nature of money explains largely how households decide to use their hoarded savings. It is in this sense that she differentiates therefore between "money as a placement and money as a medium of exchange" (Robinson, 1956a, p. 274).

Early in the book, in chapter two (Robinson, 1956a, p. 27), Robinson quickly establishes the rules of the game: organized economies are *de facto* monetary in nature. "The robin economy is non-monetary, because there is no specialization and exchange between families." But barter or non-monetary systems in human societies are "an imaginary case" and are at best an "instructive exercise" (p. 26). This is because barter systems are "inefficient" since workers would have "little time or energy to work" (p. 27). Hence, "it is impossible to imagine a non-monetary capitalist economy without falling into contradictions" (p. 27). According to the author, money "emerges very early in the development towards complexity in human societies" (p. 26).

From this analysis, she concludes that money is the point of departure for any theory of economic systems: "money...is a *sine qua non*" (p. 27). This is made clearer: "In particular, a wage economy requires money. An employer who is starting in business has to pay his workers" (p. 26). In this sense, she wants to "look through the veil of money...to the realities behind it."⁴ (p. 25). Robinson argues that wages are the mechanism by which money is released into active circulation: "The notes now circulating came into existence as the results of loans from the banks to entrepreneurs, who pay wages in advance of receiving the proceeds of

⁴This is a passage that is reminiscent of Rosa Luxemburg. See below.

selling the good that the workers produce.” In this single passage, reminiscent of Keynes’s finance motive articles, Robinson perfectly expresses the endogeneity of money: the emphasis on banks, credit, wages and active circulation.⁵

Having established that money is the essence of capitalist societies, Robinson’s analysis of credit and money begins with a clear distinction between the various “classes of income:” entrepreneurs, wage-earners, rentiers and banks, or profits, wages, rent and interest. Firms and banks are taken as “two separate watertight compartments.” In doing so, she establishes a hierarchy inherent in the production process. In time, production cannot begin without first access to finance and the employment of workers: these two debts incurred by the entrepreneur are crucial to the production process.

Entrepreneurs, in Robinson’s model, must make production and investment decisions that require financing. As in Keynes, savings only appear after the initial investment. Thus, there is a need to pay workers before proceeds are generated. Entrepreneurs must therefore approach banks, which are given a special place in Robinson’s analysis. Indeed, “banks occupy a special place” (Robinson, 1956a, p. 10), and a lack of bank credit to finance production can lead to stagnation (1956a, p. 76, n. 1).

Entrepreneurs finance not only the costs of production, but also investment (Robinson, 1956a, p. 230). Banks “facilitate the supply of finance to excess investors partly by lending” (p. 236).

Banks meet the financial needs of entrepreneurs. As she claims, “banks have long been established that cater for the monetary needs of the system” (p. 225). Bank credit is demand-determined and credit-led—to use a more modern expression—and banks only lend to creditworthy borrowers. The ability to borrow from banks is based on “the strictness of the banks’ standards of credit-worthiness” and the “subjective

⁵In an interesting passage, Robinson also argues that credit and money cannot be constrained. For Robinson, money seems to have always been endogenous, even under the gold. If there were physical limits imposed by mining, the banks would simply create the necessary amount to meet the needs of the economy, hence she writes (Robinson, 1956a, p. 32): “Geology being limited, the stock above ground did not grow nearly as fast as the demand for liquid balances, and banks came into existence to supplement the supply.” Some post-Keynesians would argue that money was exogenous under the gold, even for horizontalists like Moore (2001), “When money was a commodity, such as gold, with an inelastic supply, the total quantity of money in existence could realistically be viewed as exogenous.” For an alternative horizontalist approach that shows that money was always endogenous, even under the gold standard, see Lavoie (2003) and Rochon and Rossi (2005).

attitude of potential lenders” (p. 244). Therefore, “a lack of creditworthiness of the firms would inhibit lending” (Robinson, 1965c, p. 138). Among the criteria used by banks to judge the creditworthiness of potential borrowers, we have the debt/asset ratio (Robinson, 1956a, p. 244) and the ratio of interest to earnings (p. 231). These statements are reminiscent of contemporary horizontalists (see Lavoie, 1996; Moore, 1988; Rochon, 1999). Banks therefore supply credit, but it would be difficult to define an *ex ante* supply of credit. As Robinson argues “The supply of finance available at any moment cannot be given a definite quantitative meaning....Credit (borrowing power), however, is in reality very amorphous” (Robinson, 1956a, p. 402). But, if banks supply finance, this is not the same, as she is quick to point out, as a supply of loanable funds, such as we find in conventional theories (p. 402).

Banks play other roles as well. For instance, not only do they supply liabilities that are used as a medium of exchange, they also guarantee that debts are settled in a third party’s liabilities (Robinson, 1956a, p. 226): “The basic reason why the entrepreneurs have to pay interest to the banks...against the circulating medium is that their own IOU’s would not be acceptable as a means of payment, while the notes of respected banks are.” Hence, money is “the by-product of a balance sheet operation of a third agent who, in modern parlance, can be dubbed a ‘bank’” (Parguez and Seccareccia, 2000, p. 101). Banks are creators of credit money.

While the central bank appears in her analysis, its role is not discussed thoroughly, and the author limits her remarks to its role as the guarantor of the stability of the monetary and financial system. Hence, she writes:

The provision of a convenient and reliable medium of exchange is so important for the successful working of a complicated economy that national monetary authorities, such as central banks, have been set up in all important capitalist countries, and elaborate legal and customary requirements have been established to secure the credit of profit-seeking banks and to regulate the supply of national currency. (Robinson, 1956a, p. 32)

The emphasis in Robinson is therefore clearly on the debt relationship between banks and entrepreneurs, with banks supplying the necessary finance to cover both the costs of production and accumulation. Hence, the “size of the stock of notes required for the economy as a whole depends on the value of the weekly wages bill” (Robinson, 1956a, p. 226).

If the production process begins with outlays of money due, it is followed by a reflux of money to the entrepreneur, who then reimburses

his initial debt to the banks. Robinson therefore grasps the importance of the efflux-reflux principle: “the notes then return to the banks” and the cancellation of debt (Robinson, 1956a, p. 227).

The money supply therefore adjusts to the needs of trade, a theme that would run through Kaldor’s writings on the topic 14 years later. In this sense, there can never be an excess supply of money. As stated above, if entrepreneurs have excess money, it is used to extinguish debt: “If they issue more notes than are required for use as a medium of exchange, the excess returns to them as deposits or in cancellation of bills” (Robinson, 1956a, p. 234). This is the now familiar reflux mechanism.

In this way, the quantity of money in circulation therefore adjusts to the needs of the economy:

when an entrepreneur requires for making payments in the near future, more notes than have come to hand from recent receipts, he can discount a bill; and when he finds himself with more than he needs, he reduces his outstanding bills (in order to save his interest) by paying off, with notes, those that are falling due and not renewing them. The notes then return to the banks. Thus the quantity of notes outstanding is continuously being adjusted to the requirements of the circulation. (Robinson, 1956a, p. 227)

3. A MONETARY ECONOMIST?

The bibliographic evidence cited above certainly establishes that Robinson took money seriously. But does this imply that she was a monetary economist? Some believe so. In an interview appearing in Feiwel (1989a, p. 909), Frank Hahn was asked what he thought was Joan Robinson’s most important contribution to economic theory. Surprisingly, he did not answer growth theory or her contribution to the capital debates. Rather, he replied that it was in the field of monetary economics. Indeed, unequivocally Hahn states that:

her work on interest rates and money was excellent—outstanding in many ways....She wrote some splendid papers on the structure of interest rates, on liquidity preference, on the connection between monetary economics and the exchange rate, all these essays she collected in *The Rate of Interest and Other Essays* (1952a).

While I believe Hahn was correct in his assessment of Robinson’s views on money, I do not believe he is telling the whole story. While her earlier contributions to money and interest rates are undoubtedly of

great interest, Hahn says nothing about her views on money that appear in the *AC*. Rather, he specifically points to her 1952 essay that, while containing interesting passages, remains nonetheless rather conventional. Indeed, on the whole, her views before the *AC*, were very much in the tradition of Keynes’s Chapter 17.

Hahn’s observations notwithstanding, virtually nothing is written on Robinson’s contribution to money. This is certainly a mystery that needs to be explored. From the evidence presented above, Robinson had an important contribution to make in this area. Her writings are not only clear but offer a real alternative to the conventional views of money of the time, both the quantity theory of money and Keynes’s liquidity preference theory.

To my knowledge, only two early articles are dedicated to fully exploring Robinson’s views on money. Published side-by-side in Feiwel (1989a), these papers offer a radically different appreciation (and interpretation) of Robinson’s treatment of money and finance. One paper contends that Robinson had little interest in monetary issues, while the other argues unequivocally that she had a rich institutional theory of money. The first paper, Dillard (1989), provides a comparison between her early and later views on the topic. Dismissive of Robinson’s writings on money, Dillard (1989, p. 599) concludes that “money occupies no significant place in her extension of the General Theory [sic] to capital accumulation, economic growth and the distribution of income.” There appears to be a paradox in the sense that, after deep immersion in the monetary economics of Keynes, the absence of money as a strategic factor in her theory runs counter to expectations.

In the other paper, Graziani (1989) stresses the close relationship between the theory of the monetary circuit and Robinson’s careful analysis of the circulation of money and the alternative movements of the creation and destruction of money. He writes (1989, p. 616) that “Joan Robinson was the one among his [Keynes’s] followers who understood the problem most closely. What is to be found in her works is the proof of a clear perception of the nature and working of the problems of finance.”

How then can two highly respected economists reach such diametrically and contradictory conclusions? I believe that their disagreement over Robinson is rooted in their respective interpretation of Keynes. Indeed, while Keynes is a central figure in both approaches, Dillard and Graziani refer to two different works of Keynes’s. While for Graziani, Keynes of the *Treatise on Money* or of the finance motive articles⁶ is central to the theory of monetary circulation, Dillard clearly rests his

⁶See Keynes, 1973; see Rochon, 1997, for a further discussion.

views on Keynes of the *General Theory*, and more specifically on Chapter 17 as the fundamental theory of money. On this point, he is quite clear:

Chapter 17...contains the principal statments [sic] of the role of money in Keynes's economic theory....I could only conclude that she [Robinson] was not sympathetic to the general thrust of chapter 17. She did not accept Keynes's monetary explanation of involuntary unemployment. (Dillard, 1989, p. 604)

This view allowed Dillard to conclude that Robinson was "insensitive to 'money' as an important factor in general economic theory" (Dillard, 1989, p. 601). These two radically different positions are therefore explained because each author begins his specific analysis from a very different point of reference. But because Robinson rejects (or ignores) Chapter 17 does not make her insensitive to the importance of money. In this sense, Dillard's argument (and logic) is flawed.

In reading Robinson (1956a) it is evident that she makes no use of Chapter 17. Whether she failed to understand its significance or simply disagreed with its content is beside the point; what is clear is that she makes little use of its content, having referred to it even as "the mysterious chapter." The primary focus for the author is not on the money-stock relationship, but rather on the money-flow nature of production. The *AC* was about growth through time. So to discuss a given *stock* of money at any point in time made no sense to her. If money is endogenous, as Robinson believed, then what was needed was to analyze how the supply of money adapted itself to the growing economy. Hence, for her, a monetary theory of production and accumulation is an economy where the real and monetary sides of the economy are interconnected through the use of bank credit to finance production and investment. Money *must* be endogenous.⁷ She recognizes the creation and destruction of money inherent in the theory of monetary circulation. She therefore not only rejects the theory of loanable funds, but also the notion of an exogenous supply of money, although this is never so clearly spelled out, but can certainly be inferred. If this interpretation is correct, then it is difficult to understand why Dillard claims that "a monetary theory of production was of little interest to her, perhaps even that she was hostile to the concept" (Dillard, 1989, p. 605).

⁷Of Dow's (1997) comment that in the *General Theory* Keynes assumed a "given" stock of money, I can make no sense. From a post-Keynesian sense, if money is endogenous the flow of which responds to production and accumulation, how can it be "given?"

Graziani, by contrast, finds hints of Wicksellian influence dating as far back as 1938, in Robinson's article on the *Concept of Hoarding*, which appeared in the *Economic Journal*. On the heels of Keynes's finance motive articles, Robinson begins her analysis of the role of banks in financing production and the creation of deposits. Hence, there appears to be the seed of a theory of endogenous money and a definite rejection of the theory of loanable funds, although this is not systematically developed. From these as well as the views she would later develop, Graziani (1989, p. 623) concludes, "The description of the circulation of money, as created by banks and destroyed by the final repayment of bank loans, was surely familiar to Joan Robinson."

So, who is right? Did Joan Robinson understand the importance of money? It is clear from what has been cited above, that Robinson fully understood the importance of credit, money, and finance, but in a way that Dillard himself does not acknowledge or may not have understood. On this last point, I have three arguments. First, the primary focus of Dillard's analysis is to see money as a stock, an asset among all others chosen for its special characteristics rather than a flow. His focus is on "what is special about money, what sets it apart from all other assets" (Dillard, 1989, p. 602). He therefore did not appreciate what Robinson wanted to explain, and how the analysis of finance and money is linked to the theory of output.

Second, Dillard (1989, p. 608) claims that "throughout her career Robinson retained the traditional dualism between the real and money factors in economic analysis: Only in Keynes's perspective was money the means as well as the end in the activities of business firms." I argue that Robinson *did* place money at the very heart of the production process and carefully explained how money and finance enter into the analysis of output, employment, accumulation, and profits. She did understand that money is a flow variable that responds to the needs of the economy to reproduce and expand. Finally, a rejection of Chapter 17 does not mean that one does not understand or appreciate monetary analysis. It simply means that one rejects that specific approach to monetary theory.

4. LUXEMBURG AND ROBINSON

Robinson's radical views on credit and money in the *AC*, certainly lead one to reflect deeply on the origins of her views. The hypothesis of this chapter is that Robinson *did* have a radical change in her approach to money, from a conventional quantity theory and its critique in the form of liquidity preference to a more fully articulated, institutionally grounded

endogenous theory of money. A secondary question is how can this evolution be explained? This section argues that Robinson combined elements of Rosa Luxemburg's Marxist approach, with which she was familiar, having published the *Essay on Marxian Economics* in 1942, with elements of Keynes's finance motive approach to develop a theory of credit and money that is strikingly similar to the modern theory of the monetary circuit.

Of course, one possible explanation was her close friendship with Richard Kahn, who understood clearly the importance of money, credit, and banks.⁸ Kahn (1954) contains some insights into endogenous money. Yet, both contributions, I think, remain largely underdeveloped, though they contain key elements of a theory of endogenous money. No doubt Kahn played a very important role in influencing Robinson's 1956 views on credit and money.

Keynes's finance motive articles and his *Treatise on Money*, to which Robinson refers and Wicksell's writings (which Kahn also translated), to which she acknowledges her debt in the *AC*, could be considered obvious sources (although Wicksell is acknowledged for the choice of technique, his views on money could still have been known to Robinson). One could also include Marx, on whom she wrote earlier. Yet, the timing is off. Keynes was in 1937, Marx in 1942 (Robinson, 1966a). As for Kalecki, he arrived in Cambridge in 1936. During this period, her views on money were still, I believe, rather conventional. These events do not seem to explain why it took her several more years to develop a greater interest in credit and money, and why in 1956 her views appear to be at odds with her previous writings. In other words, why the sudden change in 1956, from the critique of the quantity theory in the short period via liquidity preference, to a theory more useful for the long-run analysis of the *AC*?

Indeed, Robinson's book shared its title with another important book. Rosa Luxemburg's own *AC*, was translated from German into English in 1951 by Agnes Schwarzschild, and Robinson had written its introduction. This seemed particularly interesting and the timing seemed right. But Robinson's introduction contained no significant reference to money. Yet, the book itself contains interesting contributions to money, with Chapter 5 entitled "The circulation of money."

Reading this chapter (as well as Chapter 9 and other passages through the book) reveals what I believe is the direct influence on Joan Robinson. There we find many similarities between Luxemburg's approach and Robinson's. First, Luxemburg divides society into social classes:

capitalists and workers, and traces the circulation of money as it moves through the economy. This is the same approach adopted by Robinson. Moreover, money is not a "measuring rod" but rather a means of exchange. The relationship between the circulation of money and the circulation of goods is crucial in her analysis. Although her analysis is foremost interested in how much money circulates how many goods (the question of the velocity of money, which is also at the heart of Nell's approach) there is no doubt that Luxemburg has no interest in the notion of money as a stock.⁹

In her analysis, the cycle of production begins with the payment of wages, which releases money into active circulation. From there, circulation involves alternating movements of money from one agent to another. At the heart of this analysis is the efflux and reflux of money. As Luxemburg writes:

Money, then, comes first into circulation by the payment of wages. The capitalist class must therefore set a certain quantity of money circulating in the first place, and this must be equal to the amount they pay in wages. (Luxemburg, 1951, p. 94)

And then

Once the process of circulation is concluded, money will always have returned to its point of origin....Thus all capitalists...have regained possession of the money which they set in circulation so as to effect these acts of exchange. (Luxemburg, 1951, p. 96)

In this context, "workers have only temporary possession of money during which time they convert the variable capital from its money form into its natural form" (pp. 96-7). Hence, wages, so to speak, is only a temporary resting place for money, although it is wages that serves the purpose of circulation. Ultimately, money returns to its point of departure and the system is closed (Luxemburg, 1951, p. 96).

These are the some of the more crucial aspects of Luxemburg's analysis, which will trickle down to Robinson and influence the development of her views away from liquidity preference toward the monetary circuit. But, as we will see in the next section, Robinson's views are richer and more developed than those of Luxemburg, and the weak areas of Luxemburg's analysis, for instance the absence of commercial banks and bank credit more notably, are central to Robinson's analysis, arguments she would borrow from Keynes's analysis of the finance motive.

⁸See Rochon (1999) for a discussion of his views.

⁹See Chapter 14 of this volume.

5. THE POST-KEYNESIAN RESPONSE

We can only begin to imagine how different post-Keynesian monetary theory would look today had post-Keynesians taken notice of Robinson's views. The impact would have been significant. Consider simply the very different points of departure: many post-Keynesians are interested primarily in money as an asset (although there are notable exceptions, such as Lavoie (1992), Moore (1988), Rochon (1999), Seccareccia (1996), Smithin (1994), Wray (1990), among others), while Robinson (1956a) is interested in the flow of money and the circulation of it through the economy. She is not interested in Chapter 17 of Keynes; she was never interested in responding directly to the monetarists, preferring rather to develop a positive contribution to money.¹⁰

But if Robinson's analysis was so prescient, why have her views been ignored by post-Keynesians at large. This is evident in the very few references in post-Keynesian writings on the subject. For instance, Eichner (1987) clearly has Robinsonian influences (and dedicates the book to her memory), but has no references to her work on money. Neither does Kaldor nor Kahn.

There is an exception—a notable exception. French banker and economist Jacques Le Bourva does recognize his debt to Robinson and specifically points to her views on credit and money. He writes:

Joan Robinson, finally, in a number of very profound contributions questions the most tenacious of ideas, renews economic thought and contributes, since AC, to build a synthesis of various approaches...It is mainly to this author that our debt is the strongest. (Krier and Le Bourva, 1968; original in French, translated by the author)

In reading this work, one gets the sense that Robinson's views on credit, banks and money permeate the book. Indeed, as a central banker, Le Bourva would have certainly been open to many of her realist views on the operations of debt and banking. Lavoie (1992) sees in Le Bourva an early champion of endogenous money (see Le Bourva, 1992). He refers

¹⁰Monetarists argued that changes in money caused changes in prices. The "Keynesian response" to this view was to argue that this relationship was imprecise given changing values of the velocity of money. This view, embedded in the Radcliffe Report was adopted by influential post-Keynesians, such as Kaldor (1958). Yet this does not amount to a theory of endogenous money. It is in this sense that Rochon (1999) argues that the early post-Keynesian position was a variation on the quantity theory of money, not a rejection of it. Robinson, however, never accepted this position, as argued in this chapter; she rejected any attempt at arguing in terms of changing velocities of money.

to Robinson's influence on Le Bourva, and points to the existence of a monetary circuit in her analysis: "Ironically, Le Bourva cites Robinson (1956a), who had written very little about money although one can discern a monetary circuit in her book" (Lavoie, 1992, p. 444). Through Le Bourva, one could argue that Robinson influenced a number of French economists.

Le Bourva notwithstanding, Robinson's views on credit and money have not been recognized by other post-Keynesians and apart from Lavoie, Le Bourva is relatively unknown by post-Keynesians outside of France. Yet her views were in plain sight and rather obvious. Anyone reading the *AC*, ought to have come upon them. How can we explain this?

I believe there may be many answers to that question. A possible first explanation may be that Robinson had no reputation as a monetary economist. Readers of the *AC*, would not have considered her views on credit and money only because they would not have expected them to be derivative of her main agenda: extending Keynes's views to the long run. Robinson fully realized that accumulation and growth cannot exist without examining "the influence of the monetary system upon accumulation" (Robinson, 1956a, p. 225). This is the task she set forth for herself in Chapters 23 and 24.

A possible second reason, argued by Parguez (2004), claims that on deciding to attack the neoclassical theory of production, Robinson chose capital theory and the production function to "destroy the inner logic of neoclassical economics in an ideal (or imaginary) economy in which money plays no part at all." Most of the *AC* is addressing the (very) long-run equilibrium conditions, certainly an ideal state of the capitalist economy. While there is no guarantee the economy will converge to the steady-state, Robinson chose to attack neoclassical economics on its own ground. Nonetheless, her remarks on the findings of the Radcliffe Committee, which she admits contained "clues which are well worth disentangling", include the following statement: "monetary policy as a rational, impartial and effective means of controlling total demand always was a myth, whether expressed in terms of a crude quantity theory or in more subtle, modern sophistries" (Robinson, 1965c). We also know that later she would argue that if the quantity theory of money had been read in reverse, it would not have been too bad (Robinson, 1970b).

A third reason, I believe, can be explained by the state of play of academic research. Post-Keynesians writing on money at the time were still interested in either responding to Friedman's theory of the velocity of money or defending the standard Keynesian views on money, explored by

Keynes in the *General Theory* (and Chapter 17 in particular). All in all, their contributions amounted to a meek criticism of the quantity theory of money, based essentially on the unpredictable nature of the velocity of money. While money determined output, financial innovation and the creation of “near monies” undermined the assumed constancy of the velocity of money, especially in times of rising interest rates (see Kaldor, 1958; Minsky, 1957a, b; Rousseas, 1960). The objective was therefore *not* to present or develop a theory of endogenous money, which was not yet in fashion.

Finally, I believe that Robinson never really developed her views further or never bothered to give them a careful examination after the *AC*. Even her comments on the Radcliffe Committee, on the heels of her book, should have encouraged her to pursue her line of reasoning. Alas, this was not the case, leading some to argue, and perhaps there is some truth to this, that her views in the *AC*, were “some exception, a way she tried but abandoned because, it is my interpretation, she understood that it could lead her too far from her major way to the reconstruction of economics” (Parguez, 2004).

6. CONCLUSION

The monetary views of Joan Robinson were largely ignored at a price. She had a vivid and clear understanding of the credit-led nature of money in production economies and would, eventually, spell out the horizontalists’ dictum: “it would have been much simpler to start by assuming a constant rate of interest and a perfectly elastic supply of money” (Robinson, 1970b, p. 507).

Robinson was interested foremost in the circulation of money through “the pipe-line of circulation,” as she wrote, as money flowed from banks to firms, to workers to firms to banks. These alternative patterns of money creation and destruction were the heart of her analysis. She understood clearly the principles of efflux and reflux, which are embedded in the theory of monetary circulation. Taken as a whole, her writing laid the foundations for an endogenous theory of money, institutionally rich and realistic.

Strangely enough, some economists never saw her analysis as being useful and her contributions were ignored by others, most oddly by post-Keynesians, who in many cases retraced her steps. Alas, perhaps one could fault Robinson for being too far ahead of her time!

14. Money in *The Accumulation of Capital*

Edward J. Nell¹

1. INTRODUCTION

This chapter develops a simplified model of Robinson’s *The Accumulation of Capital*, (*AC*) and extends it to incorporate a theory of circulation. For Robinson, money is essential to the capitalist organization of production; it allows for specialization and the division of labor, and it provides the vehicle for the movement of capital in response to profitable opportunities. In adding a theory of circulation to complete the monetary side of *The Accumulation of Capital*, we are certainly critical of Robinson’s work: she left it incomplete. But we also honor it; indeed, we claim that there are insights in her work that she never adequately developed, in particular, insights into money and production in the short period. The full implications could not be spelled out, because she never followed through with an analysis of the circulation of money (flowing opposite to the production and sale of goods). When this is carried through, however, her approach to money—with some adjustments and adding a Chartalist connection—can be seen to offer a full complement to her theory of accumulation.

Arguably, the extension is implicit in the original, but Robinson did not see it because she failed to develop her own insights into money. She took steps in the right direction, but did not go far enough. She opposed reliance on theories of equilibrium and rejected the method of comparative statics, and she understood path dependence. But she failed to see the importance of order and priority in sequences of transactions, especially in the circulation of money. Once this is taken into account, it becomes possible to unify the theories of money and interest, effective demand and employment and base them on a framework of production and distribution.²

¹New School University. I would first of all like to thank the memory of Joan Robinson. Rereading her after all these years has been a pleasure and a revelation. Gary Mongiovi offered good suggestions, and Bill Gibson did a wonderful critical and editorial job on a very imperfect draft. If I have not adopted all his suggestions it is because I continue to think that the different aspects of Joan Robinson’s work can be tied together—even if we have to import some of the rope.

²These are the problems that the famous Summer School in Trieste was convened to examine, starting in the late 1970s and running through the early 1990s, ending,

The chapter is organized as follows: first we explore Robinson's approach using one of this author's favorite constructions (a two-sector diagram—Robinson loved diagrams). The third section develops the ideas on circulation implicit in her work and the fourth extends them to cover her discussion of banking and rentier consumption. A fifth section discusses the endogeneity of money and the sixth ties the discussion of macro and money to the structure of production and distribution. The penultimate section discusses money as the unit of account and a final section offers some concluding remarks.

2. A SIMPLIFIED MODEL OF THE *AC*

In her finest and most comprehensive work, the *AC*, Robinson carefully spells out her method and the assumptions of her model (Robinson, 1956a, Chapter 7). The model abstracts from complications, but does not consider idealized individuals; instead it looks at simplified institutions. These do not make abstract choices but actively pursue interests and fulfill obligations, making use of specific and limited powers, in a setting of definite rules and contracts.

In her model, there are two outputs produced with fixed coefficients, capital goods and consumer goods (but each can be subdivided), two classes, workers and capitalists (but subclasses are considered), two income streams and two spending streams, wages and profits, consumption and investment (and again, further complications are considered). Capitalists and workers earn profits and wages, and respectively spend investment funds on capital goods and wages on consumer goods, where banks provide currency in the form of loans that create notes and deposits.

Robinson's model is a *revenue*-based model; the primitive ideas are flows of revenue, *not* separate prices and quantities. The business of the economy is carried out by means of these flows.

The justification for her multisectoral approach is not that two sectors are better than one, a small step towards the realism of hundreds or thousands of sectors, but rather that *these* flows between *these* institutional agents, are basic to the economy. The relationships between these revenue flows will continue to hold (perhaps modified in some ways) even when we subdivide the sectors and add further complications.

At this point it would be in line with Robinson's approach to present her ideas in a diagram, using a familiar macroeconomic notation. With this we will explore the role of money, and the process of circulation.

Unfortunately, without much agreement on the issues. The suggestion here is that the basis for, if not a solution, at least a valid and unified approach, had existed since the 1956 publication of the *AC*.

But later we will present the price and quantity equations to draw out some important results.

Figure 14.1 summarizes the two-sector model of production and can be used to explore the theory of effective demand (Nell, 1975). Incomes in money terms are Y_k and Y_c equal to the product of prices of capital goods and consumer goods, P_k and P_c , and their respective quantities, X_k and X_c .³ The sector on the left produces equipment, using equipment and labor; the other uses equipment and labor to produce the goods that support labor (management and services are included in labor). Equipment will initially be assumed to last one period only, and to be replaced every period.⁴ The multiplier, for instance, will be examined by increasing investment on the LHS and observing the resulting impact on employment and output in both sectors (*cf.* Robinson, 1956a, p. 205). Changes in productivity and the real wage can likewise be studied. In the diagram below, the vertical axis on the left, Y_k , measures $P_k X_k$ and the vertical axis on the right, Y_c , measures $P_c X_c$. Profits are $\Pi = \Pi_k + \Pi_c$, wages are $W = W_k + W_c$; investment, I , is likewise subdivided into I_k and I_c . We assume constant returns in the short run, so that output is shown as a function of employment. But output must equal income, so the vertical axis must also measure wages plus profits, and also consumption plus investment.

All aggregates are expressed in relative prices, convertible to an arbitrary unit of account. The rate of profit is the same in both sectors, as is the wage rate; that is, $\Pi_k/K_k = \Pi_c/K_c$, and $W_k/N_k = W_c/N_c$ where Π_i is the mass of profits, W_i is the wage bill and N_i is employment, all for ($i = k, c$). The net rate of profit is r while the gross rate is $1 + r$. The diagram on the left shows output of capital goods on the vertical axis, and measuring to the right, capital goods employment, N_k , on the horizontal. The steeper line is the output function, the shallower the wage bill, assumed equal to consumption by capital goods workers, C_k . Investment demand $I = I_k + I_c$ is marked off on the vertical axis; this determines output and employment in the sector, and thus its wage bill. This wage bill represents demand for consumer goods, and so is mapped

³The classical model setting out the relationships between production and distribution can be illustrated on a two-sector diagram (Nell, 1988; 1992, Chs. 20, 21, 23; the underlying algebraic model, presented above, is sketched in Nell, 1970, and set forth more fully in 1998, Chs. 5 and 7, and 2004a, Appendix and 2004b. See also Hicks, 1965 and Spaventa, 1970).

⁴Alternatively, as in Hicks (1965) equipment could be assumed to last forever. Fixed capital will not be considered, but is easily incorporated; Nell (1998) and Nell (2004).

demand as well and perhaps there may also be effects from monetary forces. In any event, the price level is not set by forces in the labor market. But when money wages rise, perhaps as the result of bargaining, the price level is likely also to rise, as the higher costs are passed along. The real wage might be unchanged. But if aggregate demand is not favorable, the price level might not rise as much, so the real wage would increase. But if aggregate demand is very strong, the price level could rise more than proportionally, so the real wage would decrease. On the other hand, prices could be driven up by various pressures, with money wages initially unchanged. This would tend to set off a round of wage increases, followed most likely by more price increases. In other words, the interaction between money wages, aggregate demand and prices can result in inflation independently of the money supply.

A flexible employment system, of course, calls for a flexible monetary system in which bank advances adjust promptly to changes in demand, so that the money supply, M , will be endogenous in the short run.⁵ But what of the long run? In the next section, we outline a theory of monetary circulation, broadly consistent with Robinson's approach, to fill this gap.

3. CIRCULATION

Monetary circulation is a repeated process, a flow as in any hydraulic system. We can therefore choose to break into the cycle at any point, but it will be convenient to start with inventories of consumer goods assumed to be on hand, the result of production in the previous period. New capital goods and replacements, however, have been sold and are in place.

Robinson herself gives only a brief account of circulation:

We may now inquire what has happened to the increment of money which has been created. At any moment some money is in the course of travelling round the active circulation—from income earner to shop-keeper, from shop-keeper to producer, from producer to income earner and so back again. Some is in the financial circuit, passing between buyers and sellers of paper assets. (Robinson, 1960a, p. 255)

⁵Sometimes Robinson seems to understand this perfectly, but at other times assumes that the central bank can control M , with some impact on the rate of employment.

So Robinson describes circulation as a sequence of transactions, in which money exchanges for goods and services, and then the sales revenue is broken up to cover costs, which in turn become income, and then is spent again. She could have added, "continuing until all goods and services have been exchanged against money, so that the economy is ready for another round." But she did not seem to see that circulation depends precisely on the structure of production, that there is an order of priority in the transactions. Look at the diagram. Suppose that the previous period's inventory of consumer goods has not yet been sold, but that of capital goods has. So the capital goods sector is ready to produce again. It borrows its wage bill from the banks and pays its workers (money capital decreases, as goods in progress increase). As the workers are paid, they buy consumer goods. As consumer goods inventories are run down, the sector begins production, and pays out wages, which the producers receive back immediately as their own workers buy consumer goods. At the end of the period, consumer goods producers have their new output and also their profit in money terms. This they use to purchase their investment goods—setting off a secondary circulation in the capital goods sector.

In each sector, then, money circulates in a sequence of successive transactions. This can be modeled as follows. Since intersectoral balance requires that $W_k = \Pi_c$ money income can be expressed as

$$Y = W + \Pi = W_k + W_c + \Pi_c + \Pi_K = 2W_k + W_c + \Pi_K = Y_c + Y_k.$$

Now let us assume that the labor coefficient, l , will be the same for every subsector in consumer goods. The wage bill can then be expressed in terms of the total output of the sector

$$W_i = wl_i Y_i$$

for $i = c, k$. Total demand for consumer goods comes from wages. We then have

$$Y_c = W_k + wl_c Y_c$$

or

$$Y_c = \frac{W_k}{1 - wl_c}$$

which is just a simple multiplier relationship.

Next assume that the labor coefficient will be the same in all subsectors in capital goods, and further assume that the machine tool subsector

is vanishingly small.⁶ Then the first subsector receives $\Pi_c (= W_k)$ in revenue from its sales of capital goods to the consumer sector. It withdraws $wl_k \Pi_c$ to repay its loans, and spends $(1 - wl_k) \Pi_c$ purchasing its replacements and new capital goods from the second subsector. This second subsector will withdraw $wl_k(1 - wl_k) \Pi_c$ and spend $(1 - wl_k)(1 - wl_k) \Pi_c$. The resulting sequence, taken to infinity, will sum to Π_c / wl_k . But this is Y_k , since $wl_k Y_k = W_k = \Pi_c$.

So we have⁷

$$Y = W_k \left(\frac{1}{1 - wl_c} + \frac{1}{wl_k} \right) = W_k \left[\frac{wl_k + (1 - wl_c)}{wl_k(1 - wl_c)} \right].$$

Income expressed in money of account is Y ; the RHS shows the sum required for circulation, in units of account, multiplied by the sum of the multipliers for the two sectors, showing how that sum circulates. This expression may be considered the “velocity of circulation.”⁸ So we can write

$$Y = W_k V.$$

The circuit in a more advanced economy with a stronger commitment to growth would begin from (and end at) a point at which production in both sectors was complete, but no goods of either kind had been marketed. At the outset banks lend to the consumer goods sector to finance spending on the acquisition of replacements and new capital goods, that is, they underwrite purchases of capital goods by the firms of the consumer goods sector. (This finance is one-period funding for transactions.) The sum so advanced would equal the profits of the consumer sector.⁹

⁶By “subsectors” we mean sectors that produce capital goods for other capital goods sectors.

⁷If the two sectors were to have the same capital-labor ratios, then this expression would simplify to:

$$Y = W_k / [wl_c(1 - wl_c)].$$

The multiplier can be expressed in terms of the wage and the productivity of labor because *profits* are saved, and thus are the “withdrawal.” This accords with the stylized facts for the US, in which gross business savings have long been far larger than household savings.

⁸Lautzenheiser and Yasar (2004) correct a small slip in Nell (2004) and develop the argument nicely.

⁹Circulation is a continuous process and a multiplier is the system-wide combined impact of a parametric variation. The independent variable is W_k in that this is what the banks advance. But if banks advanced funds for the consumer sector’s purchase of capital goods, the expression should be written as

$$Y = I_c \frac{wl_k + 1 - wl_c}{wl_k(1 - wl_c)}$$

This sum would then flow to the capital goods sector as revenue, and circulate in that sector. This would enable capital goods firms to purchase investment goods and pay wages, whereupon the spending of the wages of the capital goods sector would return the funds as profit to the consumer sector, enabling businesses in that sector to repay their loans. At this point the previous inventory of both sectors would have been circulated, and a new set of goods of both kinds produced, but not yet sold.

Note that in this simplified model banks do *not* finance investment spending as a whole, but only that of the consumer goods sector. Finance means funds are advanced at the beginning of the period of circulation, and not repaid until the end, with interest charged for the entire period.¹⁰ In particular, there could not be an investment-saving circuit, in which the advance of the entire sum to be invested then generated total income through multiplier respending.

At first glance such a circuit might seem attractive and plausible: banks would advance investment funds, which would then be spent and respent, according to the multiplier, with savings withdrawn at each stage, and rechanneled into the securities market, enabling firms to issue securities to pay off the bank advances. If the multiplier is m , then if investment is sufficiently large, $mI = Y_f$, where Y_f is full employment output and would be circulated by money.¹¹

But the flaw is easily seen: the capital goods sector will sell investment goods to the consumer goods sector for a sum equal to the profits of that sector. This sum, in turn, will circulate through the investment goods sector, as described above. Why should the capital goods sector borrow to purchase capital goods when its internal exchanges of capital goods will be monetized by the funds it will receive, equal to its wage expenses, from sales to the consumer goods sector?¹² Such borrowing would simply

Since the two sectors move in lock step by the assumptions of the model, the effective level of the money supply can be reduced to a multiplier investment in the consumer goods sector. The sequential nature of circulation implies that it makes no difference how the multiplier relationship is expressed.

¹⁰Interest has been ignored so far in the discussion.

¹¹With a classical savings function, $m = Y/\Pi$.

¹²Parguez and Seccareccia, in Smithin, 2000, p. 109, do not seem to understand the relationships between the investment and consumer goods sectors. Indeed, in earlier work (in Deleplace and Nell, 1996) they seemed to think that *all* production, consumer goods and capital goods, must be financed by loans. This suggests that loans equal to the total wage bill, W , would be advanced, on the one hand, and in addition, loans equal to total investment, I , would also be advanced. But they assume that $W = C$; so the loans would add up to total output, $C + I$! So loans plus interest would be greater than output! In any case, according to their present account, all

burden the firms of the capital goods sector with unnecessary interest charges.¹³

4. BANKING, INTEREST AND RENTIERS

The advances that circulate output have to be repaid with interest. Where does the money to pay interest come from? Robinson is quite clear:

The whole of the gross proceeds of the banking business (that is, the interest paid by entrepreneurs) returns to industry as quasi-rent [profits] arising from the expenditure of the bankers, as investment or via the expenditure of their employees. Thus the entrepreneurs' total profits, over any period, are equal to their own net investment *plus* the expenditure of the bankers. Since the latter is equal to the interest paid to the banks, profits net of interest are equal to net investment. (Robinson, 1956a, p. 228)

The business of banks is to make profits through earning interest on their advances. Interest is their revenue. Anticipating this, banks advance funds to themselves in two categories. As firms, banks have operating expenses, wages, salaries, supplies, and on the other, they spend for investment, new offices and equipment. Or they may buy additional reserves. The expenditure of these funds enters them into the circuit, so that they return to the banks as interest on the advances to business (Robinson, 1956a).

Banks earn what they spend. Total investment thus consists of the investment of the capital goods sector, of the consumer goods sector, plus that of the banks, and the profits of the consumer goods sector equal the wage bill of the capital goods sector, plus the wages of the banking sector. The banks advance the wage bill of the capital goods sector and their own wage bill. In addition, however, they must grow from period to period, so, in a system of real reserves, they will have to purchase additional bullion from the mining sector. They advance these investment funds, as well.

profits are now used to repay the loans which had been the prior source of investment finance. If profits equal investment, where does interest fit in? Moreover, as argued above, it implies that some businesses borrow money that they do not need.

¹³Once again, this has no bearing on very short-period borrowing in anticipation of sales. Such bridging loans are not at issue; the question is whether loans equal to the entire volume of investment must be advanced for the whole period of circulation, or whether only the investment spending of the consumer goods sector needs to be financed. See Nell (1998).

In a more complex model, the same would be true regarding the interest on loans to support capitalist consumption. The funds to pay the interest on such loans are again put in motion by the banks, which anticipate their earnings, and advance investment funds to themselves. They may use these funds to purchase equipment, to acquire additional reserves, or they may buy securities. Any of these will provide the other sectors with the wherewithal to pay the interest, while at the same time increasing the banking system's own capital.

For Robinson, banks were not different from any other firm. From period to period, then, the banking sector will hire more employees, and pay out more in wages and salaries, and in investment spending, *pari passu* with making more loans. The funds created and spent on business expenses then return to the banks as interest on their loans. In an extension of Kalecki's principle, banks, like businesses generally, collectively earn what they spend.

Besides the industries producing capital goods and consumer goods respectively, there are banks, offering loans and financial services, and a sector producing luxury goods for rentiers. Both can be included in the circuit without changing its character, although the formulae have to be modified a little. But the essential unity of money, aggregate demand and the theory of production and distribution continues to hold. Banks advance their wages to themselves as a loan; bank wages, W_b , plus W_k are then spent on consumer goods, resulting in profits $\Pi'_c = W_k + W_b$. But bank employees will be needed in proportion to the loans that have to be processed, namely in proportion to W_k .

Let us suppose that service fees and similar charges cover office expenses and rents. Then the costs to be covered are those of wages and salaries. W_b is the circulating capital of the banking system, and $W_m = W_k + W_b$ is the entire circulating wage bill advanced by the banks. There will be a socially and technically determined number of bank offices and personnel, especially loan officers, needed to process and manage the advances of working capital required to circulate the output. So

$$W_b = v_b W_m \quad (14.1)$$

where W_b is the capital advanced for providing the loans, that is, of paying the salaries of the bank tellers and loan officers and v_b is the coefficient of proportionality. This has to be covered from the earnings from the loans. In terms of W_k , then we have

$$W_m = W_k / (1 - v_b)$$

in which W_m will be spent on consumer goods, and will re-emerge as the profits of the consumer sector, $\Pi'_c = W_m$. This will now be spent on purchasing capital goods for the consumer sector. But this sum buys the same set of capital goods as before, in the case of circulation with simple money. *Only* the capital goods sector has to pay interest costs; so, for its rate of profit to be uniform with that of consumer goods, and for both to invest profits to grow at the same rate, it must charge more for capital goods, than in the case of no interest. The extra mark-up just covers the interest costs. So consumer goods purchases its investments and expands as before at the same rate. The capital goods subsector that sells to the consumer sector now repays the principal of its loan to the bank (its wage bill) *and* pays the interest, equal to the spending of the banks. The balance is the demand for intermediates from the next subsector, which does the same.

Next, bank profits and investment must be brought into the analysis. Profits go to augment bank capital, which is invested in gold reserves, so earns nothing. But, in addition, the capital of the banking system has to grow with the economy, from period to period, in order to continue to supply the need for advances. The income-expenditure balance is then

$$iW_m = W_b + \Pi_b. \quad (14.2)$$

But since W_b is the circulating capital, $\Pi_b = rW_b$, if banking earns the general rate of profit. So, $iW_m = (1 + r)W_b$, and since if we assume Golden Rule growth, that is $r = g$, this implies $i = (1 + g)W_b/W_m$ where g is the rate of growth. That is, banks invest their profits in the purchase of additional bullion, so their reserves grow at the same rate as the economy.

Taking into account equation 14.1

$$i = (1 + g)\nu_b.$$

This gives the long-run equilibrium level of the rate of interest in terms of the rate of growth and the ratio of labor employed in the banking sector to the labor force.¹⁴

¹⁴This is the rate that in the long run the rate of interest must realize on average; it is not the rate of interest on long-term bonds. The equation must be interpreted carefully; remembering that $W_b = wl_b$. The equation applies to the banking system as a whole. For any individual bank, efficient operations and reduced labor requirements will be advantageous. So l_b is determined competitively. But the volume of business of the banking system is W_k , which cannot be increased by more efficient banking. Hence the interest rate will be higher the greater the (competitively determined) level of l_b . (That banks must earn the normal rate of profit was recognized by J. S. Mill, as early as 1844; cf. *Essays*, IV, 1874, p. 115.)

This is a good start, but it does not deal with the supply of gold, which is necessary for the acquisition of reserves by the banking system. So we must add a gold-producing sector to the model of the economy. This industry will employ workers and use machinery to produce gold. Its size will depend on the need for reserves; given the reserve ratio, the size will then depend on the amount of loans the banking system makes. Banks will advance loans for wages in capital goods, W_k , wages in banking, W_b , and now wages in gold, W_g . The wage rate is the same in all sectors. The level of employment in banking depends on the volume of loans; so, employment in the gold sector times productivity of labor in gold is equal to the product of the reserve ratio, the productivity of labor in banking and the bank labor force. The size of the wage bill in the gold sector can be written, therefore, as a proportion of the size of the wage bill in banking. We can therefore rewrite the circulating money equation as $W_m = W_k + W_b + W_g$ where $W_b = \nu_b W_m$, and $W_g = \nu_g W_b$, so that

$$W_m = W_k + \nu_b W_m + \nu_g W_b \quad (14.3)$$

$$W_m = W_k / [1 - \nu_b(1 + \nu_g)] \quad (14.4)$$

The profits of banking are entirely spent on the acquisition of gold reserves

$$\Pi_b = W_g + \Pi_g \quad (14.5)$$

while the profits of the gold sector are spent on investment goods, to replace and expand equipment, so as to be ready for the next round.

The circulation proceeds as follows. Banks advance loans for wages to capital goods, to banks themselves and to gold producers, charging the rate of interest determined above. The workers all spend the wages on consumer goods, and the combined wage bill (net of wages in the consumer goods sector) re-appears as the profits of the consumer sector. The consumer goods sector then purchases its capital goods for the augmented profits, paying a higher price than in the no interest case, where the increased price is determined by the level of the rate of interest, which is calculated as above. The wage bill of banking itself has been passed on to capital goods, as has the wage bill of the gold industry. As the funds circulate through the capital goods industry, the principal of the loan of W_k will be repaid, and interest on this loan will also be repaid. The banking sector will receive its revenue, and repay its advance to itself, marking up the interest in its account books. It will then turn to the purchase of gold. Banks will have funds on hand to cover the wage bill of the gold industry. Anticipating further profits in the form of net interest income they will advance credits to the gold sector, against the

collateral of gold inventory, enabling gold producers to use these credits to purchase the capital goods they need. This will put gold producers in a position for expansion in the next round. The revenue from this sale of capital goods will enable capital goods producers to pay the rest of the interest they owe to the banks (interest that will give the banks profits at the general rate). The banks will then use their profits to buy gold for additional reserves, so their reserves expand at the general rate of growth. The revenue received by the gold industry then is used to repay the banks, canceling the debt. Interest on this debt and on the advance of the gold sector's wages, will be accounted for by shipping that much more gold than the amount of the principal.

Note that the total value of interest payments on working capital advanced, $iW_m = iW_k + iW_b + iW_g$. Taking into account equations 14.5 and 14.2, this can be expressed as

$$iW_m = W_b + W_g + \Pi_g. \quad (14.6)$$

But the interest on bank loans will be handled as a matter of bookkeeping by the banks themselves; it is interest they pay to themselves or to each other. And interest to the banks arising from the advances to gold producers is paid for in the shipment of gold for the bank's new reserves. So for the circulation, it is the interest on W_k that matters, and this interest must cover the replacement of W_b and W_g . But the interest so earned by the banks reduces the interest that the capital goods sector must pay, since such earnings can be applied to the purchase of gold. Total interest on working capital can then be employed to determine the rate of interest endogenously in the model. Taking into account equation 14.4, equation 14.6 can be expressed as follows:

$$i = (v_b + v_g v_b) + \frac{\Pi_g}{W_k} [1 - \nu_b(1 + \nu_g)].$$

Both banking and gold-producing earn profits at the general rate, and invest them to grow, so satisfying the Golden Rule. Both banking wages and gold wages are proportional to wages in the capital goods sector. So the balancing condition is just augmented by some additional constant terms.

To complete the story it is important to show that even when distribution is changing, the revenue flows add up properly, so that $\Pi = I$, $W = C$, and $W_k = \Pi_c$ continue to hold. This will be true so long as the Golden Rule obtains. When r is not equal to g , there will be problems with these balance conditions, which can easily be seen from the equations as written. Robinson assumed $r = g$, and she was right to do so. Moreover, the Golden Rule in effect eliminates Wicksell Effects,

which again can upset the accounting (as well as invalidate neoclassical relationships). In addition, all three of the above relationships can be shown to reduce to the balancing condition between the sectors, $Ap = bq$, tying the analytics of the model together very tightly.

A further extension concerns rentiers: Robinson devotes Book V to "The Rentier," apparently adding a new sector. Here the point of the extension is not only to elaborate the circuit, but to show that this can be done without changing the essential characteristics of the two-sector model. In effect, the sector that produces consumer goods for rentiers is analogous to Sraffa's non-basics.¹⁵

5. ENDOGENEITY OF MONEY

Robinson does *not* define a supply curve for money, nor for gold, nor for bank money. For banks, supplying *money* does not have marginal cost, and it does not by itself bring earnings (which come from making loans). But in the case of the gold standard, there is a genuine supply function. Supply is set by the cost of mining and minting, marked up by seigniorage. Seigniorage is analogous to profit; suppliers require it, and the market is willing to pay it for the convenience of having reliable coins. If there are constant costs in mining or minting, the supply curve is horizontal; if there are increasing costs the supply function will rise. If W_k is the amount required, then $W_k = M/P$, and substituting into $Y = W_k V$

$$PY = MV$$

the quantity equation. For Robinson, money is endogenous even in the long run, and that is just what this equation implies.

In the long run the supply of media of exchange adapts itself to requirements. If one form of money is limited in supply, others will be developed (Robinson, 1956a, p. 52). Putting more gold into circulation might temporarily raise prices, but then a unit of gold would exchange for goods worth less. Profitability in mining would fall, and with it investment, so that output growth would slow down. Changes in money may affect prices in the short run, the traditional quantity theory, but in the long run money adjusts. Nevertheless, if the price level is doubled, value of money halved, the quantity of money will double. The (in)famous proportionality theorem holds, money and prices vary proportionally in the long run, but causality runs from the price level to

¹⁵All of these points are developed in a longer version of this chapter available from the author.

the quantity of money, a point Robinson repeatedly stressed (Robinson, 1937a, p. 74-7).

The significant point here is that an expression for *velocity* is derived from the pattern of circulation, based on the interdependence of circulation and production. As a result the quantity equation can be considered to be more than a tautology; it is the monetary complement to the classical theory of production and distribution. But it should be read, nevertheless, as Robinson always argued, with causality running from right to left, money adjusts to the requirements of trade.

Of course, a system of currency based on full value coins is hugely expensive, and does not conveniently generate credit.¹⁶ Robinson notes that, the supplies provided by geology being limited, the stock above ground did not grow nearly as fast as the demand for liquid balances, and banks came into existence to supplement the supply. The transition from gold to bank notes and deposits as the leading form of money was bridged by the banks holding reserves of gold and offering to redeem their debts in gold on demand. This established confidence in their obligations and gave them liquidity (Robinson, 1937b, p. 32).

Fiat money with no reserve backing allows for the full endogeneity of money. There are no marginal costs; there is no true supply function. The *amount* of money supplied has to be expressed in monetary units. However, when the new fiat money enters circulation, *it can only do so by establishing a price for some goods or services*. But once one price is established, the connection to the real, underlying economy is established.

This is the point at which misunderstanding arose. Marshall and Pigou drew a *vertical* supply function (value of money on the vertical axis, quantity on the horizontal, with the “demand” as a rectangular hyperbola). The government decides how much to issue, so picks the point on the horizontal axis from which the vertical line rises. If the government issues more money than required by the underlying real economy, the value will fall, if it issues less the value will rise.

But this construction is flawed; these are disequilibrium changes. The newly issued fiat money has entered circulation with a definite price, for

¹⁶In a metallic currency system there is a definite supply function for money. Each unit of the money commodity produced has a definite cost. Supply and demand functions intersect at a margin, and the value determined there is imputed to the intramarginal units. These units (or paper based on these units) circulate. However, such a currency system has no organized supply curve in the market for loans; in the absence of a banking system there is no uniform or well-defined product. Every loan will be a different product, and it will be difficult to identify a dominating rate of interest, nor will there necessarily be market forces pressing all rates to move together.

it can only enter by being used to purchase something or hire labor. (If it is a loan, there must be collateral.) Hence there is an implied price level, so *the supply must begin from a point on the vertical axis, not the horizontal*. If after introduction, the quantity issued proves inconsistent with that price level, then the monetary system is in disequilibrium. Prices will therefore have to change; an adjustment process is set in motion. Prices might converge, but an inflationary process could easily generate its own pressures and overshoot. This is all the more likely if there are fixed interest bonds and fixed nominal contracts.

Robinson held that in the long run the supply of money adapted to the requirements of trade even if money were based on gold. Her instincts were right but she never closely examined Marshall and Pigou on the matter. She thought the quantity equation was either a tautology or misleading because she never worked out a theory of circulation that would give a precise meaning to velocity and link it directly to real activity.

For Robinson, and modern readers as well, there are several important implications of endogeneity. Note, for example, that there is no supply and demand for reserves here, so there can be no crowding out effects. Government deficits certainly do not drive up interest rates; indeed they have no impact so long as the rates are pegged by the monetary authority. But Robinson was not able to express this clearly, largely because she left the government out of her models. She did, however, see that interest rates responded to many conflicting influences, so that intervention would be needed to keep markets orderly.

In a nominal money system—where the money is acceptable because it is what taxes are paid in—the spending corresponding to deficits comes from money creation. That money will drive interbank interest rates *down* unless it is absorbed, or sterilized, by bond issues. This was recognized, although not stated properly, by Robinson as early as 1937:

The increase in the Quantity of Money, which takes place cumulatively as long as the deficit is running, will tend to produce a fall in the rate of interest and (unless confidence has been badly shaken) an increase in investment, induced by lower interest rates, will be superimposed upon the direct effects of the budget deficit. (Robinson, 1937b, pp. 70-71)

Robinson is here providing the necessary link to the role of the monetary authority. Note with excess reserves, a straightforward theory of supply and demand would imply that the interbank or overnight rate would be driven almost immediately to zero. To maintain a positive interest rate the central bank and/or the Treasury will have to act, which

means they *have* to peg the interest rate. The amount of money is therefore entirely endogenous depending on financing needs at the pegged interest rate.

6. THE PRIMACY OF PRODUCTION

Can our Robinsonian account of aggregate demand and money be conjoined to production and distribution? Let us set out a Robinsonian two-sector model, essentially the model that underlies the diagram. It will take a little work, but we will derive an important result for banking—the “conservation of value”—and we will show that circulating money is expressed in an unvarying unit of account (for the limited purposes of the model). And we will delve more deeply into the meaning of the conditions $\Pi = I$, $W = C$ and $W_k = \Pi_c$.

We write the capital goods coefficients as a_k, a_c , and labor as l_k, l_c , measuring labor, however, in the equivalent consumption goods. P_k and P_c are the money prices of capital goods and consumer goods, respectively. X_k and X_c are the quantities, and Y_k and Y_c are the outputs in money terms, equal to incomes. Then, assuming a positive level of productivity and distributing the surplus by paying a rate of profit and a wage rate, we have

$$Y_k = P_k X_k = (1 + r)a_k P_k X_k + w l_k P_c X_k$$

$$Y_c = P_c X_c = (1 + r)a_c P_k X_c + w l_c P_c X_c = \Pi_c + W_c.$$

Value relations do not depend on quantities, however. Hence, where $p = P_k/P_c$ and r is the rate of profit

$$p = (1 + r)a_k p + w l_k$$

$$1 = (1 + r)a_c p + w l_c.$$

Here w is the wage *rate*, meaning the competitively determined ratio of payments to labor to the cost of living. It should therefore be thought of as a real rather than nominal wage rate. When this rate is unity, or 100 percent, labor's earnings just cover the cost of living; when it is, say, 110 percent labor earns 10 percent above the cost of living.¹⁷ Then, solving

¹⁷To be analogous to other goods, labor must be represented by the means of subsistence that support it, and these, in turn, are produced by the consumer goods sector. Labor is shown as a column in the price equations, and the consumer goods sector will be the corresponding row. Since labor is represented by the goods that support it, the *basic* real wage will be unity. The *net* wage will then be a percentage of this, as market conditions drive the wage above or below unity. We will take it that the maximum rate of profit comes when $w = 1$, the basic cost of living. If $w < 1$, labor will not be able to function.

for w in terms of $(1 + r)$, we have

$$w = \frac{1 - (1 + r)a_k}{l_c + (1 + r)(a_c l_k - a_k l_c)} = \frac{1 - (1 + r)a_k}{D} \quad (14.7)$$

where $D = l_c + (1 + r)(a_c l_k - a_k l_c) = l_c[1 - (1 + r)a_k] + (1 + r)a_c l_k > 0$, since the system's viability requires that $1 - (1 + r)a_k > 0$. From equation 14.7

$$dw/dr = -a_c l_k / [l_c + (1 + r)(a_c l_k - a_k l_c)]^2 = -a_c l_k / D^2 < 0 \quad (14.8)$$

which shows that profit and wage rates are inversely related. The relative price is defined by

$$p = l_k / [l_c + (1 + r)(a_c l_k - a_k l_c)] = l_k / D \quad (14.9)$$

so that the change in the relative price with respect to the profit rate is

$$dp/dr = l_k(a_k l_c - a_c l_k) / D^2 > \text{or} < 0$$

which varies according to the sign of $a_k l_c - a_c l_k$, that is, according to the relative capital-labor ratios of the sectors.

The *quantity* relations start from the outputs in each sector in relation to their use as input. Capital will be used in proportion to growth in the capital sector, and in proportion to consumption in the consumer sector. Initially, we have

$$X_k = (1 + g)a_k X_k + ca_c X_c \quad (14.10)$$

$$X_c = (1 + g)l_k X_k + cl_c X_c. \quad (14.11)$$

Capital goods will be invested in each sector, and consumer goods will be consumed in each sector; so we must introduce two new variables, g for proposed growth, and c for anticipated consumption per capita. Observe that these variables concern the *current use* of the period's output. In particular, g does *not* refer to growth of capacity or growth of output. Rather g is the ratio of the allocated output of capital goods, in each sector, to the amount used as input (Spaventa, 1970; Nell, 1970).

The relative size of output must reflect the proposed uses in the sectors. Accordingly, the output of the capital good will be allocated to replacement of its use in its own production, expansion in proportion to proposed growth, and use in the production of consumption goods in proportion to consumer demand. Consumer goods output will be allocated to replacement of basic wages in capital goods, expansion in proportion to proposed growth, and providing wage good input in proportion to consumer demand in consumption goods.

Multiplying by prices, we then have

$$Y_k = P_k X_k = (1 + g)a_k P_k X_k + ca_c P_k X_c \quad (14.12)$$

$$Y_c = P_c X_c = (1 + g)l_k P_c X_k + cl_c P_c X_c \quad (14.13)$$

Returning to the quantity system, letting $q = X_k/X_c$ and dividing 14.12 and 14.13 by X_c

$$q = (1 + g)a_k q + ca_c$$

$$1 = (1 + g)l_k q + cl_c$$

from which we derive

$$c = \frac{1 - (1 + g)a_k}{l_c + (1 + g)(a_c l_k - a_k l_c)} = \frac{1 - (1 + g)a_k}{D'}$$

where D' differs from D by having g in place of r . By analogy to equation 14.8 above g and c are inversely related. We also see that

$$q = \frac{a_c}{l_c + (1 + g)(a_c l_k - a_k l_c)} = \frac{a_c}{D'} \quad (14.14)$$

so that $dq/dg = -a_c(a_c l_k - a_k l_c)D'^2 > \text{or} < 0$ according to the sign of $a_c l_k - a_k l_c$, the ratio of the capital-labor ratios of the sectors. Noting that from equations 14.9 and 14.14 since

$$\begin{aligned} p &= l_k/D \\ q &= a_c/D' \end{aligned}$$

if $D = D'$, that is, if $r = g$, $pq = \text{value of capital goods per worker} = a_c l_k/D^2$. But $dw/dr = -a_c l_k/D^2$. Hence

$$\frac{dw}{dr} = -pq = \frac{-P_k X_k}{P_c X_c}.$$

That is, the slope of the wage-profit trade-off equals the value of capital per worker when the Golden Rule holds.¹⁸

¹⁸This applies to circulating capital but it can be extended to fixed, as discussed in Nell, 1998; 2004. It also follows that the elasticity of a point on the wage-profit trade-off equals the ratio of the share of capital to the share of labor (Nell, 1970). And when $r = g$, so that the value of capital per worker is given by the slope of the wage-profit trade-off, if there is re-switching between two techniques, both switches will be “forward switches,” that is, the system will go from a more capital-intensive technique to a less, as r rises (Nell, 1970). This does *not* invalidate the “Cambridge capital critique,” which applies to the construction of the neoclassical production function. That function shows the value of capital per worker rising (due to substitution) as the rate of profit falls—capital is cheaper, so more is used—under conditions in which the choice is made without considering the quantity side, that is, in effect, assuming a zero rate of growth. This is surely an inappropriate construction to employ in analyzing the determination of the growth rate, as Solow and many others have done. (Once a positive rate of growth is established, the value of capital per worker will be different from that expected on the basis of the static spectrum of techniques, regardless of whether there is reswitching.) Historically, however, growth and profits broadly move

This means that $dw P_c X_c$, the increase in payments to labor, exactly equals $-dr P_k X_k$, the reduction in payments to capital, or vice versa. This could be dubbed the “conservation of value” condition; when purchasing power is transferred from one social class to another it neither increases nor decreases. The implication for circulation is that a change in distribution causes no net change in financing requirements; any change can be managed by shifting funds from financing capital payments to financing payments to labor or the reverse. This is what is meant by the phrase “primacy of production” in the section title. Banks can shift the composition of their loan portfolios, between financing investment and financing wage advances; merchants can switch between purchases of capital goods and purchases of consumer goods.¹⁹

Clearly, any actual economy might operate with a mixture of this circuit and the circuit of advanced working capital. In practice, banks do both kinds of business and real economies operate both kinds of circuits. For a mixed system to operate smoothly, it must be possible for banks to transfer business back and forth from advancing working capital to supporting investment purchases, for example when the real wage (rate of profit) changes. A rise in the real wage, increasing consumption, implies a lower rate of profit and lower investment (assuming full employment). Banks will reduce their lending for investment purchases, and increase their advances of working capital. For banks to stay fully loaned up the increase in one kind of business must just offset the reduction of the other.

7. THE UNIT OF ACCOUNT

Robinson did not think that the search for a standard of value made much sense. So it is not surprising that she does not discuss the question of a unit of account in *The Accumulation of Capital*. It does come up in *Economic Philosophy*, where she rightly places the issue in the context of Malthus’s and Ricardo’s search for an invariable measure of value, which she discusses together with Marshall’s comments on the problem. She quotes Ricardo’s last paper:

The only qualities necessary to make a measure of value a perfect one are, that it should itself have value, and that that value should be itself invariable, in the same manner [that a measure of length] should have length and that length should

together, and the value of capital per worker has risen as wages have risen. This is to be expected on the basis of the approach outlined here (Nell, 1998, Chs. 7-8).

¹⁹This is demonstrated in more detail in Nell, 1998, Chs 5, 7. See Appendix, Nell, 2004.

be neither liable to be increased or diminished. Although it is thus easy to say what a perfect measure of value should be, it is not equally easy to find any one commodity that has the qualities required.

She then comments

We can see clearly now that this is off the mark. Weight and length, of course, are human conventions, but once established they do not change because they refer to the physical non-human world. They are the same in Moscow as in New York. But value is a relationship between people. There never will be a unit for measuring national income that has the same meaning for everyone, still less a unit that means the same thing at different dates or in the setting of different economic systems. (Robinson, 1964, pp. 33-4)

It is Robinson herself, however, who is off the mark here. Value is not a relationship between people; that would only be true in neoclassical theory, where value would reflect relationships between the foregone and realized utility of various agents. Value in the classical conception is a relationship between *institutions*, specifically businesses producing goods and services with the aim of fulfilling contracts in the course of following definite rules, while meeting their obligations to creditors and shareholders. This activity gives rise to a pattern of flows of purchasing power between producing sectors and classes of income recipients, who pass the purchasing power along as expenditure. The measure of value is a very simple matter, so simple in fact that we tend to take it for granted.²⁰ It is to show that the flows of purchasing power can be reliably compared when the parameters governing income distribution and spending have changed. That is, the flows must be expressed in a unit that does not itself change. So when distribution and spending change, and flows into and out of one sector may increase and those to another may decrease, we know that these changes are meaningful, and not due to some arbitrary choice of unit or index. If we say that consumption is higher and investment lower in one case compared with another, this has to be genuine; households have to be consuming more, and capital growing

²⁰Today the unit of account is nominal and imaginary; in the past it was embodied in stocks of bullion and coin, the latter minted with a mark-up for seignorage. But production and minting gave rise to costs, and these could be affected by changes in productivity and the rate of profit. To define a measure of value that could tell us when the value of money was unchanged it was necessary to separate the influences that affected all forms of supply from those that concerned the process of circulation itself. *That* was the problem that chiefly concerned Malthus and Ricardo.

less in a seriously measurable and objective sense. Otherwise macroeconomics is not possible. *This* is the issue, not comparing Moscow and New York, or comparing the economy at widely different dates, using different technologies or producing different baskets of goods.

The condition that the wage bill in the investment sector equals the capital requirements in the consumer sector is a price quantity invariance relationship. Rewriting it, we have $p/q = l_k/a_c$; that is, the ratio of p to q is equal to a constant.

This relationship underlies the theory of circulation. Money here is therefore expressed in terms of an “invariable standard;” that is, circulation ensures that all prices and quantities are “monetized,” expressed in money. But the relationship that makes that possible also shows that the ratio of prices to quantities is constant, regardless of distribution—and we earlier saw that changes in aggregate demand changed all quantities in proportion. These are the result of assuming fixed coefficient technology underlying the simple model of this chapter.

Note that this holds for a limited and specific macroeconomic model, based on Joan Robinson’s set of simplifying assumptions. The model is intended, however, to represent a complex reality in which the definitions of capitalists, workers, the capital goods sector, the consumer goods sector, and so on will be abstractions, but not significant distortions. Whether that is true or not is a further question. Much depends on the Golden Rule, but the discussion of banking and rentiers suggests that the model can be greatly modified and extended without losing the feature that p/q is a constant.

The important point is that this theory of money, to which Robinson implicitly subscribed, contradicts the neoclassical imagination, in which money is treated like any other good for which there is supply and demand.

8. CONCLUSION

Implicit in Robinson’s approach were answers to major analytical questions, especially those that figured in the discussions in Trieste, regarding whether the neo-Ricardian equations could provide a framework of prices and distribution for the analysis of money, effective demand and variations in employment. As we see, the Robinsonian two-sector model can do just that. But she failed to bring out these points, partly because she did not develop her approach to money, downgrading the quantity equation, instead of seeing that she might have derived it in a new way (new, but consistent with the classical approach), and partly because she did not appreciate the full implications of the Golden Rule.

She considered money essential to capital, and she saw that capital circulates by means of money, passing through successive stages of being embodied in inventory, then money revenue, then inventory plus labor, then goods again, followed by revenue, etc. At the liquid points, business can decide to change aspects of its technology, or even shift to another line of activity altogether. Or all or part of it could be drawn out of circulation and held in hoards. This is liquidity preference; Robinson discusses it, but it is not a major element in her approach. Robinson had most of the materials for a comprehensive theory of money to complement her theory of capital accumulation—indeed she held that capitalism was only possible if all transactions were fully monetized. But she failed to provide an account of how much money was needed to accomplish full monetization, or how that money would circulate in order to do it.

The main thing missing was a follow-up to her insight that the pattern of circulation reflects the structure of production. And she completely failed to follow through the logical implications of the relationship for the circulation of money. Though she did see that money circulated according to the pattern of production and distribution, she never traced this out, and so never developed a theory of circulation or an account of velocity. A precise account would have provided the formula for velocity, allowing a version of the quantity equation that would have directly contradicted the Monetarists.²¹ Instead she dismissed the quantity equation as being of no use on the grounds that velocity was meaningless.

Robinson laid out a two-sector model of production and distribution, and she made use of both the equations $\Pi = I$, and $W_k = \Pi_c$, but she did not see the relationship between these equations and the circulation of money or between them and the system of production and distribution. Nor did she fully develop her insights into the latter. Even though she saw the importance of the Golden Rule she never developed its implications for the relationship between the wage bill of the capital sector and the gross profits of the consumer sector, nor did she see how this could provide a basis for the theory of effective demand. As for the unit of account, she dismisses the search for a measure of value as a will o' the wisp—and misses the significance of having a valid unit of account, which she in fact takes for granted. Finally, she could not give a full account of modern money, because she did not build government into the model.

Nevertheless she achieved many important insights. Among them: that the monetary system develops and changes under pressure from

²¹But she never saw this, perhaps because she distrusted the mathematical abstraction that such a theory would have involved.

markets, that money is endogenous in the long run, even when backed by metal, that active and idle money should be analyzed separately, that effective demand must be modeled in revenue flows, that deficits when monetized tend to drive interest rates down, that market forces may not be sufficient to determine or to move interest rates, which are subject to a variety of influences, so that having orderly financial markets requires intervention.

These can be pulled together with her account of accumulation to form a complementary monetary theory, which in turn helps to illuminate her analysis of short-run effective demand. The result is a Robinsonian model of employment, offering a simple but realistic approach that is post-Keynesian in flavor, useful for policy questions, and sharply at odds with the mainstream.

15. International Economics after Robinson

Robert A. Blecker¹

1. INTRODUCTION

This chapter reviews the ideas of Joan Robinson on international economics, from her earliest work on exchange rates, the trade balance, and employment, through her mid-career critiques of the theories of international adjustment and comparative advantage, to her later writings on the “new mercantilism” and uneven development. An emergent theme in her work was a rejection of the conventional bifurcation of international economics into separate trade (micro) and finance (macro/monetary) parts, which rests on the classical assumption of monetary neutrality. Many of her arguments are based on interactions between the trade and finance sides that are ignored in conventional theories. In international economics, as in other areas of her work, she demanded greater realism at every turn. She was unprepared to accept rarefied abstraction as a guide to action, in part because such abstract models had failed so demonstrably in addressing the central issue of her time, mass unemployment.

The remainder of this chapter traces the evolution of Robinson’s global Keynesian views and discusses their implications for current issues in the international economy. The following section provides an overview of her contributions. Sections 3 and 4 discuss Robinson’s writings from the 1930s and 1940s on foreign exchange markets, “beggar-my-neighbour” trade policies, and balance-of-payments adjustment. Section 5 considers her later writings on trade theory and policy from the 1960s and 1970s, including her analysis of the new mercantilism and her critique of the Heckscher-Ohlin-Samuelson model. Section 6 discusses later developments in international trade theory in light of Robinson’s critiques, while section 7 considers the relevance of her ideas to the current pattern of global trade imbalances. Section 8 concludes by assessing the global Keynesian policy perspective that was implicit in her analysis.

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2. OVERVIEW OF ROBINSON'S APPROACH

Robinson is perhaps best known for her role in the Cambridge capital controversy of the 1960s.² She also made major contributions to fields of economics as diverse as growth theory, monopolistic competition, Marxian economics, development economics, and economic methodology. Although less well known, however, her contributions to international economics are no less fundamental—and certainly no less controversial.³ By the end of her career, Robinson had become a fierce critic of one of the greatest shibboleths of economics: the doctrine of free trade. This critical stance developed gradually, as the culmination of a life-long process of grappling with one of the most “sacred tenets” of the economics profession.⁴

Robinson's critique of free trade had several dimensions, including her opposition to the comparative static methodology usually employed to “prove” the existence of gains from trade, as well as her scathing criticism of the actual practice of trade policy by nations proclaiming their fealty to free trade while seeking mercantilist advantages over their neighbors. Robinson also thought that international trade relations were far more conflictive than they were usually portrayed by free traders. But at the most fundamental level, her critical perspective on free trade was rooted in her radical Keynesian opposition to the assumptions of balanced trade and full employment that underlay all “pure” trade theories. These assumptions in turn rest on the classical postulate of monetary neutrality, according to which the “real” side of the economy operates independently of monetary or financial variables. In her view, in such models “the case [for free trade] was made out by assuming away all the difficulties and all the aims that in reality give rise to protectionist policies” (Robinson, 1973a, p. 15).

Today, the mainstream field of international economics is strictly bifurcated into trade (micro) and finance (macro/monetary) halves.⁵ Trade theorists still construct models of trade-as-barter in a theoretical vacuum that systematically excludes any influence of monetary factors or aggregate demand. International finance theorists spin models of foreign exchange rates, international financial markets, and the balance of

payments in which the real impact on trade flows (and on employment, growth, and income distribution) is often ignored (although there are some notable exceptions in this regard). Textbook writers segregate the two parts of the field, students are taught to view trade and financial issues in isolation from each other, and policy-makers are advised not to link policies between the two domains.⁶

From her earliest writings on the subject, however, Robinson resisted this emerging bifurcation and insisted on analyzing issues that cut across the trade-finance divide. Her earliest work in international economics concerned the effects of trade policies as well as currency devaluation on employment—a macroeconomic variable. Later, she turned her critical eye to the orthodox theories of automatic balance-of-payments adjustment. She expressed profound skepticism about the existence and stability of a long-run equilibrium in which the postulate of monetary neutrality would hold, and both full employment and balanced trade were supposed to prevail.⁷ Robinson also analyzed the practice of trade and financial policy in the real world, which she argued constituted a “new mercantilism” in which individual countries sought to increase their own income and employment (via trade surpluses) at the expense of their trading partners. She also made contributions to the analysis of North-South trade and inequality between the advanced and less-developed nations (see, for example, Robinson, 1979b).

In fairness to mainstream trade theory, some of Robinson's criticisms of orthodox trade theory as practiced up to the 1960s have been vitiated by later developments in the so-called “new international economics” starting in the late 1970s. Models of pure static comparative advantage with perfect competition, while still used as pillars of both policy advice and undergraduate pedagogy, have long been supplanted at the highest levels of theory by models of trade with scale economies, endogenous technology, imperfect competition, and growth dynamics.⁸ Although economists do not like to advertise the fact outside the ivory tower of academics, many of these new models provide ample ammunition for

⁶See any standard international economics textbook, such as Caves *et al.* (2002), which has completely separate sections on trade and finance. For the argument that trade policies should be analyzed in abstraction from employment issues or other macroeconomic concerns, see Krugman (1996) and Burtless *et al.* (1998).

⁷Robinson's critique of equilibrium models is discussed extensively in the chapters by Dutt, Skott, Harris and Bhaduri. It is not surprising that many of her criticisms of the equilibrium method would carry over directly to the pure theory of trade, as discussed in section 6, below.

⁸See, for example, Krugman (1990), Grossman and Helpman (1991), and Grossman (1992).

²See Harcourt (1972) and the chapter by Marcuzzo in this volume.

³Some previous discussions and extensions of Robinson's work on international economics include Gram and Walsh (1983), Bhaduri (1986), and Rima (1991; 2003).

⁴The reference to free trade as a “sacred tenet” of economics is from Krugman (1987, p. 131).

⁵For post-Keynesian critiques of the trade-finance split in international economics, see Blecker (2003a; 2005) and Palley (2003a).

critics of pure free trade and potential justification for certain interventionist policies, although “optimal” policies are sometimes domestic interventions rather than trade restrictions. At the same time, these models imply the existence of new types of gains from trade not found in earlier models of comparative advantage, such as gains from scale economies and induced technical progress, as well as new insights into the political economy of trade policy.

Of course, one can still be critical of the methodology of rational choice and constrained optimization utilized in most of these new models, as Robinson undoubtedly would have been had she lived to see them. For example, dynamic trade models often assume intertemporal optimizing behavior by agents who are magically endowed with fantastic amounts of information about the future. This is for reasons that seem to have more to do with ideological purity than any conceivable relevance to actual economic behavior.⁹ One can also criticize the way in which modern trade models sometimes impose assumptions that effectively limit the disequilibrating effects of scale economies and endogenous technology in order to arrive at equilibrium solutions, a practice that some have referred to as “convexifying the nonconvexities.”¹⁰

I will argue below that even the traditional trade models contained a greater recognition of conflictive aspects of trade relations, both within and between countries, than Robinson was willing to acknowledge. For example, she seems to have missed the profound significance of the Stolper-Samuelson theorem, which implies that free trade is not generally a Pareto improvement compared with protectionism. Nevertheless, at the dawn of the twenty-first century, one can no longer claim that orthodox trade theory always assumes an exogenously fixed set of resources and technology, or that orthodox trade models necessarily imply that perfectly free trade is always and everywhere the most beneficial policy for a nation. To the extent that modern trade theory has become

⁹Some mainstream economists have noted that the assumption of intertemporal optimization is unnecessary for modeling the insights of the new trade models with regard to scale economies and technological change. For example, Findlay (1995) models trade with endogenous growth using the classical assumption that all saving comes out of profits in otherwise neoclassical models.

¹⁰I encountered this term in an unpublished manuscript by Lance Taylor, who has told me that he recalls the phrase being used by Graciela Chichilnisky. Some examples of devices for “convexifying the nonconvexities” include special assumptions about utility functions and consumer demand that effectively limit the demand for any one good or variety and symmetry assumptions that prevent any one firm from gaining competitive advantages over other firms (for example, identical cost functions for all firms).

more realistic, it is in part to the credit of earlier critics such as Robinson. That she was not extensively cited in the effort to modernize trade theory should not be surprising, since the most trenchant criticisms often go unacknowledged, even in the effort to address them.

But one area in which the mainstream of international economics has made no progress—indeed, it has only become more ossified—is in its failure to admit breaches of the trade-finance (micro-macro) split. In fact, many trade economists now vociferously argue that it is a fallacy to consider any possible employment effects of a nation’s international competitiveness or trade policies (for example, Krugman, 1996, p. 123). This argument often rests on the assertion that adjustments in flexible exchange rates will automatically offset any changes in competitiveness or trade policies, even though most research on flexible exchange rates has found that they are essentially unpredictable in the short run with reference to any macroeconomic “fundamentals.”¹¹ In the orthodox view, trade policies should be evaluated solely through the lens of micro-level allocative efficiency, allowing only for qualifications to the gains from trade due to externalities, distributional effects, and adjustment costs. Unemployment is supposed to be always tending to a “natural” rate, guided either by the invisible hand of flexible prices or the visible hand of wise central bank policy, and always independently of trade performance or trade policy.

Yet, many of the most important international economic issues of our time cry out for an analysis that transcends the trade-finance divide. For example, how have the chronic trade deficits and repeated dollar overvaluation of the past 20 years affected the industrial and job structure of the US economy? How do China’s highly successful export-led growth policies affect employment and growth in other countries, including rival developing nations as well as the industrialized countries? Why did the appreciation of the Japanese yen in the late 1980s usher in a period of chronic stagnation in an economy that could no longer rely on export-led growth? How have exchange rate fluctuations contributed to tensions over trade policy, such as the 2001-03 dispute about US steel tariffs? How has the integration of global financial markets impacted on employment, growth, industrial structure, and income distribution around the world? One can look in vain to see which half of a standard international economics textbook will provide a complete answer to any of these questions.

¹¹See Frankel and Rose (1995) on short-run fluctuations in exchange rates and Rogoff (1996) on persistent violations of purchasing power parity in the short and medium runs.

Practical economists do, of course, analyze such issues all the time, but they do so with little help or guidance from high theory, in which the two worlds of international trade and international finance are separated by the intellectual hyperplane of the assumption of monetary neutrality. In the new neoclassical trade models, just as much as in the old ones, there are never any shortfalls of aggregate demand that could prevent full utilization of resources or any persistent real effects of exchange rate misalignments on real variables.¹² No wonder, then, that so many economists routinely advocate trade liberalization agreements regardless of their macroeconomic and financial implications. Many economists also promote the liberalization of financial markets with inadequate attention to the likely real impact on output, employment, distribution, and growth, although with some notable exceptions.¹³ In this stultifying intellectual environment, Robinson's work on the connections between micro- and macro-level aspects of the international economy is more relevant than ever. This real-world approach, which encompasses the mutual feedbacks between trade relations and policies on the one side and macroeconomic policies and performance on the other, was already evident in her earliest writings on the subject, to which we now turn.

3. EARLY WRITINGS

Robinson's earliest and best known contributions to international economics are her chapters on "The Foreign Exchanges" and "Beggar-My-Neighbour Remedies for Unemployment" in her *Essays in the Theory of Employment*, which was originally published in 1937 (but all citations herein are to the second edition of 1947).¹⁴ The first of these chapters is one of the few works of Robinson's that is commonly cited by mainstream economists, usually for its statement of what has become known as the "Bickerdike-Robinson-Metzler condition:" the generalized elasticities condition for a currency depreciation to improve the trade balance,

¹²An exception in this regard is the literature on hysteresis and trade, which admits that exchange rate misalignments can have persistent real effects (for example, Baldwin, 1988).

¹³Some economists have recognized the inherent market failures in liberalized global financial markets that can lead to problems such as speculative bubbles, speculative attacks, self-fulfilling panics, and contagion effects, and have acknowledged the real consequences of such financial instability. See, for example, Bhagwati (1998), Rodrik (1998), and Stiglitz (2002).

¹⁴Both of these chapters were included in the first major anthology of important articles in international economics edited by Ellis and Metzler (1950).

when supply elasticities as well as demand elasticities are finite.¹⁵ However, Robinson relegated the mathematical formulation of this condition to a footnote (Robinson, 1947, p. 142, n. 1), while offering a rich verbal discussion of the causes and consequences of changes in flexible exchange rates (as well as some discussion of the gold standard and fixed rates) in the text.¹⁶

In many respects, Robinson's discussion of foreign exchange markets is remarkably modern in its attention to institutional and behavioral detail. Unlike later textbook presentations of what became known as the "elasticities approach," Robinson did not confine herself to the situation in which all foreign currency exchanges are conducted to finance trade in goods and services.¹⁷ She noted that there were four sources of demand for foreign exchange (aside from "official exchange dealings," from which she abstracted in order to focus on free exchange markets):

- (1) in order to pay for goods or services purchased from foreigners (or to make gifts to them), (2) in order to make loans or purchase securities abroad, (3) for speculative purposes, that is to say, in order to take advantage of an expected reversal in the future course of the exchange rate, (4) in order to remove funds from a country in which political, fiscal, or business prospects appear threatening to one in which they seem relatively secure. (Robinson, 1947, p. 134)¹⁸

Thus, Robinson emphasized the capital or financial account along with the trade balance or current account as a determinant of the supply and demand for foreign exchange. With regard to the capital account, the following words of Robinson's are an apt description of the causes of the exchange rate bubbles and currency crises of recent decades: "the

¹⁵She also discussed the special case of the Marshall-Lerner condition, which assumes that supply elasticities for both imports and exports are infinite (Robinson, 1947, p. 143).

¹⁶See the chapters by Dutt, Skott, and Harris in this volume for discussions of Robinson's attitude toward the use of mathematics in economic modeling.

¹⁷A typical exposition is given by Caves *et al.* (2002, pp. 301-5 and S-44 to S-45), who assume no capital flows in their presentation of the elasticities approach.

¹⁸The only odd element in this quote is the presumption that speculation always consists in betting on a reversal in the direction of change in an exchange rate. Modern theories of speculative bubbles also emphasize the opposite possibility, that is, betting on continued movement in the same direction, which creates self-fulfilling expectations as speculators buy an appreciating currency or sell a depreciating one. However, newer models also treat the case of speculative attacks on pegged currencies that are perceived to be overvalued, which is betting on a change (devaluation). See Blecker (1999a) for a survey.

motives which govern the demand for currency for foreign lending are inextricably bound up with the motives which govern exchange speculation and the panic movement of funds" (Robinson, 1947, pp. 135-6).

Although most presentations of the elasticities approach focus on the effects of a change in a fixed exchange rate, Robinson focused on the effects of a change in a flexible exchange rate brought about by a shift in capital flows. "Suppose that...the amount which the inhabitants of the home country desire to lend abroad increases. At the ruling exchange rate the demand for foreign currency exceeds the supply and the exchange rate consequently falls" (Robinson, 1947, p. 138).¹⁹ She then traced through all the possible effects of this depreciation on the value of exports, the value of imports, and the overall trade balance, depending on the four crucial price elasticities (of supply and demand for both imports and exports), and considered all the relevant special cases (that is, when particular elasticities are zero or infinite).

Robinson also discussed the relevance of various elasticity configurations to countries with different economic structures and levels of development. For example, she noted that countries that specialized in primary commodities would be likely to have both inelastic supply and inelastic demand for their exports. On the other hand, she noted that "[a] country whose main exports are manufactured goods in which it has no monopoly will normally enjoy a fairly elastic foreign demand, combined, except in boom conditions, with a highly elastic home [export] supply" (Robinson, 1947, p. 145). These considerations foreshadow later structuralist approaches to North-South trade between industrialized and developing nations, as well as current debates about a "race to the bottom" among low-wage countries seeking to attract foreign investment in export-oriented manufactures, both of which are discussed further below.

Although Robinson is often cited merely as a contributor to the "elasticities approach" to the balance-of-payments effects of a currency devaluation, she did not confine her analysis to the elasticities of supply and demand for imports and exports of goods and services. She also discussed (although she did not formally model) both the domestic income effects of a devaluation, which may affect the demand for imports and supply of exports, and the possible repercussion effects of a change in a

¹⁹Note that Robinson always defines the "exchange rate" in the British manner, as the value of the home currency measured in foreign currency. By this definition, a fall in the exchange rate is a depreciation of the home currency.

country's trade balance on its foreign trading partners in what is now known as the "large country case."²⁰

In addition, Robinson analyzed the effects of a currency depreciation on interest obligations on foreign debts (or assets) and how those effects differ depending upon whether the debt is denominated in domestic or foreign currency. In words that seem prophetic in light of the many foreign debt crises of the past few decades, Robinson wrote:

From the point of view of a debtor country, interest payments fixed in terms of the creditor's currency represent an import which rises in value in proportion to a fall in the exchange rate, and if such obligations are considerable (and default is not contemplated) exchange depreciation may be extremely dangerous to the balance of trade [that is, current account.] (Robinson, 1947, p. 145)

Another unexpected element in a chapter famous for its contributions to the elasticities approach is a recognition of the macroeconomic equilibrium condition that a surplus on current account requires a country to have an excess of national saving over domestic investment.²¹ In simple algebra (although Robinson only stated this equation verbally)

$$X - M = S - I \quad (15.1)$$

where X is exports and M is imports, both broadly defined to include what Robinson called "invisibles" (services and income flows). Also, S is national saving (possibly including the budget surplus per the previous note) and I is domestic investment. Interestingly, Robinson did not accept the currently popular notion among some economists that causality in this relationship always runs from right to left, that is, from the difference between saving and investment ($S - I$) to the trade balance ($X - M$).²² She explicitly noted that causality could run either way and specifically stated that, "when the balance of trade increases, and home saving consequently increases, this in itself will lead to an increase in [net] foreign lending" (Robinson, 1947, p. 149).

²⁰See the exposition in Dornbusch (1980, pp. 33-49).

²¹Robinson did not consider the fiscal surplus or deficit in this discussion, presumably because of her focus on the operation of a private market economy. However, the fiscal balance can be understood as adding to (or subtracting from) the national saving term, at least in an accounting sense.

²²This idea was especially prominent in the "twin deficits" hypothesis of the 1980s, which maintained that the US trade deficit was mainly or solely caused by the federal government budget deficit. See Blecker (1992) and Feldstein (1992) for later retrospectives and critiques.

Robinson extensively discussed how a rise in the home country's interest rate would affect the balance of payments in an open economy with mobile capital. Anticipating the treatment of capital mobility in the later Mundell-Fleming and portfolio balance models, she argued that a rise in the home interest rate would increase net capital inflows (or reduce net outflows) and hence improve the capital account balance.²³ She argued that the higher interest rate could depress domestic investment, and would therefore be likely to reduce national income and employment, as well as reduce the demand for imports and improve the trade balance. She also noted that increased unemployment would tend to put downward pressure on money wages to some extent (how much would depend on labor market institutions), which under favorable elasticity conditions would tend to improve the trade balance similarly to a fall in the exchange rate. Thus, the overall effect of a rise in the home interest rate on the balance of payments is likely to be positive, although the improvement on the external accounts is likely to be purchased at the expense of higher domestic unemployment, a phenomenon often noted as a result of contemporary macro "stabilization" policies that include higher interest rates.²⁴

Finally, in an interesting anticipation of the modern notion of multiple equilibria in international financial markets (and the econometric rejection of most fundamentals-based exchange rate models), Robinson stated the following conclusion about exchange rates:

It is now obvious that there is no one rate of exchange which is the equilibrium rate corresponding to a given state of world demands and techniques. In any given situation there is an equilibrium rate corresponding to each rate of interest and level of effective demand, and any rate of exchange, within very wide limits, can be turned into the equilibrium rate by altering the rate of interest appropriately....The notion of *the* equilibrium exchange rate is a chimera. (Robinson, 1947, p. 154, emphasis in original)

Even more significantly, she recognized the centrality of expectations about the exchange rate as one of the variables that interacts with the actual exchange rate and other macroeconomic and monetary variables,

²³However, see Taylor (2004) for an argument that the conventional Mundell-Fleming and portfolio balance models are theoretically incapable of explaining exchange rates when all asset market relationships and income-expenditure flows are fully accounted for.

²⁴For critiques of orthodox stabilization policies see Taylor (1988), Blecker (1999a), and Stiglitz (2002), among many others.

using the metaphor of the economy as a bowl of balls which she borrowed from Alfred Marshall:

The rate of exchange, the rate of interest, the level of effective demand and the level of money wages react upon each other like the balls in Marshall's bowl, and no one is determined unless all the rest are given. [Footnote: One more ball in the bowl is represented by *expectations as to the future course of the exchange rate...*] (Robinson, 1947, pp. 154, 154, n. 1, emphasis added)

In the chapter on "Beggars-My-Neighbour Remedies for Unemployment," Robinson analyzed how individual countries sought to increase their employment at the expense of their trading partners by increasing their respective trade balances. She considered four means of increasing the trade balance, including currency depreciation (as discussed above) plus three other methods: wage reductions, export subsidies, and import protection (Robinson, 1947, pp. 156-70).²⁵

Although trade policies are usually studied for their effects on economic efficiency and income distribution under the assumption of full employment, Robinson dedicated herself to the task of understanding their effects on employment when the latter is also a variable. Most of this chapter is taken up with detailed consideration of how each of the four means of improving the trade balance operates to increase employment. Robinson noted, for example, the different elasticities conditions that are necessary for each type of policy to be effective, the different effects of each type of policy on a country's terms of trade, and the specific sectors that would be most likely to feel direct or indirect employment effects as a result of each policy. For example, the initial employment effects of a tariff or quota would be felt in import-competing or "rival" industries, while those of an export subsidy would be felt in export sectors. Throughout this analysis, Robinson shifted back and forth between what might be thought of as "micro" and "macro" levels of analysis, on the assumption that no automatic adjustment mechanism existed to eliminate the employment consequences of micro-level changes in industry output.²⁶ In this discussion, Robinson accepted that there was likely to be a loss of overall efficiency or productivity if a protectionist policy

²⁵Robinson abstracted from the fiscal consequences of trade subsidy and tax (tariff) policies, on the simplifying assumption that these are offset by other fiscal adjustments that leave the budget balance unaffected, but she noted the existence of specific employment effects in those sectors in which tariff revenues are spent.

²⁶Robinson's critique of theories of automatic adjustment mechanisms is discussed in section 4, below.

resulted in reduced international specialization. But Robinson's analysis considered the likely gains in employment that could offset such losses of efficiency, gains that were assumed away in the orthodox analysis by the unrealistic assumption of full employment.

Leaving the analytical details aside, what is most striking in this chapter is Robinson's astute discussion of the political economy of protectionism, subsidies, competitive devaluations, and wage cuts, when these policies are carried out in a situation of less-than-full employment. First and foremost, she argued that one of the most common arguments for not retaliating against other countries' protectionism, the claim that retaliation only hurts the retaliating country, does not necessarily hold when the consequence of not retaliating would be to accept a decline in home employment. She argued that retaliation may be justified from a national point of view when all countries are playing the "beggar-my-neighbour" game and any country that refuses to play along risks losing jobs. She noted, moreover, that a country has the choice of retaliating via other means besides tariffs or quotas (for example, through export subsidies, wage cuts, or a competitive devaluation) and acknowledged the negative global consequences if all countries retaliate simultaneously.

Second—following earlier suggestions of Keynes (1936a)—she observed that if one country increases its own employment by stimulating domestic investment, that country will also provide a demand stimulus to other countries via the induced increase in imports. If such a country seeks to limit the degree to which the benefits of its stimulus policy leak abroad via trade deficits, Robinson argued, that country could hardly be faulted for using protectionist devices to prevent its trade balance from worsening and thereby keeping more of the employment gains from its own stimulus at home (Robinson, 1947, p. 170).

In making these arguments about optimal policies from a national viewpoint, Robinson did not shed her internationalist perspective. She noted that, "From an un-nationalist point of view all [four means of improving the trade balance] are equally objectionable, since each is designed to benefit one nation at the expense of the rest" (Robinson, 1947, p. 170). She worried about the consequences of a global trade war—what she called a "game of beggar-my-neighbour...played between the nations"—because "not only is the efficiency of world production impaired by the sacrifice of international division of labour, but the total of world activity is likely to be reduced" (Robinson, 1947, pp. 156-7). In words that eerily appear to anticipate the current-day policies of the new European central bank, she argued that

owing to the apprehensive and cautious tradition which dominates the policy of monetary authorities, they are chronically more inclined to foster a rise in the rate of interest when the balance of trade is reduced than to permit a fall when it is increased. The beggar-my-neighbour game is therefore likely to be accompanied by a rise in the rate of interest for the world as a whole and consequently by a decline in world activity. (Robinson, 1947, p. 157)

What distinguished Robinson's Keynesian analysis from a more classically liberal internationalist view was not a lack of concern over the global repercussions of nationalist economic policies, but rather her willingness to consider what policies would be in a nation's interest in the real world when (as was likely) there was insufficient international policy coordination to maintain global full employment. Rather than advocating trade policies that would make sense only under the assumption of full employment, Robinson concerned herself with what individual nations could do to better their own circumstances in a world in which neither market forces nor public policy succeeded in achieving full employment.

Robinson clearly shared Keynes's view that the world as a whole would be better off if all countries used coordinated expansions of their domestic economies to push the global economy as a whole closer to the full-employment frontier, rather than each one seeking to maintain its own employment at the expense of the others. If her analysis was more concerned with the latter situation, it is because she thought that the latter was a much more likely situation to arise in the real world.

4. CRITIQUE OF "PURE" TRADE THEORY

From the time of Ricardo (1821) and Marshall (1879), orthodox trade theory assumed the existence of a long-run equilibrium with full employment and balanced trade, in which global resources would be most efficiently allocated if there were no restrictions on international trade flows. Robinson provided a critique of the theoretical basis for assuming an automatic process of adjustment toward such an equilibrium state in a 1946-47 article ironically titled (after Marshall's book) "The Pure Theory of International Trade" (Robinson, 1951a, pp. 182-205).²⁷ She

²⁷This chapter cites Robinson's shorter articles, essays, and lectures by reference to her five-volume *Collected Economic Papers*, which are listed by year of publication of each volume.

also discussed the consequences for trade theory if such an adjustment mechanism did not operate.²⁸

Robinson began by considering the adjustment process assuming that capital flows were non-existent; later, she considered the adjustment process assuming that capital flows were allowed (see below). In the first case, she began with the classical specie-flow mechanism, which assumes a “crude quantity theory of money:” a country with a trade surplus would have a net inflow of gold, which (in logical order of cause and effect) would increase the money supply, raise the price level, reduce the country’s competitiveness, and bring trade back into balance. As a Keynesian, however, Robinson quickly rejected such a direct causal connection between the money supply and the price level, and instead considered mechanisms that involved adjustments in aggregate demand and money wages.

Again assuming the absence of capital flows, a country with a trade surplus would have net inflows of monetary assets (she assumed a gold standard for simplicity).²⁹ The resultant increase in the money supply might be thought to cause a decline in interest rates, which in turn could boost domestic investment spending and thereby increase aggregate demand. Then, several variations are possible. For example, if prices were flexible, higher aggregate demand would directly raise prices; alternatively, demand for labor could rise thereby putting upward pressure on money wages, which in turn would lead to higher prices. But Robinson questioned the efficacy of an adjustment mechanism resting on a causal link between interest rates and investment spending, for two reasons. First, she argued that monetary inflows would mainly affect the “bank rate” (that is, short-term, money market rates), while having little effect on longer-term bond or loan rates that have more impact on business

²⁸This article also contains other ideas which can only be mentioned more briefly here. Especially, Robinson argued that—even on the classical assumptions of pure trade theory—free trade is not the optimal policy for an individual country (even though it is optimal for the world as a whole) because an import tariff (or export tax) can be used to turn the terms of trade in the country’s favor by enough to outweigh the efficiency losses. She recognized that this argument only applies to countries that are large enough to have an appreciable impact on world prices and which face inelastic foreign demand for their exports. She did not seem to realize, however, that these conditions are quite restrictive, and may limit the “optimal tariff” argument for protection to rather special cases.

²⁹Robinson stated this analysis in terms of the adjustment process for a deficit country, but it is restated here in terms of adjustment in a surplus country for expository purposes. Asymmetries between deficit and surplus countries are discussed below where relevant to the argument.

fixed investment. Second, she argued that investment was likely to be relatively inelastic with respect to interest rates anyway.³⁰

This critique then led Robinson (1951a, p. 185) to “short-circuit the whole argument about interest rates” and focus instead on an adjustment mechanism involving employment and wages alone. Ignoring monetary channels altogether, Robinson argued that a trade surplus would have a directly expansionary effect on employment, and hence (unless there was a lot of slack in the labor market) would tend to cause money wages to rise.³¹ As this would increase marginal costs, in a competitive economy the price level would also increase, thus tending to reduce the nation’s trade surplus assuming that favorable elasticity conditions prevailed. Robinson’s point was not to endorse the realism of this adjustment mechanism, but rather to argue that it was the most theoretically valid basis for assuming a tendency toward balanced trade in the absence of capital flows.³² She also pointed out that, for a poor country with a trade deficit, the decrease in wages required to correct the deficit could entail a massive increase in poverty: “the classical doctrine does not exclude starvation from the mechanism by which equilibrium tends to be established” (Robinson, 1951a, p. 189).

Having established what she thought was the most theoretically plausible adjustment mechanism, Robinson then began to trace out what would happen if that mechanism failed to operate. In an analysis of tremendous importance to the debate about “globalization” today, Robinson focused on the following situation. Suppose that a country with initially high unemployment (possibly “disguised” unemployment in a less developed country) was able to increase its productivity in its export sectors and thereby become more externally competitive. Assuming that the high unemployment prevented wages from rising, that country would become a “cheap labour country” in the sense of having *relatively low unit labor costs*; such a country could then obtain a persistent trade surplus and would take jobs away from other countries.

³⁰This second point has been confirmed in numerous empirical studies of investment behavior. See, for example, Fazzari *et al.* (1988), Fazzari (1993), Bosworth (1993), and Chirinko (1993).

³¹Interestingly, in the course of making this argument, Robinson hypothesized the existence of an inverse relationship between the rate of money wage increase and the rate of unemployment, which is clearly recognizable as a theoretical statement of what was later called the Phillips Curve.

³²Robinson (1951a, p. 186) expressly stated that this analysis was based “on the assumption of perfect competition,” but the same result would also occur in an imperfectly competitive environment.

Robinson noted that, in principle, such a country could have either high or low *wages*; what mattered for being a cheap labor country in her sense was having wages that were low *relative* to productivity, not absolutely low wages. She also argued that this situation could prevail even if wages were not absolutely rigid; all that was required was that wage increases lagged behind productivity increases. Expressing her belief that “the tendency to establish the equilibrium wage rates never works fast enough,” she concluded that “in reality disequilibrium is the normal rule” (Robinson, 1951a, p. 194). And in the normal disequilibrium state, trade would be governed by absolute advantages in unit labor costs (wages adjusted for productivity), not by comparative advantages based on relative productivities alone.

Robinson then investigated what kind of balance-of-payments adjustment mechanism would operate if capital flows were permitted. To facilitate the argument, she assumed a hypothetical initial equilibrium in which money wages in all countries were consistent with full employment, and interest rates (which were assumed to be equalized by capital mobility) were at the right level to make net capital flows exactly equal to the trade imbalance in every country. In other words, trade was not necessarily balanced, but the “overall” balance of payments was in equilibrium in the sense that (private or “unofficial”) capital account surpluses (deficits) exactly matched current account deficits (surpluses), with no net flows of official reserve assets (gold or currency reserves). Starting from this idealized equilibrium position, she then supposed that one country “Alpha” had an exogenous increase in its investment opportunities such that its investment demand function shifted upward.

Now, several adjustment stories were possible. First, if Alpha was a large country in the global capital market, the world interest rate would rise, thus at least partially diminishing the increase in home investment (and also reducing investment in other countries), which would help to restore equilibrium between global saving and investment. Also, the stimulus to employment at home would tend to push up money wages, which would reduce the competitiveness of home products and lower the trade balance in order to accommodate the (partially) increased home investment via a larger current account deficit (or smaller surplus) matched by an equal and offsetting change in the capital account. Alternatively, if money wages were rigid but the exchange rate was flexible, the same result could be achieved through an appreciation of Alpha’s currency induced by the increased capital inflows responding to the improved investment opportunities in that country.

Through these and other adjustments, Alpha can obtain net capital inflows sufficient to finance the increase in the equilibrium level of domestic investment (which will be smaller than the initial shift in the investment demand function if there is partial crowding-out due to an interest rate increase). As long as enough net capital inflows are thus obtained, international flows of official monetary reserves (gold or hard currencies) “do not have very much work to do” (Robinson, 1951a, p. 203). Although such an idealized adjustment mechanism restores overall balance-of-payments equilibrium, it does not generally maintain balanced trade. Rather, this adjustment mechanism creates an increase in the capital account balance that exactly offsets (and finances) the decrease in the current account balance that results from the rise in domestic investment.

Although Robinson did not reach this conclusion, if a country has a persistent trade deficit financed by net capital inflows, that country must be importing some goods and services that would not be imported in a free trade equilibrium consistent with balanced trade. In other words, the adjustment process with capital mobility allows a country with a trade deficit to have an absolute disadvantage in (and import) some goods and services in which it has a static comparative advantage. Such a pattern of trade appears to violate standard norms of economic efficiency: one cannot presume that a deficit country is only importing goods in which it has a true comparative disadvantage.³³

The neoclassical response to this point has been to shift the ground of the debate to the notion of international capital flows following a pattern of intertemporal comparative advantage. Thus, using the example discussed above, the enhanced attractiveness of Alpha as a location for investment can be interpreted as a sign that this country has a comparative advantage in future production. Alpha’s capital inflows allow it to borrow against its future income from increased future production, thereby allowing it to sustain a greater level of consumption in the present than it could maintain if it had to finance the higher level of investment through domestic saving alone. Thus, the net increase in Alpha’s trade deficit represents an exchange of future consumption for present consumption, which can be regarded as *intertemporally* efficient.

Robinson would certainly have been critical of such a view, especially given the intrinsic uncertainties about whether currently perceived investment opportunities ultimately turn out to be highly productive assets in the future. Following Keynes’ notions of the animal spirits of

³³This implication is discussed at greater length in Blecker (2005).

entrepreneurs and his “beauty contest” metaphor for investors’ expectations, she would likely have argued that market perceptions of prospects for future productivity and profitability could easily be mistaken. (Examples such as the Thai real estate bubble and US internet bubble of the 1990s, both of which were used to justify large capital inflows, evidently come to mind.) One could also add that the allocation of resources resulting from capital flows *cum* imbalanced trade in the present is still inefficient based on the criterion of static comparative advantage as defined by the assumption of balanced trade in traditional trade models. In effect, this raises an issue of whether the (uncertain) gains from a more efficient intertemporal allocation of consumption are (expected to be) large enough to offset the (definite) losses from a less efficient static allocation of resources, an issue that to this author’s knowledge has not been adequately addressed.

Although Robinson did not delve into all these issues, she did note that the adjustment mechanism described above assumes that full employment of labor is maintained throughout the adjustment process. In her words, “the whole analysis is based upon the arbitrary assumption that world full employment is always preserved. When that assumption is not fulfilled there is no one pattern of trade which can be described as equilibrium” (Robinson, 1951a, p. 204). In the presence of global unemployment, we are back in a world in which all countries have incentives to follow “beggar-my-neighbour” policies for increasing home employment at the expense of their trading partners, as discussed earlier. Especially, if surplus countries have high unemployment, their wages may not rise sufficiently (or only with very long lags), thus allowing them to remain “cheap labour countries” for a prolonged period of time.

Also, Robinson argued that if deficit countries have high unemployment, they may not be attractive locations for foreign investment. Although she did not make clear her reasons for this argument, one possible rationalization could be that a country with a large current account deficit is considered to be a risky place to invest if it is accumulating large international debts or inviting a speculative attack on an overvalued currency.³⁴ In such a situation, reserve flows (gold or hard currencies) would have “much work to do,” and the country’s financial position would be

³⁴ Another possible rationalization could be that the foreign investment is targeted to the domestic market (such as under import-substitution policies), and the domestic market is depressed because of the trade deficit. However, there are other possible scenarios in which a trade deficit would not necessarily dissuade foreign investment from entering a country. For example, export-oriented foreign investment (whether targeted toward primary commodities or manufactured goods) would be less dependent on domestic market conditions (although it might be sensitive to the exchange

likely to deteriorate (possibly ending in a currency crisis and/or debt default). Anticipating what actually occurred after global capital markets were liberalized starting in the 1970s (see Eatwell and Taylor 2000, 2002), she concluded that in the presence of capital mobility “balances of payments may remain out of equilibrium for long periods (indeed, the whole international monetary system may be disrupted before they are restored) and monetary strains further bedevil the confusion of trade” (Robinson, 1951a, p. 205).

5. LATER CRITIQUES OF FREE TRADE

After a hiatus of nearly two decades during which she was preoccupied with growth theory and the capital controversy, Robinson wrote a few pithy essays on international economics in the mid-1960s and early 1970s. Because they incorporate many of the same points raised in her earlier writings, this section will focus on what was new and distinctive in these later essays. In addition, this section will briefly address the implications for trade theory of some of her later critical writings on the methodology of equilibrium analysis.

Robinson’s *Inaugural Lecture* at Cambridge on October 15, 1965 presented her concept of “the new mercantilism” (Robinson, 1973a, pp. 1-13). Updating her earlier argument about “beggar-my-neighbour remedies for unemployment,” Robinson argued that the incentives to use employment-shifting policies such as competitive devaluations or export subsidies still existed in the post-war, post-depression economy:

Ever since the war, partly by good luck, partly by good management and partly by the arms race, overall effective demand has been kept from serious relapses. Nowadays governments are concerned not just to maintain employment, but to make national income grow. Nevertheless, *the capitalist world is still always somewhat of a buyer’s market, in the sense that capacity to produce exceeds what can be sold at a profitable price....The chronic condition for industrial enterprise is to be looking round anxiously for prospects of sales.* Since the total market does not grow fast enough to make room for all, each government feels it a worthy and commendable aim to increase its own share in world activity for the benefit of its own people.

rate). Also, as noted earlier, a trade deficit can *result* from an investment boom, including large foreign investment inflows.

This is the new mercantilism....Every nation wants to have a surplus in its balance of trade. This is a game where the total scores add up to zero. Some can win only if others lose. (Robinson, 1973a, pp. 4-5, emphasis added)

The zero-sum nature of the game that Robinson describes stems from her assumption that the world as a whole lacks full employment or full realization of its growth potential due to demand-side constraints (even if some individual countries have excess demand at any point in time).

Robinson was aware that both multilateral reductions in trade barriers and regional efforts at economic integration had limited the ability of individual nations to use explicitly protectionist devices, such as tariffs and quotas, in the post-war era. Nevertheless, she believed that these reductions in trade barriers did not prevent the new mercantilism from operating, presumably because they left the door open to other means of promoting trade surpluses such as export subsidies, exchange rate manipulation, and wage repression. Moreover, protectionism remained stronger in some areas (for example, agriculture) than others, and was still available on a contingent or administered basis in other sectors (for example, manufacturing) under the "escape clause" (safeguard) and "unfair trade" (antidumping and countervailing duty) provisions of post-war trade laws and agreements.

Also, even though the formation of regional trade blocs limits protectionist policies between the member nations, Robinson believed that such trading blocs could foster mercantilist effects relative to the rest of the world:

a large nation, with a large internal market within the orbit of its political control, has important economic advantages over a small one....A group of nations that can succeed in agreeing to behave as if, for certain purposes, they were one, thus scores a benefit for all of them in competition with the outside world (Robinson, 1973a, pp. 5-6).

Presumably, she had in mind the European Economic Community (EEC) and European Free Trade Area (EFTA) of the 1960s, but her words would apply with equal force to new or enlarged regional alignments such as the European Union (EU) and North American Free Trade Agreement (NAFTA) of the 1990s. Although promoted as trade liberalizing initiatives, such regional blocs are often aimed at (or may have the effect of) boosting the economies of member nations at the expense of nonmembers, such as by diverting trade away from the latter. In addition, a trading bloc can be used to make regional firms more globally

competitive, especially if the bloc uses its larger internal market to foster increased economies of scale.

Expressing skepticism about the free-trade orientation of post-war economic policy, Robinson stated, "It seems after all that the free-trade doctrine is just a more subtle form of mercantilism. It is believed only by those who gain an advantage from it" (Robinson, 1973a, p. 12). What she meant by this is clear from the context of the preceding sentences: she was referring to the tendency of the older industrial powers (she had England in mind, but the same argument would apply to the United States and other countries today) to find ways of effectively blocking imports from the newly industrializing countries when such imports threaten established domestic industries. Robinson points out the hypocrisy of nations that promote free trade for others while selectively closing their own markets. This critique resonates today, most notably with respect to examples such as the European Common Agricultural Policy and the United States' frequent protection of its steel industry.

In this lecture, Robinson also raised the issue of a deflationary bias in the global economy as a whole that is introduced by the desire of many countries to hoard international currency reserves. In words that were probably intended for West Germany and Japan in the 1960s, and that could be applied to China, Japan, and other East Asian countries today, she wrote

The free-traders used to mock at the old mercantilists for thinking that a country could grow rich by amassing treasure. The new mercantilists believe that it is not necessarily foolish to prefer to acquire sterile money rather than useful goods or profitable assets. (Robinson, 1973a, p. 7)

By accumulating large reserves, surplus countries prevent their currencies from appreciating and thereby perpetuate their surpluses. Such countries also help to insulate themselves against speculative attacks and currency crises. But if the major surplus countries accumulate large stocks of reserves, rather than spending the hoarded funds on imports or investing those funds abroad, the very countries that can best afford to give demand stimulus to the rest of the world fail to do so.³⁵ Hence, she argued, there is "a deflationary kink in a financial system in which every country likes to gain reserves and hates to lose them" (Robinson, 1973a, p. 7).

³⁵This point has been emphasized more recently by Davidson (1999).

Robinson again reiterated her view that one could not presume the optimality of free trade policies from a national perspective in the absence of full employment. As she wrote

since full employment is not guaranteed, merely to agree to prohibit beggar-my-neighbour devices for checking imports and pushing exports would not be to the good of all. The same rule would inhibit also constructive remedies for unemployment from being undertaken by individual countries. When one country gives a boost to the world as a whole by increasing its home activity, its imports are liable to rise, while, until the rest of the world follows suit, the market for its exports is not better than before. In short it tends to develop a trade deficit, which it may not be able to finance. To be able to benefit the world by increasing employment at home, it must be free to reduce its *propensity* to import, so that its total *amount* of imports does not rise too fast. (Robinson, 1973a, p. 4, emphasis in original)

Thus, if open markets operate to discourage countries from adopting expansionary domestic macro policies that would have positive “repercussion effects” on other countries’ economies, then free trade can effectively diminish output and employment both at home and abroad. She was especially concerned that countries not be inhibited from adopting domestic stimulus policies for fear of worsening their trade deficits: “Of all bad-neighbourly conduct among trading nations, the worst is to go into a slump, and expedients necessary to prevent it have to be excused” (Robinson, 1973a, p. 4).

Robinson’s 1970 article on “The Need for a Reconsideration of the Theory of International Trade” (Robinson, 1973a, pp. 14-24) and her 1974 lecture on “Reflections on the Theory of International Trade” (Robinson, 1979a, pp. 130-45) contain some of her few explicit discussions of the Heckscher-Ohlin (H-O) theory of trade, especially as developed by her nemesis from the Cambridge capital controversies, Paul Samuelson. After discussing the earlier trade theories of Ricardo and Marshall, she writes,

Samuelson’s version of the Heckscher-Ohlin theory is still more degenerate. In this model the production functions are everywhere the same: countries differ only in respect to their “factor endowments”. It was on this basis that Samuelson produced the theorem that, in equilibrium, with two factors,

two countries and two commodities, either at least one country must be [completely] specialized, or, if both commodities are produced in both countries, the “factor prices” must be the same in both countries (Robinson, 1973a, pp. 18-19).

One part of this critique has proved to be correct: the assumption of identical technology (production functions) in all countries has been shown to be one of the main sources of the empirical failure of H-O predictions, including Samuelson’s factor price equalization theorem as well as the core H-O theorem on the direction of trade.³⁶ Ricardo’s original view that international differences in technological capabilities were an important part of the explanation of trade patterns is closer to the truth, even today.

Yet, I think Robinson was too dismissive of the significance of Samuelson’s theorems about the impact of trade on income distribution. Of course, the world is very far from complete factor price equalization for various well-known reasons (including trade barriers, transportation costs, complete specialization, and increasing returns, as well as technological differences). Nevertheless, the Stolper-Samuelson (1941) theorem, which requires far less stringent assumptions than factor price equalization, can give useful insights into the direction of the distributional effects of trade. Stated in its most general (and weakest) form, Stolper-Samuelson says that owners of the factor of production that is used relatively intensively in the production of import-competing goods lose absolutely from free trade (assuming that free trade lowers the prices of those goods).³⁷

At the theoretical level, this theorem has the significant (and, for advocates of free trade, deeply disconcerting) implication that a move toward free trade is not a Pareto improvement. Some gain only at the expense of others, and the losers may possibly be the poorer or more populous class. In response to this discomfort, the compensation principle holds that free trade is a *potential* Pareto improvement in the sense that the winners could possibly compensate the losers in an incentive-compatible fashion (for example, a lump-sum transfer) so that no one

³⁶See Trefler (1993, 1995).

³⁷Note that this may not necessarily be the relatively scarce factor in the country, if certain H-O assumptions are violated and the pattern of trade does not follow the H-O prediction. For example, in the presence of strong international differences in preferences or technology, a country may import the good that is relatively intensive in its relatively abundant factor. In this situation, the abundant factor would be the loser from free trade.

would be worse off (see, for example, Samuelson, 1962a). But in the absence of such compensation actually being paid, the Stolper-Samuelson theorem clearly implies that there are social classes who have a rational self-interest in supporting protectionism even in a long-run, free-trade equilibrium with full employment and balanced trade.

Of course, as Robinson pointed out, using the factor of production “capital” in the H-O model is problematic for the reason established in the Cambridge capital critique: that is, the value aggregate of heterogeneous capital goods cannot be expected to behave like the physical quantity of a homogeneous factor of production (Robinson, 1979a, p. 137).³⁸ In particular, the presumption of an inverse relationship between the quantity of capital and its rate of return (so-called “cost of capital” or factor price) does not generally hold when the quantity of capital is measured by the value of an aggregated stock of heterogeneous, produced goods, instead of the physical units of a single, homogeneous, exogenously endowed capital good.³⁹

Nevertheless, as Robinson acknowledged, Samuelson (1949) originally applied his factor price equalization theorem to two non-produced factors of production, land and labor. More recently, empirical trade economists have moved from the $2 \times 2 \times 2$ (two-factor, two-commodity, two-country) version of H-O popularized by Samuelson, toward the multi-factor, multi-commodity, multi-country version.⁴⁰ In modern empirical implementations, although “capital” is usually retained as one of the factor inputs, there are often ten or more other, non-produced factors, such as different skill grades of labor and different types of natural resources. Thus, in effect, the role of capital in the H-O model has been downgraded, and to the extent that the model has any predictive power at all it

³⁸Robinson also noted that the “Leontief paradox” in empirical tests of H-O (i.e., the finding that the United States was specialized in labor-intensive goods in spite of its relative abundance of capital in the late 1940s and early 1950s) is not a paradox at all if one does not believe that a large stock of capital necessarily implies a low cost of capital (Robinson, 1979a, p. 64).

³⁹This conjecture of Robinson was later verified by Metcalfe and Steedman (1973) and Mainwaring (1976), who demonstrated that the key theorems of the H-O model (including both the price and quantity versions of H-O and factor price equalization) do not generally hold in models in which the two factors of production are labor and aggregated heterogeneous capital goods. Needless to say, mainstream economists have ignored these implications of the Cambridge capital critique for the H-O model, as in other areas such as growth theory.

⁴⁰This model is usually attributed to Vanek (1963). See also, Bowen *et al.* (1987) and Treffer (1995) for expositions of what has become known as the HOV model (Heckscher-Ohlin-Vanek).

derives mainly from the relative supplies of other factors besides “capital.”⁴¹ This means that the distributional theorems in the H-O model are now more often applied to the effects of trade on the wages of different segments of the labor force, rather than to the overall capital-labor distribution in which the logical validity of those theorems is suspect.⁴² For example, recent empirical applications of Stolper-Samuelson have tested for negative effects of imports on the wages of relatively more- and less-skilled workers in the US economy.⁴³

Robinson’s lack of appreciation for the Stolper-Samuelson theorem and other subtleties of modern trade theory led her to some overstated criticisms of mainstream trade theory for its allegedly harmonious depiction of international trade relations. For example, in her 1965 *Inaugural Lecture*, she wrote that “The beautiful harmony of the free-trade model is far indeed to seek” (Robinson, 1973a, p. 5). But “the free trade model” is replete with recognitions of the potentially conflictive nature of trade relations. As noted above, through the Stolper-Samuelson theorem (and its cousin, the Haberler Theorem in the specific factors model), trade theory recognizes that some social classes (“factor owners”) are likely to lose absolutely from trade liberalization and have a rational self-interest in supporting protectionism. Moreover, all trade models recognize conflict over the international distribution of the gains from trade: even if all countries gain from trade, the countries with more favorable terms of trade obtain a relatively larger share of those gains. And, as discussed earlier (and recognized by Robinson, 1951a, pp. 194-8), orthodox trade theory implies that large countries can benefit from imposing tariffs or

⁴¹Steedman and Metcalfe (1977) showed that the Cambridge critique of neoclassical capital theory is less destructive of H-O predictions about trade when the two primary factors of production are land and labor—even if heterogeneous intermediate goods (with a positive rate of profit on their stocks) are taken into account. Under other H-O assumptions, and assuming an equal (positive) rate of profit in both countries, the quantity version of H-O still holds: each country exports the good that is relatively intensive in its physically more abundant factor, in spite of multiple equilibria and other anomalies. Moreover, factor price equalization (in rents and wages) still holds, and Stolper-Samuelson holds in its weak form (free trade hurts whichever primary factor is used relatively intensively in the import-competing sector). However, the price version of H-O breaks down, because the relationship between the factor-price ratio and factor intensities (land-labor ratios) is not monotonic.

⁴²One should also note that, although profit rates are not exactly equalized around the world, they are relatively closer than other factor returns, such as real wages. Steedman and Metcalfe’s (1977) results, discussed in note 40 above, imply that H-O predictions about non-produced factors of production (that is, factors other than capital) may not be far off the mark if profit rates differ by relatively small amounts across countries.

⁴³See, for example, Sachs and Shatz (1998) and Leamer (1998; 2000).

other restrictions that turn the terms of trade in their favor at the expense of other countries and global welfare.

Thus her statement that “the case [for free trade] was made out by assuming away *all* the difficulties and *all* the aims that in reality give rise to protectionist policies” (Robinson, 1973a, p. 15, emphasis added) is not entirely accurate. Whatever its other problems, free trade theory has long recognized that certain well-defined interests have to be sacrificed in order to obtain the theoretically greater benefits to the world as a whole from eliminating all trade restrictions. Large countries, owners of scarce factors (or any factors used relatively intensively in import-competing goods), and owners of “specific” (immobile) factors used in import-competing industries are identified as potential losers from pure free trade. Although crude versions of free trade ideology may ignore such qualifications and pretend that free trade benefits all, serious scholars of trade theory since the time of Ricardo (who argued that English landlords would be hurt by free trade in corn) have long recognized many of the “difficulties” and “aims” that prevent universal acceptance of free trade. Indeed, a large literature on the political economy of protectionism is built upon this recognition.⁴⁴ Where Robinson was on stronger ground was in her insistence on analyzing the effects of trade policies (free or otherwise) in the absence of full employment. That analysis, as discussed earlier, brings to the fore additional “difficulties” and “aims” that are indeed ignored by mainstream trade theory in its analysis of the gains and losses from alternative trade policies.

In the end, Robinson’s attitude toward the orthodox doctrine of free trade (with its twin assumptions of full employment and balanced trade) was a lot like what Mahatma Gandhi is reputed to have said when asked what he thought of Western civilization: it would be a good idea. To Robinson, the free trade model was a beautiful thing on its own assumptions, but those assumptions did not correspond to the real world in which trade policies had to be formulated. Clearly, she would have preferred that the nations of the world cooperate in making the underlying assumptions of the theory come true: maintain a high level of aggregate demand consistent with full employment, and manage international finances so as to prevent large trade imbalances from emerging. In such a world, she might have been willing to entertain a debate over the merits of opening all national markets to free trade; otherwise, she thought it more prudent first to solve the more pressing problems of stimulating employment and growth.

⁴⁴See Feenstra (2004, pp. 300-37) for an up-to-date survey and exposition.

6. TRADE THEORY AFTER ROBINSON

It would surely be an exaggeration to claim that most of the new trade theories of the last few decades were invented directly in response to Robinson’s critique of orthodox trade theory. Nevertheless, there are clearly new approaches to trade theory since the 1970s that to a greater or lesser extent were influenced by the Cambridge school of economics more broadly defined, including not only Robinson but also her contemporaries Piero Sraffa, Nicholas Kaldor, Luigi Pasinetti, and (although he never held a post at Cambridge) Michal Kalecki. Also, Robinson expressed a widespread methodological dissatisfaction with the traditional comparative static models of trade in the mid-twentieth century that did indeed motivate many of the newer models, both mainstream and heterodox, beginning in the 1970s. Although space precludes a full discussion of these now vast literatures, a brief survey will hopefully give a sense of how the field of international economics has evolved in areas of Robinson’s concerns.

An obvious starting point is the literature that has revived and extended Ricardo’s original approach to trade theory, which Robinson always took as a starting point in her analyses of trade theory. The neo-Ricardian trade theory literature itself contains several distinct strands. One strand consists of the application of the Cambridge critique of neo-classical capital theory to the use of the concept of an aggregate capital stock as a “factor of production” in the H-O trade model, as discussed in the previous section. In addition to this critical perspective, economists using this approach have also developed positive models of trade that focus on international differences in technology (input-output coefficients) as the underlying determinants of trade, and that also allow for capital-theoretic paradoxes that can give rise to “wrong” price signals for international specialization in a free-trade equilibrium (see Steedman, 1979a; 1979b).⁴⁵ Unlike the textbook “Ricardian” trade model in which labor is the only input, these models include produced means of production with positive rates of profit that make autarky relative prices

⁴⁵For a counter-critique see Smith (1979), who argues that Steedman and Metcalfe’s comparisons across steady states (that is, free trade versus autarky equilibria) are inappropriate, and that if one compares the intertemporal consumption paths with free trade and autarky one finds that the free-trade paths are never inferior (in the sense that the present value of future consumption is at least as great along the free-trade paths as on the autarky path). As in static models, there are losers from free trade (certain generations are worse off), but the free trade path is a potential Pareto improvement in the sense that suitable compensation of the losers would ensure that no one is worse off.

diverge from relative labor values. This approach probably owes more to the influence of Sraffa (1960), however, than to Robinson *per se*.

Another variant of a neo-Ricardian approach is the work of Pasinetti (1981; 1993).⁴⁶ Pasinetti short-circuits the problems of measuring the aggregate capital stock by utilizing vertically hyperintegrated labor coefficients to measure total direct and indirect labor inputs into production and to incorporate technological progress into a dynamic analysis of trade. Pasinetti shows how differences in rates of technological progress across countries and industries lead to changes in the terms of trade that redistribute some of the gains from technological progress between nations. He mainly emphasizes, however, that the dynamic gains from “technological learning” (that is, less developed countries converging to the advanced countries in productivity) are likely to far exceed the static (allocative) gains from trade, and that most of the gains from technological progress remain at home absent large changes in the terms of trade.

Yet another neo-Ricardian approach is one that has returned to Ricardo’s original focus on the effects of trade on the rates of profit and capital accumulation. Ricardo (1821) devoted only about two pages of his chapter on foreign trade to the famous example of England and Portugal’s respective comparative advantages in cloth and wine. As Robinson reminded us, Ricardo’s main emphasis was on demonstrating that abolishing the Corn Laws and allowing unrestricted imports of cheap food into England would lower labor costs and thereby increase the rate of profit, stimulate the accumulation of capital, and prevent the advent of the stationary state due to diminishing returns in agriculture.⁴⁷ In this vein, Steedman and Metcalfe (1973) showed that Ricardo’s argument that trade increases the rate of profit if and only if a country imports goods consumed by workers (wage-goods) remains valid in generalized Ricardian models with positive profits on capital and different capital intensities across sectors.

Maneschi (1983) used a model with a manufacturing sector characterized by constant returns to scale and an agricultural sector characterized by diminishing marginal productivity of labor due to a fixed land supply to validate Ricardo’s original idea that free trade would increase the rates

of profit and growth and diminish rents in the country that specialized in manufactures, and would do the opposite in the country that specialized in agriculture (assuming that workers consume the agricultural product).⁴⁸ Robinson referred to such negative implications of Ricardo’s trade model for the agricultural countries when she wrote, with reference to the England-Portugal example,

When accumulation is brought into the story, it is evident that Portugal is not going to benefit from free trade. Investment in expanding manufactures leads to technical advance, learning by doing, specialization of industries and accelerating accumulation, while investment in wine runs up a blind alley into stagnation. (Robinson, 1979a, pp. 134-5).

Another type of neo-Ricardian contribution has revived and formalized Robinson’s idea of international competition based on “cheap labour” (that is, low wages *relative* to productivity), as discussed earlier. Brewer (1985) showed that, in a Ricardian trade model with positive profits, trade will follow absolute competitive advantages (that is, production of each commodity will take place in the country with the lowest unit labor costs) if capital is mobile and real wages are rigid. However, either complete immobility of capital or perfect flexibility of real wages leads to trade based on comparative labor costs. This analysis has obvious relevance to contemporary discussions of “globalization,” including concepts such as footloose capital, low-wage competition, gender discrimination in export industries, and a “race to the bottom.”⁴⁹

In the literature on North-South trade, the “structuralist” models of Taylor (1981; 1983), the “alternative closures” models of Dutt (1988; 1990), and related models owe more to Robinson’s work on growth theory than to her writings on trade theory.⁵⁰ In these models, the North is generally represented as having a demand-led economy in which growth is constrained by the level of desired investment, while the South is often represented as a classical-Marxian economy in which output is constrained by the supply of capital and investment is determined by available saving. The specification of the North in these models derives

⁴⁸Maneschi (1983, p. 79, n. 24) explicitly acknowledged Robinson’s 1974 essay, “Reflections on the Theory of International Trade” (Robinson, 1979a, pp. 130-45), as supporting his interpretation of Ricardo’s trade model. See also Maneschi (1992) for further discussion and Burgstaller (1985) for a related modeling approach.

⁴⁹For a variety of perspectives on these issues see Blecker (1996a), Blecker and Seguino (2002), Burtless *et al.* (1998), Feenstra (1998), Golub (2000), Larudee and Koechlin (1999), Milberg (1994, 1997), Palley (1998), and Rodrik (1997).

⁵⁰Other related models include those of Darity (1990) and Blecker (1996b).

⁴⁶See also Pasinetti’s chapter in this volume.

⁴⁷See Robinson (1979a, p. 134). Ricardo (1821) also devoted a large portion of his chapter on foreign trade to the issue of balance of payments adjustment, in an effort to justify his assumption of balanced trade in his theory of comparative advantage. As noted earlier, this was also a major concern of Robinson’s, although she rejected Ricardo’s arguments on this issue.

in large part from the neo-Keynesian growth model in Robinson (1962a), as developed and extended by (among others) Harris (1978a), Marglin (1984), and Dutt (1987; 1990).⁵¹

It is difficult to disentangle the exact intellectual lineage of these structuralist North-South trade models, some of which owe much to Kalecki (1954), Steindl (1952), and Baran (1956) as well as to Robinson. Given the many reciprocal influences between some of these authors, it is probably not possible to separate their genetically intertwined contributions.⁵² Some common themes in these structuralist models, which would be very congenial to Robinson, are how the Southern economies are asymmetrically dependent on aggregate demand conditions in the North and how increases in Northern profit mark-up rates can lead to increasing inequality between the North and South.

In the latter part of her career, Robinson became highly critical of all equilibrium-based methodologies, including neo-Ricardian models of steady-state growth as well as neoclassical models of general intertemporal equilibrium. In her essay on "History Versus Equilibrium," she wrote, "The long wrangle about 'measuring capital' has been a great deal of fuss over a secondary question. The real source of trouble is the confusion between comparisons of equilibrium positions and the history of a process of accumulation" (Robinson, 1979a, p. 57). Although she was not explicitly concerned with international trade in this essay, she posed a question that has profound implications for trade theory: "do the firms [in an economy] go meekly crawling down a pre-existing production function, or do they introduce new techniques that raise output per unit of investment as well as output per man?" (Robinson, 1979a, p. 57).

The picture of how trade affects a country in traditional (comparative advantage) trade models, Ricardian as well as neoclassical, is precisely that firms move passively along pre-existing production functions to more efficient points in a free-trade equilibrium, as compared with an

⁵¹For discussion and extensions of Robinson's approach to growth theory see the chapters by Bhaduri, Dutt, Harris, Pasinetti, and Skott in this volume.

⁵²Although Kalecki interacted with both Robinson and Steindl, this author is not aware of any reciprocal influence between Robinson and Steindl. Kalecki's early work from the 1930s on how a trade surplus could increase a nation's realized profits at the expense of its trading partners ran on a parallel track to Robinson's early work from the same period on how trade surpluses increased a nation's employment. See Blecker (1999b) for a discussion of Kalecki's approach to international economics and more recent neo-Kaleckian models of open economies.

equilibrium state of autarky or protection.⁵³ The possibility that trade relations and trade policies have profound effects on nations' technological capabilities and radically alter their "production functions" was systematically excluded from all traditional trade models. In this respect, traditional trade models are likely to miss the most significant effects of trade on the development of national economies. Of course, this criticism of static models of comparative advantage was also made by many others, such as Williams (1929), Myrdal (1957), and Kaldor (1985). But Robinson took special note of this point when she wrote:

In neoclassical trade theory there is no path, no process, no movement of any kind. An isolated country is in a stationary equilibrium and hey presto! trade puts it in a new equilibrium, with a different composition of output but resources, knowledge and tastes all the same. This has cut off the "pure theory" from any relation to the trade that takes place in real life and has reduced it to an idle toy. (Robinson, 1979a, p. 141)

Much of the "new" neoclassical trade theory responds to this aspect of Robinson's (and others') critique, although many of the new models would not satisfy her methodological concerns over the use of equilibrium modeling techniques and assumptions of strict optimizing behavior. But the idea that history matters and that small initial differences between countries can lead to growing international gaps is central to the work of Krugman (1990; 1991a; 1991b) and many others on trade with increasing returns, technical progress, and transportation costs. The idea that countries' international specializations have feedback effects on their long-term growth and development, including their rates of product innovation and their overall technological capabilities, can now be found in a large theoretical literature including both neoclassical and heterodox models.⁵⁴

⁵³This statement is subject to certain well-known qualifications, especially that a free-trade equilibrium is not generally socially optimal in the presence of market failures or "distortions" such as externalities. See Bhagwati *et al.* (1998) for an encyclopedic presentation. In the presence of a market failure, free trade is generally less optimal than some particular type of intervention, although the optimal form of intervention varies widely among models and often involves generic industrial policies rather than industry-specific trade protection or export subsidies (and even the latter policies can possibly be welfare-enhancing in the presence of oligopoly or strongly increasing returns).

⁵⁴Some representative works in this vast literature, encompassing a variety of theoretical perspectives, include Dosi *et al.* (1990), Grossman and Helpman (1991), Foray and Freeman (1993), and Fagerberg *et al.* (1994). See also Elmslie and Vieira

These new directions for trade theory vindicate many of Robinson's criticisms of the old models of static comparative advantage. But even leaving her reservations about the equilibrium methodology used in some of the new trade theory aside, most of these models still assume balanced trade with full employment as the norm for analyzing micro-level trade relations without specifying any credible adjustment mechanism to justify that assumption. Only the literature on cumulative causation (for example, Setterfield and Cornwall, 2002, León-Ledesma 2002) allows for the macroeconomic feedbacks between export performance, growth rates, and productivity enhancements contemplated in Robinson's view of the new mercantilism. Although these authors are more directly following Kaldor's (1985) work on cumulative causation, Robinson was clearly thinking along parallel lines when she wrote,

"Export lead [*sic*] growth" is the most convenient way of running modern capitalism. Who succeeds at any moment is accidental, largely depending upon historical circumstances and political and psychological influences. *Success leads to success and failure engenders failure.* (Robinson, 1973a, p. 20, emphasis added)

7. CONTEMPORARY RELEVANCE

Although there is much that appears strikingly contemporary in Robinson's work on international economics, one aspect of the current world situation appears surprising in light of her ideas about "beggar-my-neighbour" policies and the "new mercantilism." The willingness and ability of the United States to run large trade deficits for the past two decades while having generally lower unemployment rates and faster growth rates than many of its trading partners contradicts Robinson's argument that countries generally require trade surpluses to promote high employment and rapid growth. In this section, I will discuss the reasons why the United States has proven to be so exceptional in this regard, while arguing that the new mercantilism is still alive and well in other parts of the world, especially China.

During the early 1980s and again in the late 1990s, the United States served as the world's demand-side engine of growth. It did this in the former period through the government stimulus of President Ronald Reagan's tax cuts and military build-up and in the latter period through a boom in private consumption and investment spending that was at least

(1999) for a survey of the "technology gap" approach. On the question of how to introduce "history" into a model, see Dutt in this volume.

partly fueled by a speculative bubble in asset markets (Pollin, 2003). In both periods, a sharp appreciation of the US dollar and a growing merchandise trade deficit devastated many domestic producers of tradable goods. Yet, during most of this period, the United States had better performance in regard to both growth and employment than many of its trading partners, especially in Western Europe, in spite of maintaining mostly open import markets.⁵⁵ Why was the country with the world's largest trade deficit able to sustain a higher overall employment rate than many surplus countries?

Two factors explain the inconsistency of the current US situation with Robinson's view of the new mercantilism. First, Robinson did not fully recognize the expanding role of multinational corporations (MNCs) and the future prospects for vertically disintegrated production across national frontiers.⁵⁶ The operation of MNCs together with the phenomenon of outsourcing create a disjuncture between the interests of a country's largest business firms and the goal of employing the country's industrial labor force at home. Although the US *economy* has been running large trade deficits that represent net losses of jobs in tradables industries, US-based *corporations* have no such large deficit and have profited enormously from their foreign operations, many of which produce the excess imports that have flooded the US domestic market.⁵⁷ In other words, the interests of the nation's leading business firms are no

⁵⁵Robinson's argument, cited above, suggests that the US government could have used import restraints during the periods of large trade deficits generated by high domestic demand to offset the negative side-effects on the trade balance and industrial employment. The United States did make some use of protectionist devices during those episodes, including voluntary restraint agreements, anti-dumping and countervailing duties, and safeguard tariffs. However, this was done only sporadically in response to legal and political pleadings from particular industries; there was no overall, systematic policy of restricting imports in the 1980s or 1990s comparable to the overall import surcharge imposed by President Richard M. Nixon in 1971.

⁵⁶Robinson did acknowledge MNCs in her trade writings of the 1960s and 1970s (see, for example, Robinson, 1973a, p. 23), but generally assumed that they were engaged in import-substituting production for the home markets in the host countries rather than in export production for global markets (including the parent country).

⁵⁷According to Cohen *et al.* (2003), taking into account both the sales of goods and services by majority-owned foreign affiliates of US MNCs and domestic sales by foreign-owned MNC affiliates in the United States, "a US goods and services balance measured by traditional trade flows *plus* local sales generated at home and abroad by FDI [foreign direct investment] would have registered a small surplus through the late 1990s. The US merchandise deficit grew so large by 2000 that including foreign affiliate sales would reduce the deficit but no longer produce a US surplus" (p. 100, emphasis in original).

longer aligned with the national interest in having goods produced at home or maintaining a trade surplus.

Second, Robinson (along with most other economists) did not anticipate the unique ability of the world's largest economy and single hegemonic power to finance large, chronic trade deficits through massive international borrowing that has absorbed most of the world's net capital flows for more than two decades. This highly elastic supply of capital inflows has thus far freed the United States from the constraints on domestic spending that bind smaller countries to what has come to be known as "balance-of-payments-constrained growth."⁵⁸ Except during temporarily cyclical downturns, the United States has been able to sustain relatively high overall employment in spite of the destruction of jobs in its tradable goods sectors through the growth of employment in non-tradable activities, including (ironically) the distribution and retailing of imports, the so-called "Walmartization of America." This proliferation of nontradable activity in turn has been supported by the debt-financed expenditures of consumers, businesses, and government, and the entire country's transformation into the world's largest international debtor (Blecker, 1999c; 2002a). How long such a growth trajectory can be sustained while average family incomes are squeezed and debt burdens rise remains to be seen, but so far it has eluded most predictions of its impending collapse (including some by this author).⁵⁹

The other side of the coin of the US trade deficit is the large surpluses of the East Asian countries, chiefly Japan in the past and now increasingly China. In the past decade, the major East Asian countries (led by Japan and China) have amassed huge treasure-chests of reserves (currently approximating \$2.5 trillion and increasing rapidly) in efforts to keep their currencies undervalued and maintain their trade surpluses, and, as Robinson would point out, to prop up their own industrial employment and growth at the expense of other countries.⁶⁰

⁵⁸See McCombie and Thirlwall (2004) for a collection of articles on the theory of balance of payments constrained growth, which (although more directly inspired by the work of Roy Harrod and Nicholas Kaldor) can be seen as a long-run version of Keynes's and Robinson's idea of the asymmetrical pressure on deficit countries to adjust by restraining their output and employment.

⁵⁹See Blecker (1999c; 2002a; 2003b) as well as Godley (2000).

⁶⁰For five leading East Asian countries (Japan, China, Taiwan, Hong Kong, and Singapore), total reserves minus gold skyrocketed from \$0.7 trillion at year end 1995 to \$1.6 trillion at year end 2002 and rose further to \$2.4 trillion by the end of February 2004, the most recent time for which data were available as of this writing (data converted from SDRs to US dollars by the author using data from the International Monetary Fund, *International Financial Statistics*, on-line version). See Blecker (2003b) for further analysis and discussion.

The role of China in today's global economy is a new and important factor, which demonstrates the continued relevance of Robinson's concept of the new mercantilism. This formerly isolated socialist nation is now the world's most successful capitalist developing nation, albeit with a form of state-managed capitalism directed by a so-called Communist Party. China's success has many roots, including the nation's high saving rate, abundant labor supply, and high educational achievement. The strength of its one-party state, while legitimately criticized for its suppression of democracy, nevertheless gives China extraordinary advantages in terms of both domestic development initiatives (for example, infrastructure investment and technology policy) and international bargaining strength (for example, its refusal to liberalize its financial markets and invite a financial crisis, as well as its ability to win favorable terms for foreign direct investment from MNCs). In terms of Pasinetti's framework, China has emphasized dynamic gains from technological learning rather than mere static gains from trade. But in terms of Robinson's analysis, another key ingredient in China's success is that it is currently the most skillful practitioner of the new mercantilism.

In her *Essays on Employment*, Robinson used the analogy of a card game, and referred to the four types of "beggar-thy neighbour policies" (currency undervaluation, cheap labor, export subsidies, and import protection) as the four "suits" in a deck of cards. She wrote that "a trick can be taken by playing a higher card out of any suit," and that "the decision as to which suit it is wisest to play must be taken in the light of all the considerations set out above." (Robinson, 1947, pp. 157, 170). China has played all four suits in a coordinated fashion, so as to build up a powerful export-oriented industrial complex that is out-competing most of its foreign rivals while inducing their MNCs to invest in the further development of that complex. As part of this strategy, China has perfected the use of "cheap labor" in Robinson's sense: not low wages *per se*, but rather, wages that lag behind productivity growth by enough to create sustained absolute advantages in unit labor costs. The high saving rate is not (yet) a problem for China as it currently is for Japan, because China can still rely on robust exports to make up for suppressed domestic demand, while the high level of domestic saving frees China from the dependency on foreign capital inflows that has led to chronic debt problems in so many developing countries.

Such a strategy makes perfect sense for China, whose per capita income still ranks it among the lower-income nations of the world, but is poised to develop into a major economic power if it continues on its present growth trajectory with average annual growth rates of about

10 percent for the past two decades.⁶¹ Nevertheless, China's export-led strategy is still a "beggar-thy-neighbour" approach to stimulating employment and growth. The losers include not only US, Japanese, and European industrial workers, but also workers in other developing countries whose own efforts at export-led growth are held back by Chinese competition.⁶²

Meanwhile, MNCs (including American, European, Japanese and even Korean firms) profit immensely from their ability to produce or source in China at low costs while selling at higher prices in industrial country markets. Only smaller national firms that lack the ability to move offshore into China themselves (for example, US steel producers) bother to complain, and to seek protection under the trade laws through antidumping duties, safeguard tariffs, and the like. Thus, the point of this discussion is not to engage in China-bashing (or multinational-bashing), but simply to make it clear that the specter of the new mercantilism and beggar-thy-neighbor employment policies still looms large in the global economy.

Indeed, China is hardly the only practitioner of the new mercantilism today, although it is certainly one of the most adept at the game. Taiwan and other East Asian countries have also been skilled players, following Japan before them. Japan still prefers undervaluing the yen to reforming and stimulating its domestic economy, although the results have not been terribly successful. The EU and the United States continue to protect and subsidize their agricultural sectors. Brazil resists pressure to join a Free Trade Area of the Americas in part because it does not want to give up its industrial development policies. Most of the industrial countries use anti-dumping and safeguard duties as well as a proliferation of non-tariff barriers to keep out unwanted imports of manufactures, while vociferously complaining about each other's use of these same instruments. Low wages in export sectors (often with an element of gender discrimination) and lax social standards (such as weak enforcement of labor rights and environmental protection) are used as

⁶¹Data from World Bank, *World Development Indicators 2002*, online.

⁶²Although the United States was able to maintain overall full employment in the late 1990s in spite of large trade deficits, as discussed above, most of the employment generation was in non-tradable service sectors, and by the early 2000s manufacturing employment had shrunk considerably. For analyses of the fallacy of composition in the simultaneous pursuit of export-led growth strategies by large numbers of developing nations, see Blecker (2002b), Erturk (2001-02), Kaplinsky (1999), Palley (2003a), and Razmi (2004).

lures to attract foreign investment into developing countries, while currency depreciations are welcomed all around for enhancing competitiveness. In this situation, one may justly recall Robinson's statement that "the beautiful harmony of the free-trade model is far indeed to seek" (Robinson, 1973a, p. 5).

At the macroeconomic level, the successful export-led economies (currently led by China, but previously led by Japan and the "Four Tigers") put a constant drain on total world demand by failing to spend all their export earnings on comparable amounts of imports from other countries. The US government tolerates this arrangement not only because production and outsourcing in low-wage locations have become so profitable for US MNCs, but also because this arrangement allows the US to finance its chronic trade deficits (and renewed large budget deficits in the early 2000s) without having to raise interest rates or depreciate the dollar as much as would otherwise be necessary.⁶³ But the perpetual recycling of Asian net export earnings into the acquisition of American debt and the maintenance of an overvalued dollar cannot be a sustainable, long-run equilibrium for the international payments system, and when this house of cards collapses, it may well take the global economy down with it unless measures are put in place to prevent a collapse.⁶⁴ This brings us back squarely to the need for internationally coordinated expansionary macro policies to foster sustainable and widely shared international prosperity, as advocated by Robinson.

8. CONCLUSION

Robinson's work embodies a global Keynesian vision that may be considered as an alternative to the current paradigm of neo-liberalism founded upon free trade theory and faith in automatic adjustment mechanisms to solve macroeconomic and financial disequilibria. In this respect, Robinson's work should be read in the context of, and as an extension of, the suggestions of Keynes on the subject. Keynes had recommended that countries follow

⁶³US corporations objected more to the neo-mercantilist policies of Japan and the Four Tigers in the 1970s and 1980s because those countries were largely closed to FDI. However, now that the export-led strategy is being pursued by more FDI-friendly countries like China, most US corporations support keeping the US market open to their exports. Thus, corporate lobbyists have strongly supported most-favored-nation trading status for China as well as China's accession to the World Trade Organization.

⁶⁴The dollar is still (as of mid-2004) considerably overvalued relative to most Asian currencies, in spite of its significant depreciation relative to the euro and other Western currencies (UK pound, Canadian dollar, etc.) since early 2002. See Blecker (2003b).

a policy of an autonomous rate of interest, unimpeded by international preoccupations, and a national investment programme directed to an optimum level of employment [, a policy] which is twice blessed in the sense that it helps ourselves and our neighbours at the same time. And it is the simultaneous pursuit of these policies by all countries together which is capable of restoring economic health and strength internationally, whether we measure it by the level of domestic employment or by the volume of international trade. (Keynes, 1936c, p. 349)⁶⁵

Such a global Keynesian approach of coordinated domestic expansionary policies provides a way out from the otherwise inescapable inducements for most countries to play the new mercantilist game by pursuing export-led growth at each other's expense. The only way to allow most countries to escape from the temptations of "beggar-my-neighbour" trade policies is to pursue coordinated macroeconomic and financial policies in all the major countries to ensure the maintenance of global full employment along with moderate trade imbalances that can be financed by sustainable capital flows (exactly balanced trade being an unlikely and unnecessary result).⁶⁶ In this global Keynesian view, moving toward pure free trade and liberalized capital flows in the absence of such macroeconomic coordination, as recommended in the neo-liberal or "Washington Consensus" policy approach, is putting the cart before the horse.

Furthermore, given the importance of an autonomous interest rate policy in Keynes' view, open capital markets may only impede the pursuit of the domestic stimulus policies in all countries that is central to his vision of global prosperity. As Keynes put it:

if [all] nations can learn to provide themselves with full employment by their domestic policy...there need be no important economic forces calculated to set the interest of one country against that of its neighbours. There would still be

⁶⁵Quoted in Davidson (1999, pp. 10-11), who well articulates the global Keynesian macro perspective and also provides an updated version of Keynes's proposal for an international monetary system.

⁶⁶Keynes's endorsement of globally coordinated expansionary macro policies has been missed by many of his neoclassical critics, who focus mainly on his willingness to support protectionism as a means of maintaining high employment in the absence of such policy coordination. See, for example, Irwin (1996, pp. 189-206)—who, by the way, cites Robinson only in passing as one of Keynes's "more enthusiastic disciples" (p. 201).

room for the international division of labour and for international lending in appropriate conditions. But there would no longer be a pressing motive why one country need force its wares on another or repulse the offerings of its neighbours...International trade would cease to be what it is, namely, a desperate expedient to maintain employment at home by forcing sales on foreign markets and restricting purchases, which, if successful, will merely shift the problem of unemployment to the neighbour which is worsted in the struggle, but a willing and unimpeded exchange of goods and services in conditions of mutual advantage (Keynes, 1936a, pp. 382-83).

The risk of a new mercantilist trade war and the concomitant need for global Keynesian macro-management and policy coordination are now greater than at any time since the Great Depression of the 1930s. A Wall Street economist was recently quoted as saying that, "Right now, no region wants a strong currency. Regions are trying to undercut each other in terms of their currencies."⁶⁷ Many regions of the global economy (including Japan, Western Europe, and many developing nations) are suffering slow or stagnant growth, but few (aside from the United States, as discussed earlier) are willing or able to use domestic expansionary policies. The echoes of Robinson's notion of "beggar-my-neighbour remedies for unemployment" could not be more clear. Although the world economy in 2004 is far from the depressed state of the 1930s, and explicit trade barriers are definitely lower today, the world is also far from the relatively prosperous times of the "golden age of capitalism" in the 1950s and 1960s.

After decades of assuming that international macroeconomic problems would largely take care of themselves, an increasing number of economists are beginning to perceive the seriousness of the present global situation and the need for coordinated solution. In response to the previous episode of large trade imbalances and misaligned exchange rates in the 1980s, Williamson and Miller (1987) advocated a plan for international coordination of macro policies along with exchange rate management (target zones for the major currencies) to achieve simultaneous goals of internal and external balance, defined as high employment consistent with low inflation combined with sustainable trade imbalances. More recently, Posen (1998; 2003) has called attention to the policy failures in Japan and Germany that have led to stagnation of their economies

⁶⁷Richard Bernstein, who is chief US strategist at Merrill Lynch, was quoted in Reddy (2003).

and corresponding threats to regional growth in Asia and Europe. Bergsten and Williamson (2003) offer a collection of papers that generally recognize the unsustainability of the high value of the US dollar in the early 2000s and the need for policy coordination to manage its inevitable decline.⁶⁸ Unfortunately, these and similar voices have not been heeded by global institutions such as the IMF or by the governments of the major countries.

Many economists have explicitly adopted a global Keynesian perspective in advocating the need for exchange rate management and coordinated macro stimulus policies to restore global prosperity. Some examples include Bibow (2001; 2003), Blecker (1999a; 2003b), Davidson (1991), Eatwell and Taylor (2000), Galbraith (1989), Godley (2000; 2003), Grieve Smith (2001), Palley (2003b), and Weller and Singleton (2002). Many of these economists also call for greater regulation of global capital markets, and some propose new international institutions such as a World Financial Authority (Eatwell and Taylor) or International Monetary Clearing Union (Davidson). Most recognize that more expansionary domestic policies are essential in the countries that need to let their currencies appreciate, in order to prevent a collapse of formerly export-led demand.⁶⁹

⁶⁸Bergsten (2003) recently wrote that “burgeoning trade deficits, and especially an overvalued exchange rate for the dollar, trigger protectionist forces that poison US relations with all of this country’s major trading partners, which also happen to be its chief friends and allies.” Robinson might object that Bergsten inverts means and ends by elevating free trade to a goal of policy rather than an instrument, but she would welcome the recognition that pressures for protectionism would be easier to overcome in a world with more balanced trade and sustained high employment.

⁶⁹One issue on which there is no consensus, however, is the question of whether labor rights should be incorporated in trade agreements. Some economists, mainly from industrialized countries, argue that promoting stronger labor standards in developing countries is important not only from a human rights perspective and for strengthening the labor movement globally, but is also helpful for promoting higher wages that can lead to the expansion of internal markets in developing countries (and, hence, less reliance on export-led growth). Others, mainly from developing nations, argue that inserting labor standards into trade agreements would be a form of disguised protectionism that would only benefit Northern workers at the expense of Southern workers (thus, an anonymous reviewer of this chapter suggested that these could be called “beggar-thy-worker policies”). See Broad (2002), Deardorff and Stern (2000), and Palley (2004) for a variety of perspectives. Although it is not obvious which side of this issue Robinson would have supported, one can be certain that she would have viewed the conflict over this issue as one that would be ameliorated if the world as a whole pursued full employment policies so that workers in each country would not have to fear losses of jobs to workers in other countries.

Thus, the issues that concerned Robinson about international economic theory and policy have not lessened but rather grown in importance. Robinson was ahead of her time in her emphasis on the centrality of international trade and financial relations for the achievement of full employment at the national level. She was an internationalist, but one who rejected ideological assumptions about free trade in favor of more realistic and pragmatic approaches to analyzing the costs and benefits of alternative trade policies. Many contemporary policy debates reflect the same issues about how to promote full employment and rapid growth in an open trading system that she identified nearly seven decades ago. On the theoretical side, her key criticisms of the older trade models have been vindicated by numerous new developments in trade theory that put more emphasis on growth dynamics rather than comparative statics. However, her theoretical goal of developing a unified theory of international trade and finance—in which international money is not neutral, trade policies have macroeconomic effects, and the effects of trade evolve through historical time—has yet to be accomplished.

References

- Aghion, P. and P. Howitt (1997), *Endogenous Growth Theory*, Cambridge, MA: MIT Press.
- Alam, M. (2000), *Poverty from the Wealth of Nations: Integration and Polarization in the Global Economy since 1760*, Houndmills and London: Macmillan.
- Amable, B., J. Henry, F. Lordon and R. Topol (1994), "Strong Hysteresis versus Unit-root Dynamics", *Economics Letters*, **44**, 43-7.
- Amable, B., J. Henry, F. Lordon and R. Topol (1995), "Hysteresis Revisited: a Methodological Approach", in R. Cross (ed.), *The Natural Rate of Unemployment. Reflections on 25 years of the Hypothesis*, Cambridge: Cambridge University Press, pp. 153-80.
- Anderson, P. W., K. J. Arrow and D. Pines (eds) (1988), *The Economy as an Evolving Complex System*, Redwood City, CA: Addison-Wesley.
- Argyrous, G. (2001), "Setterfield on Cumulative Causation and Interrelatedness: A Comment", *Cambridge Journal of Economics*, **25**, 103-6.
- Arrow, K. J. (1962), "Economic Welfare and the Allocation of Resources for Inventions", in R. Nelson (ed.), *The Rate and Direction of Inventive Activity*, Princeton, NJ: Princeton University Press.
- Arrow, K. J. and F. H. Hahn (1971), *General Competitive Analysis*, San Francisco: Holden-Day.
- Arthur, B. (1989), "Competing Technologies, Increasing Returns, and Lock-in by Historical Events", *Economic Journal*, **99**, 116-31.
- Arthur, B. (1994), *Increasing returns and path dependence in the economy*, Ann Arbor: University of Michigan Press.
- Asada, T., Flaschel, P. and Skott, P. (2005) "Prosperity and stagnation in capitalist economies", in C. Chiarella, P. Flaschel, R. Franke and W. Semmler (eds) *Empirical and Quantitative Analysis of Nonlinear Dynamic Macromodels*, Amsterdam: Elsevier.
- Auerbach, Paul and P. Skott (1988), "Concentration, Competition and Distribution—A Critique of Theories of Monopoly Capital", *International Review of Applied Economics*, **2** (1), 44-61.
- Azariadis, C. (1993), *Intertemporal Macroeconomics*, Oxford: Blackwell.
- Baker, D. and M. Weisbrot (2002), "The Role of Social Security Privatization in Argentina's Economic Crisis", Center for Economic and Policy Research, Washington, DC.
- Baldwin, R. E. (1988), "Hysteresis in Import Prices: The Beachhead Effect", *American Economic Review*, **78**, 773-85.
- Baragar, F. (2003), "Joan Robinson on Marx", *Review of Political Economy*, **15** (4), 467-82.
- Baran, P. A. (1956), *The Political Economy of Growth*, New York: Monthly Review Press.
- Baran, P. A. (1963), "Review of Joan Robinson's Economic Philosophy", *American Economic Review*, **53**, 455-58. Reprinted in Kerr and Harcourt (2002) vol. V, 3-6.
- Baranzini, M. (1982), "Can the Life-Cycle Help in Explaining Income Distribution and Capital Accumulation?", in M. Baranzini (ed.), *Advances in Economic Theory*, New York: St. Martin's Press.
- Barro, R. J. (1994), "The Aggregate-Supply/Aggregate-Demand Model", *Eastern Economic Journal*, Winter, 1-6.
- Barro, R. J. and X. Sala-i-Martin (1995), *Economic Growth*, New York: McGraw-Hill.
- Begg, D. K. H. (1982), *The Rational Expectations Revolution in Macroeconomics*, Baltimore: Johns Hopkins University Press.
- Bellofiore, R. (ed.) (1998), *Marxian Economics: A Reappraisal—Essays on vol. III of Capital—vol. 1: Method, Value and Money*, Basingstoke: Macmillan.
- Benhabib, J. and K. Nishimura (1985), "Competitive Equilibrium Cycles", *Journal of Economic Theory*, **35** (2), 284-306.
- Bergsten, C. F. (2003), "Muzzling Our Economic Negotiators", *Washington Post*, 10 September, p. A19.
- Bergsten, C. F. and J. Williamson (eds) (2003), *Dollar Overvaluation and the World Economy*, Washington, DC: Institute for International Economics.
- Besanko, D. and R. Braeutigam (2002), *Microeconomics: An Integrated Approach*, New York: Wiley.
- Besomi, D. (2001), "R.F. Harrod and Joan Robinson", in M. C. Marcuzzo (ed.) (2001).
- Bhaduri, A. (1986), *Macroeconomics: The Dynamics of Commodity Production*, London: Macmillan.
- Bhaduri, A. and D. J. Harris (1987), "The Complex Dynamics of the Simple Ricardian System", *Quarterly Journal of Economics*, **102** (4), 893-901.

Bhaduri, A. and S. Marglin (1990), "Unemployment, the Real Wage: The Economic Basis of Competing Political Ideologies", *Cambridge Journal of Economics*, **14**, 375-95.

Bhaduri, A. and J. Robinson (1980), "Accumulation and Exploitation: An Analysis in the Tradition of Marx, Sraffa and Kalecki", *Cambridge Journal of Economics*, **4**, 103-15.

Bhagwati, J. N. (1998), "The Capital Myth: The Difference Between Trade in Widgets and Dollars", *Foreign Affairs*, **77** (3), 7-12.

Bhagwati, J. N., A. Panagariya and T. N. Srinivasan (1998), *Lectures on International Trade*, 2nd edition, Cambridge, MA: MIT Press.

Bharadwaj, K. (1990), "Sraffa's Return to Classical Theory", in K. Bharadwaj and B. Schefold (eds), *Essays on Piero Sraffa: Critical Perspectives on the Revival of Classical Theory*, London: Unwin Hyman.

Bibow, J. (2001), "Making EMU Work: Some Lessons from the 1990s", *International Review of Applied Economics*, **15** (3), 233-59.

Bibow, J. (2003), "Is Europe Doomed to Stagnation? An Analysis of the Current Crisis and Recommendations for Reforming Macroeconomic Policymaking in Euroland", Working Paper No. 379, Levy Economics Institute of Bard College, Annandale-on-Hudson, NY, May.

Bils, M. (1987), "The Cyclical Behavior of Price and Marginal Cost", *American Economic Review*, **77**, 838-57.

Blanchard, O. (2003), *Macroeconomics*, 3rd edition, Upper Saddle River, NJ: Prentice Hall.

Blanchard, O. and L. Summers (1987), "Hysteresis in Unemployment", *European Economic Review*, **31**, 288-95.

Blaug, M. (1980), *The Methodology of Economics*, Cambridge: Cambridge University Press.

Blecker, R. A. (1992), *Beyond the Twin Deficits: A Trade Strategy for the 1990s*, Armonk, NY: M.E. Sharpe.

Blecker, R. A. (1996a), "International Trade and the Real World", in P. Arestis (ed.), *Keynes, Money and the Open Economy: Essays in Honour of Paul Davidson*, vol.1, Cheltenham, UK and Brookfield, VT, USA: Edward Elgar.

Blecker, R. A. (1996b), "The New Economic Integration: Structuralist Models of North-South Trade and Investment Liberalization", *Structural Change and Economic Dynamics*, **7** (3), 321-45.

Blecker, R. A. (1999a), *Taming Global Finance: A Better Architecture for Growth and Equity*, Washington, DC: Economic Policy Institute.

Blecker, R. A. (1999b), "Kaleckian Macro Models for Open Economies", in J. Deprez and J. T. Harvey (eds), *Foundations of International Economics: Post Keynesian Perspectives*, London: Routledge.

Blecker, R. A. (1999c), "The Ticking Debt Bomb: Why the U.S. International Financial Position is Not Sustainable", Briefing Paper, Economic Policy Institute, Washington, DC, June.

Blecker, R. A. (2002a), "International Capital Mobility, Macroeconomic Imbalances, and the Risk of Global Contraction", in J. Eatwell and L. Taylor (eds), *International Capital Markets: Systems in Transition*, New York: Oxford University Press.

Blecker, R. A. (2002b), "The Balance-of-Payments-Constrained Growth Model and the Limits to Export-Led Growth", in P. Davidson (ed.), *A Post Keynesian Perspective on Twenty-first Century Economic Problems*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.

Blecker, R. A. (2003a), "International Economics", in J. King (ed.), *The Elgar Companion to Post Keynesian Economics*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.

Blecker, R. A. (2003b), "Why the Dollar Still Needs to Fall Further", *Challenge*, **46** (5), 15-36.

Blecker, R. A. (2005), "Financial Globalization, Exchange Rates, and International Trade", in G. Epstein (ed.), *Financialization and the World Economy*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar (forthcoming).

Blecker, R. A. and S. Seguino (2002), "Macroeconomic Effects of Reducing Gender Wage Inequality in an Export-oriented, Semi-industrialized Economy", *Review of Development Economics*, **6** (1), 103-19.

Bliss, C. J. (1975), *Capital Theory and the Distribution of Income*, Amsterdam: North-Holland.

Boldrin, M. and L. Montrucchio (1986), "On the Indeterminacy of Capital Accumulation Paths", *Journal of Economic Theory*, **40** (1), 26-39.

Bosworth, B. P. (1993), *Saving and Investment in a Global Economy*, Washington, DC: Brookings Institution.

Boulding, K. (1963), "Review of Joan Robinson's *Economic Philosophy*", *American Sociological Review*, **28**, 657-8. Reprinted in Kerr and Harcourt (eds) (2002), vol. 7-8.

Bowen, H. P., E. E. Leamer and L. Sveikauskas (1987), "Multicountry, Multifactor Tests of the Factor Abundance Theory", *American Economic Review*, **77** (5), 791-809.

Bowles, S. and H. Gintis, H. (1990), "Contested Exchange: New Microfoundations for the Political Economy of Capitalism", *Politics and Society*, **18**, 165-222.

Bradford, W. and G. C. Harcourt (1997), "Units and Definitions", in G. C. Harcourt and P. A. Riach (eds), pp. 107-31.

- Brewer, A. (1985), "Trade with Fixed Real Wages and Mobile Capital", *Journal of International Economics*, **18**, 177-86.
- Broad, R. (ed.) (2002), *Global Backlash: Citizen Initiatives for a Just World Economy*, Lanham, MD: Rowman and Littlefield.
- Brown, E. H. P. (1957), "The Meaning of the Fitted Cobb-Douglas Function", *Quarterly Journal of Economics*, **71**, 546-60.
- Brown, M. (1969), "Substitution-composition Effects, Capital-intensity Uniqueness and Growth", *Economic Journal*, **79** (314), 334-47.
- Bruno, M. (1967), "Optimal Accumulation in Discrete Capital Models", in Shell (1967), pp. 181-218.
- Bruno, M. (1969), "Fundamental Duality Relations in the Pure Theory of Capital and Growth", *Review of Economic Studies*, **36** (1), 39-53.
- Burgstaller, A. (1985), "North-South Trade and Capital Flows in a Ricardian Model of Accumulation", *Journal of International Economics*, **18**, 241-60.
- Burgstaller, A. (1994), *Property and Prices, Toward a Unified Theory of Value*, Cambridge: Cambridge University Press.
- Burmeister, E. (1980), *Capital Theory and Dynamics*, Cambridge: Cambridge University Press.
- Burtless, G., et al. (1998), *Globophobia: Confronting Fears about Open Trade*, Washington, DC: Brookings Institution.
- Caldwell, B. (1991), "Clarifying Popper", *Journal of Economic Literature*, **29** (1), 1-33.
- Cass, D. and K. Shell (1976), *The Hamiltonian Approach to Dynamic Economics*, New York: Academic Press.
- Cass, D. and K. Shell (1983), "Do Sunspots Matter?", *Journal of Political Economy*, **91** (2), 193-227.
- Cattaneo, C. (1861), "Del Pensiero Come Principio d'Economia Publica", translated recently with the reproduction of the Italian text as "Intelligence As a Principle of Public Economy", Milan: Libri Scheiwiller, 2001 and Lanham, Maryland: Lexington Books, 2003.
- Caves, R. E., J. A. Frankel and R. W. Jones (2002), *World Trade and Payments: An Introduction*, 9th edition, Boston: Addison-Wesley.
- Chiarella, C. and P. Flaschel (2000), *The Dynamics of Keynesian Monetary Growth*, Cambridge: Cambridge University Press.
- Chirinko, R. (1993), "Business Fixed Investment Spending: A Critical Survey of Modeling Strategies, Empirical Results, and Policy Implications", *Journal of Economic Literature*, **31**(4), 1875-911.
- Chirinko, R. and S. Fazzari (1994), "Economic Fluctuations, Market Power, and Returns to Scale: Evidence from Firm-Level Data", *Journal of Applied Economics*, **9**, 47-69.

- Chisari O., A. Estache and C. Romero (1999), "Winners and Losers of Privatization and Regulation of Utilities: Lesson from a General Equilibrium Model of Argentina" *The World Bank Economic Review* **13** (2), 357-378.
- Cibils, A., M. Weisbrot, and D. Kar (2004) "Argentina Since Default: The IMF and the Depression", Center for Economic and Policy Research, Washington, D.C.
- Cohen, A. (1993), "Does Joan Robinson's Critique of Equilibrium Entail Theoretical Nihilism?", in G. Mongiovi and C. Rühl (eds), *Macroeconomic Theory: Diversity and Convergence*, Aldershot, UK and Brookfield, VT, USA: Edward Elgar.
- Cohen, S. D., R. A. Blecker and P. D. Whitney (2003), *Fundamentals of U.S. Foreign Trade Policy: Economics, Politics, Laws, and Issues*, 2nd edition, Boulder, CO: Westview.
- Committeri, M. (1986), "Some Comments On Recent Contributions On Capital Accumulation, Income Distribution And Capacity Utilization", *Political Economy*, **2** (2), 161-86.
- Cookinboo, L. J. (1955), "Production and Cost Functions for Oil Pipe Lines", from *Crude Oil Pipe Lines and Competition in the Oil Industry*, Cambridge: Harvard University Press. Reprinted in D. S. Watson (1965), *Price Theory in Action: A Book of Readings*, Boston: Houghton Mifflin, pp. 79-87.
- Cross, R. (1993), "On The Foundations of Hysteresis in Economic Systems", *Economics and Philosophy*, **9** (1), 53-74.
- Cross, R. (1995), "Is the Natural Rate Hypothesis Consistent with Hysteresis?", in R. Cross, ed., *The Natural Rate of Unemployment. Reflections on 25 years of the Hypothesis*, Cambridge: Cambridge University Press.
- Cross, R. and A. Allan (1988), "On the History of Hysteresis", in R. Cross (ed.), *Hysteresis and the Natural Rate Hypothesis*, Oxford: Basil Blackwell.
- Dalziel, P. C. (1991), "A Generalisation and Simplification of the Cambridge Theorem with Budget Deficits", *Cambridge Journal of Economics*, **15**, 287-300.
- Damill, M., R. Frenkel, R. Maurizio (2002) "Argentina: A Decade of Currency Board", ILO Employment Paper 2002/42.
- Darity, W., Jr. (1990), "The Fundamental Determinants of the Terms of Trade Reconsidered: Long-Run and Long-Period Equilibrium", *American Economic Review*, **80**, 816-27.
- David, P. (1985), "Clio and the Economics of QWERTY", *American Economic Review*, **75**, 332-7.

Davidson, P. (1991), "What International Payments Scheme Would Keynes Have Suggested for the Twenty-first Century?", in P. Davidson and J. A. Kregel (eds), *Economic Problems of the 1990s: Europe, the Developing Countries and the United States*, Aldershot, UK and Brookfield, VT, USA: Edward Elgar.

Davidson, P. (1999), "Global Employment and Open Economy Macroeconomics", in J. Deprez and J. T. Harvey (eds), *Foundations of International Economics: Post-Keynesian Perspectives*, London: Routledge.

Deardorff, A. V. and R. M. Stern (eds) (2000), *Social Dimensions of U.S. Trade Policies*, Ann Arbor: University of Michigan Press.

Deleplace, G. and E. J. Nell (1996), *Money in Motion*, London: Macmillan.

Desai, M. (1985), "Fall from Grace", *The Times Higher Education Supplement*, June 21, p. 41.

Dickinson, H. D. (1963), "Review of Joan Robinson's Economic Philosophy", *Economic Journal*, **73**, 497-8. Reprinted in Kerr and Harcourt (eds) (2002), vol. v, 9-10.

Dillard, D. (1989), "The Paradox of Money in the Economics of Joan Robinson", in Feiwel (1989a).

Dixit, A. (1989), "Hysteresis, Import Penetration and Exchange Rate Pass-through", *Quarterly Journal of Economics*, **104** (2), 205-28.

Dixit, A. (1992), "Investment and Hysteresis", *Journal of Economic Perspectives*, **6** (1), 107-32.

Dixon, R. and A. Thirlwall (1975), "A Model of Regional Growth Rate Differences On Kaldorian Lines", *Oxford Economic Papers*, **27**, 201-14.

Dobb, M. H. (1954), *On Economic Theory and Socialism. Collected Papers*, London: Routledge and Kegan Paul.

Domowitz, I., G. Hubbard and B. Petersen (1986), "Business Cycles and the Relationship between Concentration and Price-Cost Margins", *Rand Journal of Economics*, **17**, 1-17.

Dorfman, R., P. A. Samuelson and R. Solow (1958), *Linear Programming and Economic Analysis*, New York: McGraw-Hill.

Dornbusch, R. (1980), *Open Economy Macroeconomics*, New York: Basic Books.

Dosi, G., C. Freeman, R. Nelson, G. Silverberg and L. Soete (1988), *Technical Change and Economic Theory*, London: Pinter Press.

Dosi, G., K. Pavitt and L. Soete (1990), *The Economics of Technical Change and International Trade*, New York: New York University Press.

Dow, S. (1985), *Macroeconomic Thought. A Methodological Approach*, Oxford and New York: Basil Blackwell.

Dow, S. (1997), "Endogenous Money", in G. Harcourt and P. Riach (eds), *The Second Edition of Keynes's General Theory*, London: Routledge.

Duesenberry, J. (1949), *Income, Saving and the Theory of Consumer Behavior*, Cambridge, MA: Harvard University Press.

Dutt, A. K. (1984), "Stagnation, Income Distribution, and Monopoly Power", *Cambridge Journal of Economics*, **8**, 25-40.

Dutt, A. K. (1986-87), "Wage Rigidity And Unemployment: The Simple Diagrammatics of Two Views", *Journal of Post Keynesian Economics*, **9**, 279-90.

Dutt, A. K. (1987), "Alternative Closures Again: A Comment on 'Growth, Distribution and Inflation'", *Cambridge Journal of Economics*, **11** (1), 75-82.

Dutt, A. K. (1988), "Monopoly Power and Uneven Development: Baran Revisited", *Journal of Development Studies*, **24** (2), 161-76.

Dutt, A. K. (1990), *Growth, Distribution and Uneven Development*, Cambridge: Cambridge University Press.

Dutt, A. K. (1992a), "Conflict Inflation, Distribution, Cyclical Accumulation and Crises", *European Journal of Political Economy*, **8**, 579-97.

Dutt, A. K. (1992b), "The Origins of Uneven Development: The Indian subcontinent", *American Economic Review*, **82** (2), 146-50.

Dutt, A. K. (1997a), "Equilibrium, Path Dependence and Hysteresis in post-Keynesian models", in P. Arestis and M. Sawyer (eds), *Essays in Honour of G. C. Harcourt, vol. 2: Markets, Unemployment and Economic Policy*, London: Routledge, pp. 238-53.

Dutt, A. K. (1997b), "On an Alleged Inconsistency in Aggregate-Supply/Aggregate-Demand Analysis", *Eastern Economic Journal*, **23** (1), 469-76.

Dutt, A. and E. Amadeo (1990), *Keynes's Third Alternative? The neo-Ricardian Keynesians and the Post Keynesians*, Aldershot, UK and Brookfield, VT, USA: Edward Elgar.

Dutt, A. K. and J. Ros (2003), "Contractionary Effects of Stabilization and Long-run growth", unpublished, Department of Economics, University of Notre Dame.

Eatwell, J. (1997), "History versus equilibrium", in P. Arestis, G. Palma and M. Sawyer (eds), *Essays in Honour of G. C. Harcourt, vol. 1: Capital Controversy, Post-Keynesian Economics and the History of Economics*, London: Routledge, pp. 386-97.

Eatwell, J. and L. Taylor (2000), *Global Finance at Risk: The Case for International Regulation*, New York: New Press.

- Eatwell, J. and L. Taylor (eds) (2002) *International Capital Markets: Systems in Transition*, New York and Oxford: Oxford University Press.
- Eichner, A. (1987), *The Macrodynamics of Advanced Market Economies*, Armonk, NY: M. E. Sharpe.
- Ellis, H. S. and L. A. Metzler (eds) (1950) *Readings in the Theory of International Trade*, Philadelphia: Blakiston.
- Elmslie, B. and F. Vieira (1999), "A Primer on Technology Gap Theory and Empirics", in Johan Deprez and John T. Harvey (eds), *Foundations of International Economics: Post Keynesian Perspectives*, London: Routledge.
- Empson, W. (1833), "Review of Jane Marcet (1833) *John Hopkin's Notions of Political Economy*", London and Harriet Martineau (1932), 'Illustrations of Political Economy"', *The Edinburgh Review*, **57** (115), 1-39.
- Erturk, K. (2001-02), "Overcapacity and the East Asian Crisis", *Journal of Post Keynesian Economics*, **24** (2), 253-75.
- Estrup, H. (1977), *Essays in the Theory of Income Creation*, Copenhagen: Akademisk Forlag.
- Evans, G. W. and R. Guesnerie (2003), "Coordination on Saddle-path Solutions: the Eductive viewpoint—Linear Univariate Models", *Macroeconomic Dynamics*, **7** (1), 42-62.
- Evans, P. (1995), *Embedded Autonomy. States and Industrial Transformation*, Princeton: Princeton University Press.
- Fagerberg, J., B. Verspagen and N. von Tunzelmann (1994), *The Dynamics of Technology, Trade, and Growth*, Aldershot, UK and Brookfield, VT, USA: Edward Elgar.
- Fazzari, S. M. (1993), "Monetary Policy, Financial Structure, and Investment", in G. A. Dymski *et al.* (eds), *Transforming the U.S. Financial System*, Armonk, NY: M. E. Sharpe.
- Fazzari, S., R. Hubbard and B. Petersen (1988), "Financing Constraints and Corporate Investment", *Brookings Papers on Economic Activity*, **1**, 141-95.
- Feenstra, R. C. (1998), "Integration of Trade and Disintegration of Production in the Global Economy", *Journal of Economic Perspectives*, **12** (4), 32-50.
- Feenstra, R. C. (2004), *Advanced International Trade: Theory and Evidence*, Princeton: Princeton University Press.
- Feiwel, G. (ed.) (1985a), *Issues in Contemporary Macroeconomics and Distribution*, London: Macmillan.
- Feiwel, G. (ed.) (1985b), *The Theory of Normal Prices and the Reconstruction of Economic Theory*, London: Macmillan.

- Feiwel, G. (1989a), *The Economics of Imperfect Competition and Employment*, London: Macmillan.
- Feiwel, G. (ed.) (1989b) *Joan Robinson and Modern Economic Theory*, New York: NYU Press.
- Feldstein, M. (1992), "The Budget and Trade Deficits Aren't Really Twins", *Challenge*, March-April.
- Findlay, R. (1963), "The Robinson Model of Accumulation", *Economica*, **30** (117), 1-12.
- Findlay, R. (1995), *Factor Proportions, Trade, and Growth*, Cambridge, MA: MIT Press.
- Fine, B. (2000), "Economics, Imperialism and Intellectual Progress: The Present As History of Economic Thought", *History of Economics Review*, **32**, 10-36.
- Fisher, F. (1969), "The Existence of Aggregate Production Functions", *Econometrica*, **37** (4), 553-77.
- Fisher, F. (1971), "Aggregate Production Functions and the Explanation of Wages: A Simulation Experiment", *Review of Economics and Statistics*, **53** (4), 305-325.
- Fisher, I. (1906), *The Nature of Capital and Income*, New York: Macmillan.
- Fisher, I. (1907), *The Rate of Interest*, New York: Macmillan.
- Fisher, I. (1930), *The Theory of Interest*, New York: Macmillan.
- Flaschel, P. and R. Franke (2000), "An Old-Keynesian Note on Destabilizing Price Flexibility", *Review of Political Economy*, **12**(3), 273-84.
- Flaschel, P. and P. Skott (2005), "Steindlian Models of Growth and Stagnation", *Metroeconomica*.
- Foley, D. and T. Michl (1999), *Growth and Distribution*, Cambridge, MA: Harvard University Press.
- Foray, D. and C. Freeman (1993), *Technology and the Wealth of Nations: The Dynamics of Constructed Advantage*, London: Pinter and New York: St. Martin's Press.
- Frankel, J. A. and A. K. Rose (1995), "Empirical Research on Nominal Exchange Rates", in G. M. Grossman and K. Rogoff (eds), *Handbook of International Economics*, vol. III, Amsterdam: Elsevier.
- Galbraith, J. K. (1989), *Balancing Acts: Technology, Finance and the American Future*, New York: Basic Books.
- Galenson, W. and H. Leibenstein (1955), "Investment Criteria, Productivity, and Economic Development", *Quarterly Journal of Economics*, **69**, 343-70.

- Galiani, S., P. Gertler, E. Schargrodsky and F. Sturzenegger (2003), "The Costs and Benefits of Privatization in Argentina: A Microeconomic Analysis", Washington, DC: Inter-American Development Bank.
- Gandolfo, G. (1997), *Economic Dynamics*, 3rd edition, Berlin: Springer.
- Garegnani, P. (1970), "Heterogeneous Capital, The Production Function and the Theory Of Distribution", *Review of Economic Studies*, **37** (3), 407-36.
- Garegnani, P. (1979), "Notes on Consumption, Investment and Effective Demand: A Reply to Joan Robinson", *Cambridge Journal of Economics*, **3** (2), 181-7.
- Garegnani, P. (1998), "Sui manoscritti di Piero Sraffa", *Rivista italiana degli economisti*, **3** (1), 151-5.
- Garegnani, P. (2000), "Savings, Investment and Capital in a System of General Intertemporal Equilibrium", in H. D. Kurz (ed.), *Critical Essays on Piero Sraffa's Legacy in Economics*, Cambridge: Cambridge University Press, pp. 392-445.
- Garegnani, P. (2004), "Di una svolta nella posizione teorica e nella interpretazione dei classici in Sraffa nei tardi anni 20", in Atti del Convegno "Piero Sraffa", Roma: Accademia Nazionale dei Lincei, pp. 159-194.
- Gehrke, C. (2003), "More on the Sraffa-Dobb Collaboration in Piero's Sraffa's Edition of the Works and Correspondence of David Ricardo", mimeo.
- Giavazzi, F. and C. Wyplosz (1985), "The Zero-root Problem: A Note on the Dynamic Determination of the Stationary Equilibrium in Linear Models", *Review of Economic Studies*, **52**, 353-7.
- Gibson, B. (2003), "An Essay on Late Structuralism", in A. Dutt and J. Ros (eds), *Development Economics and Structuralist Macroeconomics, Essays in Honor of Lance Taylor*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar, pp. 52-76.
- Gibson, B. and D. van Seanter (2000), "A Tale of Two Models", *International Review of Applied Economics*, **14** (2), 149-71.
- Gilibert, G. (1996), "Joan Robinson, Piero Sraffa and the Standard Commodity Mystery", in M. C. Marcuzzo, L. Pasinetti and A. Roncaglia (eds), *The Economics of Joan Robinson*, London: Routledge, pp. 121-31.
- Gnos, C. and L.-P. Rochon (2003), "Joan Robinson and Keynes: Money, Relative Prices and the Monetary Circuit", in *Review of Political Economy*, **15** (4), 483-91.

- Godley, W. (2000), "Seven Unsustainable Processes: Medium-Term Prospects and Policies for the United States and the World", Levy Economics Institute of Bard College, Annandale-on-Hudson, NY, Revised, October.
- Godley, W. (2003), "The U.S. Economy: A Changing Strategic Predicament", Strategic Analysis, Levy Economics Institute of Bard College, Annandale-on-Hudson, NY, March.
- Golub, S. (2000), "Does Trade with Low-Wage Countries Hurt American Workers?", in P. King (ed.), *International Economics and International Economic Policy: A Reader*, 3rd edition, Boston: Irwin/McGraw-Hill.
- Goodwin, R. M. (1967), "A Growth Cycle", in C. Feinstein (ed.), *Socialism, Capitalism and Growth*, Cambridge: Cambridge University Press.
- Goodwin, R. M. and L. F. Punzo (1987), *The Dynamics of a Capitalist Economy. A Multi-sectoral Approach*, Cambridge: Polity Press.
- Gordon, D. M. (1995), "Putting The Cart (back) Before The Horse: Disentangling the Macro Relationship Between Investment and Saving", in H. Gintis and G. Epstein (eds), *Macroeconomic Policy after the Conservative Era: Studies in Investment, Saving and Finance*, New York: Cambridge University Press, pp. 57-108.
- Gordon, D. M. (1996), *Fat and Mean: The Corporate Squeeze of Working Americans and the Myth of Managerial Downsizing*, Free Press: New York, 1996.
- Gordon, R. (1981), "Output Fluctuations and Gradual Price Adjustment", *Journal of Economic Literature*, **19**, 493-530.
- Gram, H. (1976), "Two-sector Models in the Theory of Capital and Growth", *American Economic Review*, **66** (5), 891-903.
- Gram, H. (2003), "Joan Robinson: Classical Revivalist or Neoclassical Critic?", *Review of Political Economy*, **15** (4), 493-508.
- Gram, H. and V. Walsh (1983), "Joan Robinson's Economics in Retrospect", *Journal of Economic Literature*, **21** (2), 518-50.
- Grandmont, J.-M. (1985), "On Endogenous Competitive Business Cycles", *Econometrica*, **53** (5), 995-1045.
- Graziani, A. (1989), "Money and Finance in Joan Robinson's Work", in Feiwel (1989a).
- Grieve Smith, J. (2001), *There Is A Better Way: A New Economic Agenda*, London: Anthem Press.
- Grossman, G. M. (ed.) (1992), *Imperfect Competition and International Trade*, Cambridge, MA: MIT Press.

- Grossman, G. M. and E. Helpman (1991), *Innovation and Growth in the Global Economy*, Cambridge, MA: MIT Press.
- Hahn, F. (1966), "Equilibrium Dynamics with Heterogeneous Capital Goods", *Quarterly Journal of Economics*, **80**, 633-46.
- Hahn, F. (1987), "Information, Dynamics and Equilibrium", *Scottish Journal of Political Economy*, **34** (4), 321-4.
- Hahn, F. (1989), "Robinson-Hahn Love-Hate Relationship: An Interview", in G. R. Feiwel (1989b).
- Hahn, F. and R. M. Solow (1995), *A Critical Essay on Modern Macroeconomic Theory*, Cambridge, MA: The MIT Press.
- Harcourt, G. C. (1963), "A Critique of Mr. Kaldor's Model of Income Distribution and Economic Growth", *Australian Economic Papers*, **2**, 20-36.
- Harcourt, G. C. (1972), *Some Cambridge Controversies in the Theory of Capital*, Cambridge: Cambridge University Press.
- Harcourt, G. C. (1978), "The Social Science Imperialists", reprinted in Pru Kerr (ed.), *The Social Science Imperialists: Selected Essays of G. C. Harcourt*, London: Routledge and Kegan Paul, 1982.
- Harcourt, G. C. (1981), "Marshall, Sraffa and Keynes: Incompatible bedfellows?", *Eastern Economic Journal*, **7** (1), 39-50. Reprinted in P. Kerr (ed.), *The Social Science Imperialists: Selected Essays of G. C. Harcourt*, London: Routledge and Kegan Paul, 1982.
- Harcourt, G. C. (1986), "On the Influence of Piero Sraffa on the Contribution of Joan Robinson to Economic Theory", Conference papers, *Economic Journal*, **96** (Supplement), 96-108.
- Harcourt, G. C. (1990), "Joan Robinson's Early Views on Method", *History of Political Economy*, **22** (3), 411-27.
- Harcourt, G. C. (1992), "Joan Robinson", in P. Arestis and M. Sawyer (eds), *A biographical dictionary of dissenting economists*, Aldershot, UK and Brookfield, VT, USA: Edward Elgar.
- Harcourt, G. C. (1993), *Post-Keynesian Essays in Biography. Portraits of Twentieth Century Political Economists*, London: Macmillan.
- Harcourt, G. C. (1994), "Kahn and Keynes and the Making of *The General Theory*", *Cambridge Journal of Economics*, **18**, 11-23.
- Harcourt, G. C. (1995), "Joan Robinson, 1903-1983", *Economic Journal*, **105** (423), 1228-43.
- Harcourt, G. C. (1998), "Two Views on Development: Austin and Joan Robinson", *Cambridge Journal of Economics*, **22**, 367-77.
- Harcourt, G. C. (2001), "Joan Robinson and her Circle", *History of Economic Ideas*, **9**, 59-71.

- Harcourt, G. C. and P. A. Riach (eds) (1997), *A 'Second Edition' of The General Theory*, vol. 2. London and New York: Routledge.
- Harris, D. J. (1967), "Inflation, Income distribution, and Capital Accumulation in a Two-sector Model of Growth", *Economic Journal*, **77**, 814-33.
- Harris, D. J. (1973), "Capital, Distribution and the Aggregate Production Function", *American Economic Review*, **63** (1), 100-13.
- Harris, D. J. (1974), "The price policy of firms, the level of employment and distribution of income in the short run", *Australian Economic Papers*, **13**, 144-51.
- Harris, D. J. (1978a), *Capital Accumulation and Income Distribution*, Stanford, CA.: Stanford University Press.
- Harris, D. J. (1978b), "The Theory Of Economic Growth: A Critique and a Reformulation", *American Economic Review, Papers and Proceedings*, **65**, 329-37.
- Harris, D. J. (1980), "A Post-mortem on the Neoclassical 'Parable'", in E. J. Nell (ed.), *Growth, Profits, and Property*, New York: Cambridge University Press.
- Harris, D. J. (1981), "Profits, Productivity, and Thrift: The Neoclassical Theory of Capital and Distribution Revisited", *Journal of Post Keynesian Economics*, **3** (3), 359-82.
- Harris, D. J. (1982), "Structural Change and Economic Growth", *Contributions to Political Economy*, **1**, 25-45.
- Harris, D. J. (1988), "On the Classical Theory of Competition", *Cambridge Journal of Economics*, **12**, 139-67.
- Harris, D. J. (1991), "Equilibrium and Stability in Classical Theory", in Nell and Semmler (eds) (1991).
- Harrod, R. F. (1939), "An Essay in Dynamic Theory", *The Economic Journal*, **49** (193), 14-33.
- Harrod, R. F. (1948), *Towards a Dynamic Economics. Some Recent Developments of Economic Theory and Their Application to Policy*, London: Macmillan.
- Henderson, W. (1995), *Economics as Literature*, London and New York, Routledge.
- Heston, A., R. Summers and B. Aten (2002), "CICUP Penn World Table Version 6.1", Center for International Comparisons at the University of Pennsylvania.
- Hicks, J. R. (1965), *Capital and Growth*, Oxford: Oxford University Press.
- Hirsch, M. W. and S. Smale (1974), *Differential Equations, Dynamical Systems and Linear Algebra*, New York: Academic Press.

Ingrao, B. and G. Israel (1990), *The Invisible Hand: Economic Equilibrium in the History of Science*, Cambridge, MA: MIT Press.

Irwin, D. A. (1996), *Against the Tide: An Intellectual History of Free Trade*, Princeton: Princeton University Press.

Isaac, A. (1994), "Fiscal Policy and the Natural Rate", in A. Dutt (ed.), *New Directions in Analytical Political Economy*, Aldershot, UK and Brookfield, VT, USA: Edward Elgar, pp. 33-48.

John-Paul II (1981), Encyclical Letter "Laborem Exercens", Vatican City.

Kahn, R. F. (1929), *The Economics of the Short Period*, London: Macmillan.

Kahn, R. F. (1954), "Some Notes on Liquidity Preference", *Manchester School of Economic and Social Studies*, **22**, 229-57.

Kahn, R. F. (1984), *The Making of Keynes's General Theory*, Cambridge: Cambridge University Press.

Kahneman, D., P. Slovic and A. Tversky (eds) (1982), *Judgment Under Uncertainty: Heuristics and Biases*, Cambridge: Cambridge University Press.

Kaldor, N. (1934a), "A Classificatory Note on the Determinateness of Equilibrium", *Review of Economic Studies*, **1**, 122-36.

Kaldor, N. (1934b), "The Determinateness of Static Equilibrium", *Review of Economic Studies*, reprinted in F. Targetti and A. Thirlwall (1989).

Kaldor, N. (1956), "Alternative Theories of Distribution", *Review of Economic Studies*, **23**, 83-100.

Kaldor, N. (1958), "Monetary Policy, Economic Stability and Growth." A Memorandum Submitted to the Committee of the Working of the Monetary System (Radcliffe Committee), June 23. Reprinted in *Collected Economic Papers, Essays On Economic Policy 1*, vol. III, London: Duckworth, 1964.

Kaldor, N. (1960), *Essays on Value and Distribution*, Glencoe, IL.: Free Press.

Kaldor, N. (1961), "Capital Accumulation and Economic Growth", in F. Lutz (ed.), *The Theory of Capital*, London: Macmillan. Reprinted in F. Targetti and A. Thirlwall (1989).

Kaldor, N. (1970a), "The Case for Regional Policies", *Scottish Journal of Political Economy*, **17**, 337-48. Reprinted in F. Targetti and A. Thirlwall (1989).

Kaldor, N. (1970b), "The New Monetarism", *Lloyds Bank Review*, July, 1-7.

Kaldor, N. (1972), "The Irrelevance of Equilibrium Economics", *Economic Journal*, **82**, 1237-55. Reprinted in F. Targetti and A. Thirlwall (1989).

Kaldor, N. (1975), "What is Wrong with Economic Theory", *Quarterly Journal of Economics*, reprinted in F. Targetti and A. P. Thirlwall (1989).

Kaldor, N. (1977), "Equilibrium Theory and Growth Theory", in M. Boskin (ed.), *Economics and Human Welfare: Essays in Honor of Tibor Scitovsky*, New York: Academic Press. Reprinted in F. Targetti and A. Thirlwall (1989).

Kaldor, N. (1985), *Economics Without Equilibrium*, Armonk, New York: M. E. Sharpe.

Kaldor, N. (1996), *Causes of Growth and Stagnation in the World Economy*, Raffaele Mateoli Lectures, Cambridge: Cambridge University Press.

Kalecki, M. (1942), "A Theory of Profits", *Economic Journal*, **52**, 258-67.

Kalecki, M. (1943), "Political Aspects of Full Employment", *Political Quarterly*, **14** (4), 322-31.

Kalecki, M. (1954), *Theory of Economic Dynamics: An Essay on Cyclical and Long-Run Changes in Capitalist Economy*, reprinted New York: Monthly Review Press, 1968.

Kalecki, M. (1971), *Selected Essays on the Dynamics of the Capitalist Economy*, Cambridge: Cambridge University Press.

Kaplinsky, R. (1999), "If You Want to Get Somewhere Else, You Must Run at Least Twice as Fast as That! The Roots of the East Asian Crisis", *Competition and Change*, **4**, 1-30.

Katzner, D. W. (1998), *Time, Ignorance, and Uncertainty in Economic Models*, Ann Arbor: Michigan University Press.

Katzner, D. W. (2001), *Unmeasured Information and the Methodology of Social Scientific Inquiry*, Boston/Dordrecht/London: Kluwer Academic Publishers.

Kerr, P. and G. C. Harcourt (eds) (2002), *Joan Robinson. Critical Assessments of Leading Economists*, London: Routledge.

Keynes, J. M. (1925), "A Short View of Russia", reprinted in Keynes (1972), pp. 253-71.

Keynes, J. M. (1930), *A Treatise on Money*, 2 vols., London: Macmillan. (Collected Works, vols. V, VI, 1971).

Keynes, J. M. (1933), *Essays in Biography*, in *The Collected Writings of John Maynard Keynes*, vol. 10, London: Macmillan, 1972.

Keynes, J. M. (1936a), *The General Theory of Employment, Interest and Money*, London and Basingstoke: Macmillan.

Keynes, J. M. (1936b), *The General Theory of Employment, Interest and Money*, in *The Collected Writings of John Maynard Keynes*, vol. 7, London: Macmillan, 1973.

Keynes, J. M. (1936c), Letter of Keynes to Harrod, 30 August 1936, in: D. Besomi (ed.), "The Collected Interwar Papers and Correspondence of Roy Harrod", electronic version.

Keynes, J. M. (1972), *Essays in Persuasion in The Collected Writings of John Maynard Keynes*, vol. 9, London: Macmillan.

Keynes, J. M. (1973), *The General Theory and After: Defence and Development*, in D. Moggridge (ed.), *The Collected Writings of John Maynard Keynes*, vol. 14, London: Macmillan.

Keynes, J. M. (1979), *The General Theory and After. A Supplement*, in D. Moggridge (ed.), *The Collected Writings of John Maynard Keynes*, vol. 29, London: Macmillan.

Keynes, J. M. (1982), *Social, Political and Literary Writings in The Collected Writings of John Maynard Keynes*, vol. 28, London: Macmillan.

Kregel, J. A. (1976), "Economic Methodology in the Face of Uncertainty: the Modelling Methods of Keynes and the Post-Keynesians", *Economic Journal*, **86**, 209-25.

Krier, H. and J. Le Bourva (1968), *Economie Politique*, Paris: Librairie Armand Colin.

Krueger, A. B. (2003), "An Interview with Edmond Malinvaud", *Journal of Economic Perspectives*, **17** (1), 181-98.

Krugman, P. (1981), "Trade, Accumulation, and Uneven Development", *Journal of Development Economics*, **8**, 149-61.

Krugman, P. (1987), "Is Free Trade Passé ?", *Journal of Economic Perspectives*, **1** (2), 131-44.

Krugman, P. (1990), *Rethinking International Trade*, Cambridge, MA: MIT Press.

Krugman, P. (1991a), "Increasing Returns and Economic Geography", *Journal of Political Economy*, **99**, 483-99.

Krugman, P. (1991b), *Geography and Trade*, Cambridge, MA: MIT Press.

Krugman, P. (1991c), "History versus Expectations", *Quarterly Journal of Economics*, **106**, 651-67.

Krugman, P. (1996), *Pop Internationalism*, Cambridge, MA: MIT Press.

Kuhn, T. (1962), *The Structure of Scientific Revolutions*, Chicago: University of Chicago Press.

Kurz, H. D. and N. Salvadori (1999), "Reswitching-Simplifying a Famous Example", in H. D. Kurz and N. Salvadori (eds), *Classical Economics and Modern Theory, Studies in Long-period Analysis*, London and New York: Routledge, pp. 299-309.

Kurz, M. (1968), "The General Instability of a Class of Competitive Growth Processes", *Review of Economic Studies*, **25** (2), 155-74.

Lange, O. (1945-46), "The Scope and Method of Economics", *The Review of Economic Studies*, **13** (1), 19-32.

Larudee, M. and T. Koechlin (1999), "Wages, Productivity, and Foreign Direct Investment Flows", *Journal of Economics Issues*, **33** (2), 419-25.

Lautzenheiser, M. and Y. Yasar (2004), "Nell's Theory of Circulation", mimeo.

Lavoie, M. (1992), "Jacques Le Bourva's Theory of Endogenous Credit-Money", *Review of Political Economy*, **4** (94), 436-46.

Lavoie, M. (1995), "The Kaleckian Model of Growth and Distribution and its Neo-Ricardian and Neo-Marxian Critiques", *Cambridge Journal of Economics*, **19**, 789-818.

Lavoie, M. (1996), "The Endogenous Supply of Credit-Money, Liquidity Preference and the Principle of Increasing Risk: Horizontalism Versus the Loanable Funds Approach", *Scottish Journal of Political Economy*, **43** (3), 275-300.

Lavoie, M. (1999), "The Credit-Led Supply of Deposits and the Demand for Money: Kaldor's Reflux Mechanism as Previously Endorsed by Joan Robinson", *Cambridge Journal of Economics*, **23**, 103-13.

Lavoie, M. (2003), "A Primer On Endogenous Credit-Money", in L.-P. Rochon, and S. Rossi (eds), *Modern Theories of Money*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.

Leamer, E. (1998), "In Search of Stolper-Samuelson Linkages between International Trade and Lower Wages", in S. M. Collins (ed.), *Imports, Exports, and the American Worker*, Washington, DC: Brookings Institution.

Leamer, E. (2000), "Foreigners and Robots: Assistants of Some, Competitors of Others", in A. V. Deardorff and R. M. Stern (eds), *Social Dimensions of U.S. Trade Policy*, Ann Arbor: University of Michigan Press, 19-52.

Le Bourva, J. (1992), "Money Creation and Credit Multipliers", *Review of Political Economy*, **4** (4), 447-66.

- León-Ledesma, M. A. (2002), "Accumulation, Innovation and Catching-Up: An Extended Cumulative Growth Model", *Cambridge Journal of Economics*, **26** (2), 201-16.
- Lerner, Abba P. (1957), "Review of Joan Robinson (1956)", *American Economic Review*, **47**, 693-9.
- Lippi, M. (1996), "Joan Robinson on Marx's Theory of Value", in Marcuzzo, Pasinetti and Roncaglia (1996).
- Luxemburg, R. (1951), *The Accumulation of Capital*, London: Routledge Kegan. First published in 1931.
- Mainwaring, L. (1976), "Relative Prices and 'Factor Price' Equalisation in a Heterogeneous Capital Goods Model", *Australian Economic Papers*. Reprinted in Steedman (1979a), pp. 77-89.
- Maki, U. (1989), "On the Problem of Realism in Economics", *Ricerche Economiche*, **43** (1-2), 176-198.
- Malinvaud, E. (1953), "Capital Accumulation and Efficient Allocation of Resources", *Econometrica*, **21** (2), 233-68.
- Maneschi, A. (1983), "Dynamic Aspects of Ricardo's International Trade Theory", *Oxford Economic Papers*, **35** (1), 67-80.
- Maneschi, A. (1992), "Ricardo's International Trade Theory: Beyond the Comparative Cost Example", *Cambridge Journal of Economics*, **16** (4), 421-37.
- Mankiw, N. G. (1995), "The Growth of Nations", *Brookings Papers on Economic Activity*, **25**, 275-310.
- Marcet, J. (1816), *Conversations on Political Economy in which the elements of that science are familiarly explained*, Paternoster Row, Longmans, 7th edition, 1839.
- Marcuzzo, M. C. (2001a), "Sraffa and Cambridge Economics, 1928-1931", in T. Cozzi and R. Marchionatti (eds), *P. Sraffa's Political Economy. A centenary estimate*, London: Routledge, pp. 81-99.
- Marcuzzo, M. C. (2001b), "Joan Robinson: une quête passionnée de la rationalité" in G. C. Harcourt (ed.), *L'économie rebelle de Joan Robinson*, Paris: L'Harmattan, pp. 27-58.
- Marcuzzo, M. C. (ed.) (2001c), "Economists in Cambridge. The letters between Kahn, Keynes, Harrod, J. Robinson, Sraffa, Kaldor and Hayek, 1921-1946", Dipartimento di Scienze Economiche, Università degli Studi di Roma, La Sapienza, Discussion Papers, n. 37.
- Marcuzzo, M. C. (2002), "The Collaboration between J. M. Keynes and R. F. Kahn from the *Treatise*, to the *General Theory*", *History of Political Economy*, **34** (2), 421-47.
- Marcuzzo, M. C. (2003), "Joan Robinson and the Three Cambridge Revolutions", *Review of Political Economy*, **15** (4), 545-60.

- Marcuzzo, M. C. (2004), "Sraffa all'università, di Cambridge", Atti del Convegno "Piero Sraffa", Roma: Accademia Nazionale dei Lincei, pp. 123-55.
- Marcuzzo, M. C. and A. Rosselli (eds) (2005), *Economists in Cambridge: A Study Through Their Correspondence, 1907-1946*, London: Routledge.
- Marcuzzo, M. C. and C. Sardoni (2004), "The Fight for Keynesian Revolution: The Correspondence between Keynes and J. Robinson", in M. C. Marcuzzo and A. Rosselli (eds) (2005).
- Marcuzzo, M. C., L. Pasinetti and A. Roncaglia (eds) (1996), *The Economics of Joan Robinson*, London and New York: Routledge.
- Marglin, S. A. (1984), *Growth, Distribution, and Prices*, Cambridge, MA: Harvard University Press.
- Marglin, S. A. and A. Bhaduri (1990), "Profit Squeeze and Keynesian Theory", in Marglin and Schor (eds) (1990).
- Marglin, S. A. and A. Bhaduri (1991), "Profit Squeeze and Keynesian Theory" (a revised and extended version), in Nell and Semmler (eds) (1991).
- Marglin S. and J. Schor (eds) (1990), *The Golden Age of Capitalism*, Oxford: Clarendon Press.
- Marquetti, A. (2004), "Extended Penn World Tables: Economic Growth Data on 118 Countries", online. <http://homepage.newschool.edu/~foleyd/epwt/>.
- Marshall, A. (1879), *The Pure Theory of International Trade*, reprinted Clifton, NJ: A. M. Kelley, 1974.
- Martineau, H. (1832), *Illustrations of Political Economy*, London: Charles Fox.
- Marty, A. (1991), "A Reminiscence of Joan Robinson", *American Economic Association Newsletter*, October, pp. 5-8.
- Marx, K. (1968), *Theories of Surplus-Value*, Part II, Moscow: Progress Publishers.
- McCombie, J. S. L. and A. P. Thirlwall (eds) (2004), *Essays on Balance of Payments Constrained Growth: Theory and Evidence*, London: Routledge.
- Meade, J. E. (1961), *A Neo-Classical Theory of Economic Growth*, London: Allen and Unwin.
- MECON, Ministerio de Economía y Producción, "Argentina Indicadores Económicos", online <http://www.mecon.gov.ar/>.
- Medio, A. (1978), "A Mathematical Note on Equilibrium in Value and Distribution", *Economic Notes*, by Monte Dei Paschi di Siena, **7** (2-3), 97-106.

Metcalf, J. S. and I. Steedman (1973), "Heterogeneous Capital and the Heckscher-Ohlin-Samuelson Theory of Trade", in J. M. Parkin (ed.), *Essays in Modern Economics*, London: Longman.

Milberg, W. (1994), "Is Absolute Advantage Passé? Towards a Post-Keynesian/Marxian Theory of International Trade", in M. Glick (ed.), *Competition, Technology and Money: Classical and Post-Keynesian Perspectives*, Aldershot, UK and Brookfield, VT, USA: Edward Elgar, pp. 304-22.

Milberg, W. (1997), "Globalization and International Competitiveness", in P. Davidson and J. A. Kregel (eds), *Improving the Global Economy: Keynesianism and the Growth in Output and Employment*, Cheltenham, UK and Lyme, USA: Edward Elgar, pp. 219-36.

Minsky, H. (1957a), "Monetary Systems and Accelerator Models", *American Economic Review*, **47** (6), 859-83.

Minsky, H. (1957b), "Central Banking and Money Market Changes", *Quarterly Journal of Economics*, **71** (2), 171-87.

Moggridge, D. E. (1992), *Maynard Keynes: An Economist's Biography*, London and New York: Routledge.

Moore, B. (1988), *Horizontalists and Verticalists: the Macroeconomics of Credit-Money*, Cambridge: Cambridge University Press.

Moore, B. (2001), "Some Reflections On Endogenous Money", in L.-P. Rochon and M. Vernengo (eds), *Credit, Interest Rates And The Open Economy: Essays on Horizontalism*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.

Morgenstern, O. (1976), [1935] "Perfect Foresight and Economic Equilibrium", translation by F. H. Knight reprinted in A. Schotter and M. I. Nadiri (eds), *Selected Economic Writings of Oskar Morgenstern*, New York: New York University Press, pp. 169-83.

Murata, Y. (1977), *Mathematics for Stability and Optimization of Economic systems*, New York: Academic Press.

Myers, Greg (1997), "Fictionality, Demonstration, and a Forum for Popular Science: Jane Marcet's Conversations on Chemistry", in B. Gates and A. Schier (eds), *Natural Eloquence. Women Reinscribe Science*, Madison: University of Wisconsin Press.

Myrdal, G. (1953), *The Political Element in the Development of Economic Theory*, London: Routledge.

Myrdal, G. (1957), *Economic Theory and Underdeveloped Regions*, London: Duckworth.

Negishi, T. (1961), "Monopolistic competition and general equilibrium", *Review of Economic Studies*, **28**, 196-201.

Nell, E. J. (1967), "Wicksell's Theory of Circulation", *Journal of Political Economy*, **75** (4), 386-94.

Nell, E. J. (1970), "A Note on Cambridge Controversies on Capital Theory", *Journal of Economic Literature*, **8** (1), 41-4.

Nell, E. J. (1975), "The Simple Theory of Effective Demand", in *Political Economy at the New School*, reprinted in Nell (1992).

Nell, E. J. (1988), "On Monetary Circulation and the Rate of Exploitation", in P. Arestis (ed.), *Post-Keynesian Monetary Economics*, Aldershot, UK and Brookfield, VT, USA: Edward Elgar, pp. 72-121.

Nell, E. J. (1992), *Transformational Growth and Effective Demand*, London: Macmillan.

Nell, E. J. (1998), *The General Theory of Transformational Growth*, Cambridge: Cambridge University Press

Nell, E. J. (2003), "Monetizing the Classical Equations", *Cambridge Journal of Economics*.

Nell, E. J. (2004), "The Quantity Equation and the Classical Theory of Production and Distribution", in Mongiovi and Petri (eds), *Proceedings of the Sraffa Conference*.

Nell, E. J. and W. Semmler (eds) (1991), *Nicholas Kaldor and Mainstream Economics*, London: Macmillan.

Nelson, Julie (2003), "Confronting the Science/Value Split: Notes on Feminist Economics, Institutionalism, Pragmatism and Process Thought", *Cambridge Journal of Economics*, **27**, 49-64.

Nelson, R. (1959), "The Simple Economics of Basic Scientific Research", *Journal of Political Economy*, **67** (2), 297-306.

Nooteboom, B. (1986), "Plausibility in economics", *Economics and Philosophy*, **2**, 197-224.

Palley, T. I. (1996), "Inside Debt, Aggregate Demand, and the Cambridge Theory of Distribution", *Cambridge Journal of Economics*, **20**, 465-74.

Palley, T. I. (1997), "Money, Fiscal Policy, and the Cambridge Theorem", *Cambridge Journal of Economics*, **26**, 633-9.

Palley, T. I. (1998), *Plenty of Nothing: The Downsizing of the American Dream and the Case for Structural Keynesianism*, Princeton, NJ: Princeton University Press.

Palley, T. I. (2002a), "Financial Institutions and the Cambridge Theory of Distribution", *Cambridge Journal of Economics*, **26**, 275-7.

Palley, T. I. (2002b), "Economic Contradictions Coming Home to Roost? Does the US Economy Face a Long-term Aggregate Demand Generation Problem?", *Journal of Post Keynesian Economics*, **25**, 9-32.

Palley, T. I. (2003a), "Export-led Growth: Evidence of Developing Country Crowding-out", in P. Arestis, M. Baddeley and J. McCombie (eds), *Globalization, Regionalism, and Economic Activity*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.

Palley, T. I. (2003b), "International Trade, Macroeconomics, and Exchange Rates: Re-examining the Foundations of Trade Policy", unpublished manuscript, Open Society Institute, Washington; paper presented at conference on *Globalization and the Myths of Free Trade*, New School University, New York, April.

Palley, T. I. (2004), "The Economic Case for International Labour Standards", *Cambridge Journal of Economics*, **28** (1), 465-474.

Parguez, A. (2004), "An Inquiry into a Dark Mystery in the History of the Monetary Theory of Production: What Went Wrong with the Early Contribution of Joan Robinson?", paper presented at the *Theory of Monetary Production: Tradition and Perspectives* conference in honour of Augusto Graziani, Benevento, Italy, 5-6 December 2003.

Parguez, A. and M. Seccareccia (2000), "The Credit Theory of Money: The Monetary Circuit Approach", in J. Smithin (ed.), *What is Money?*, London: Routledge.

Pasinetti, L. L. (1960), "Cyclical Fluctuations and Economic Growth", *Oxford Economic Papers*, new series, **12** (2), 215-41.

Pasinetti, L. L. (1962a), *A Multi-sector Model of Economic Growth*, Ph.D dissertation submitted at the Faculty of Economics and Political Science of the University of Cambridge: Cambridge, England.

Pasinetti, L. L. (1962b), "The Rate of Profit and Income Distribution in Relation to the Rate of Growth", *Review of Economic Studies*, **29**, 267-79.

Pasinetti, L. L. (1965), "A New Theoretical Approach to the Problems of Economic Growth", in *Pontificia Academia Scientiarum Scripta Varia*, n. 28; Proceedings of a Study Week on "The Econometric Approach to Development Planning": Vatican City, reprinted by North-Holland, Amsterdam, pp. 572-696.

Pasinetti, L. L. (1973), "The Notion of Vertical Integration in Economic Analysis", *Metroeconomica*, **25**, 1-29.

Pasinetti, L. L. (1980), *Essays on the Theory of Joint Production*, London: Macmillan.

Pasinetti, L. L. (1981), *Structural Change and Economic Growth: A Theoretical Essay on the Wealth of Nations*, Cambridge: Cambridge University Press.

Pasinetti, L. L. (1983), "The Accumulation of Capital", in *The Cambridge Journal of Economics*, **7**, 405-11.

Pasinetti, L. L. (1986), "Theory of Value—A Source of Alternative Paradigms in Economic Analysis", in M. Baranzini and R. Scazzieri (eds), *Foundations of Economics—Structures of Inquiry and Economic Theory*, Oxford: Basil Blackwell, pp. 409-31.

Pasinetti, L. L. (1988), "Growing Sub-systems, Vertically Hyper-integrated Sectors and the Labour Theory of Value", *The Cambridge Journal of Economics*, **12**, 125-34.

Pasinetti, L. L. (1993), *Structural Economic Dynamics: A Theory of the Economic Consequences of Human Learning*, Cambridge: Cambridge University Press.

Pasinetti, L. L. (1994), "Economic Theory and Institutions", in R. Delorme and K. Dopfer (eds), *The Political Economy of Diversity—Evolutionary Perspectives on Economic Order and Disorder*, Aldershot, UK and Brookfield, VT, USA: Edward Elgar, pp. 34-45.

Pasinetti, L. L. (2003), "The Cambridge School of Keynesian Economics", mimeo.

Pollin, R. (2003), *Contours of Descent: U.S. Economic Fractures and the Landscape of Global Austerity*, London: Verso.

Posen, A. S. (1998), *Restoring Japan's Economic Growth*, Washington, DC: Institute for International Economics.

Posen, A. S. (2003), "Is Germany Turning Japanese?", Working Paper No. WP 03-2, Institute for International Economics, Washington, DC.

Ramsey, J. (1928), "A Mathematical Theory of Savings", *Economic Journal*, **38** (152), 543-59.

Razmi, A. (2004), *Three Essays on Balance of Payments-Related Constraints on the Growth of Developing Economies*, unpublished doctoral dissertation, American University, Washington, DC.

Reddy, A. (2003), "Stocks Fall as G7 Statement Raises Dollar Worries", *The Washington Post*, 23 September 2003, E1, E3.

Ricardo, D. (1821), *Principles of Political Economy and Taxation*, 3rd edition, P. Sraffa (ed.), Cambridge: Cambridge University Press, 1951.

Ricardo, D. (1965) [1821], *Principles of Political Economy and Taxation*, 3rd edition, London: Dent Dutton.

Rima, I. H. (1991), "Robinson and the 'Other Half' of the Keynesian Revolution", in I. H. Rima (ed.), *The Joan Robinson Legacy*, Armonk, NY: M. E. Sharpe.

Rima, I. H. (2003), "From Profit Margins to Income Distribution: Joan Robinson's Odyssey from Marginal Productivity Theory", *Review of Political Economy*, **15** (4), 575-86.

Roberts, M. (2003), "History versus Equilibrium: A Debate Revisited", Department of Land Economy, University of Cambridge, paper

presented at the 4th Analytical Political Economy Conference, Trinity College, Hartford, Connecticut.

Robertson, D. (1931), "Wage-grumbles", *Economic Fragments*, London: P. S. King and Son. Reprinted in W. Fellner and B. F. Haley (eds) (1946), *Readings in the Theory of Income Distribution*, Homewood, IL: Richard D. Irwin, pp. 221-36.

Robertson, D. H., G. F. Shove and P. Sraffa (1930), "Increasing Returns and the Representative Firm: A symposium", *Economic Journal*, **40**, 79-116.

Robinson, E. A. G. (1931), *The Structure of Competitive Industry*, Cambridge: Cambridge University Press.

Robinson, E. A. G. (1941), *Monopoly*, Cambridge: Cambridge University Press.

Robinson, E. A. G. (1994), "Richard Kahn in the 1930s", *Cambridge Journal of Economics*, **18** (1), 7-10.

Robinson, J. (1932), *Economics as a Serious Subject. The Apologia of an Economist to the Mathematician, the Scientists and the Plain Man*, Cambridge: Heffer.

Robinson, J. (1933a), *The Economics of Imperfect Competition*, London: Macmillan. 2nd edition, 1969.

Robinson, J. (1933b), "The Theory of Money and the Analysis of Output", *Review of Economic Studies*, **1**, 22-6. Reprinted in Robinson (1951a), pp. 52-8.

Robinson, J. (1933c), "A Parable of Saving and Investment", *Economica*, (NS, 13), 75-84.

Robinson, J. (1936), "Some Reflections on Marxist Economics (a review of Strachey (1935))", *Economic Journal*, **46**, 298-302.

Robinson, J. (1937a), "The Long Period Theory of Employment", in *Essays in the Theory of Employment*, London: Macmillan.

Robinson, J. (1937b), *Introduction to the Theory of Employment*, London: Macmillan. 2nd edition, 1969.

Robinson, J. (1938), "The Classification of Inventions", *Review of Economic Studies*, **5** (2), 139-42.

Robinson, J. (1947), *Essays in the Theory of Employment*, 2nd edition, Oxford: Basil Blackwell. First published 1937.

Robinson, J. (1948), "Marx and Keynes", translated from Italian and reprinted in Robinson (1951a), pp. 133-45.

Robinson, J. (1949a), "Mr. Harrod's Dynamics", *Economic Journal*, **59**, 68-85. Reprinted in Robinson (1951a), pp. 155-74.

Robinson, J. (1949b), "Theory of Planning. Review of Maurice Dobb, *Soviet Economic Development Since 1917*", *Soviet Studies*, **1**, 60-64.

Robinson, J. (1951-80), *Collected Economic Papers*, Oxford: Basil Blackwell.

Robinson, J. (1951a), *Collected Economic Papers*, vol. I, Oxford: Basil Blackwell.

Robinson, J. (1951b), "Marx and Keynes", in *Collected Economic Papers*, vol. I, Oxford: Blackwell.

Robinson, J. (1951c), "Introduction", to the English edition of Rosa Luxemburg's *The Accumulation of Capital*, reprinted in Robinson (1975b), pp. 59-73.

Robinson, J. (1952a), *The Rate of Interest and Other Essays*, London: Macmillan.

Robinson, J. (1952b), "The Model of an Expanding Economy", *Economic Journal*, reprinted in Robinson (1975b), pp. 74-87.

Robinson, J. (1953a), "The Production Function and the Theory of Capital", *Review of Economic Studies*, **21** (2), 81-106. Reprinted in abbreviated form with a postscript in Robinson (1960a), pp. 114-31.

Robinson, J. (1953b), *On Re-Reading Marx*, in Robinson (1973a), pp. 247-68.

Robinson, J. (1955), "Marx, Marshall and Keynes", in Robinson (1975b), pp. 1-17.

Robinson, J. (1956a), *The Accumulation of Capital*, London: Macmillan, 2nd edition, 1965, 3rd edition, 1969.

Robinson, J. (1956b), *The Accumulation of Capital*, London: Blackwell.

Robinson, J. (1956c), *The Accumulation of Capital*, Homewood, IL: Irwin.

Robinson, J. (1959a), "Accumulation and the Production Function", *Economic Journal*, **69** (275), 433-42. Reprinted in Robinson 1960a, pp. 132-44.

Robinson, J. (1959b), "A comment", *Oxford Economic Papers*, **11**, 141-2.

Robinson, J. (1960a), *Collected Economic Papers*, vol. II, Oxford: Basil Blackwell.

Robinson, J. (1960b), "Imperfect Competition, Revisited", in *Collected Economic Papers*, vol. II, Oxford: Blackwell. First published 1953.

Robinson, J. (1960c), "Rosa Luxemburg's *Accumulation of Capital*", in *Collected Economic Papers*, vol. II, Oxford: Blackwell. First published 1951.

Robinson, J. (1960d), *Exercises in Economic Analysis*, London: Macmillan.

- Robinson, J. (1961a), *Essays in the Theory of Economic Growth*, London: Macmillan.
- Robinson, J. (1961b), "Own Rates of Interest", *Economic Journal*, **71**, 596-600.
- Robinson, J. (1962a), *Essays in the Theory of Economic Growth*, London: Macmillan.
- Robinson, J. (1962b), *Economic Philosophy*, Middlesex, England: Penguin.
- Robinson, J. (1962c), "Review of H. G. Johnson, *Money, Trade and Economic Growth*", *Economic Journal*, **72**, 690-92. Reprinted as "The General Theory, After Twenty-five Years", in *Collected Economic Papers*, vol. III, Oxford: Blackwell, 1965, pp. 100-102.
- Robinson, J. (1962d), "A Model of Accumulation", in *Essays in the Theory of Economic Growth*, London: Macmillan, pp. 22-87.
- Robinson, J. (1964), *Economic Philosophy*, Harmondsworth, Middlesex: Penguin Books.
- Robinson, J. (1965a), "The General Theory After Twenty-Five Years", in *Collected Economic Papers*, vol. III, Oxford: Basil Blackwell, pp. 100-102.
- Robinson, J. (1965b), "General Liquidity", *Collected Economic Papers*, vol. III, pp. 125-31, Oxford, Basil Blackwell. Originally published in *The Banker*, December, 1960.
- Robinson, J. (1965c), "Own Rates of Interest (Postscript)", *Collected Economic Papers*, vol. III, pp. 132-38, Oxford: Basil Blackwell.
- Robinson, J. (1966a), *An Essay on Marxian Economics*, London: Macmillan. First published in 1942.
- Robinson, J. (1966b), *Economics: An Awkward Corner*, London: George Allen and Unwin.
- Robinson, J. (1969a) [1956], *The Accumulation of Capital*, London: Macmillan. 3rd edition.
- Robinson, J. (1969b), *The Economics of Imperfect Competition*, London: Macmillan. 2nd edition.
- Robinson, J. (1970a), *Freedom and Necessity. An Introduction to the Study of Society*, London: George Allen and Unwin.
- Robinson, J. (1970b), "Quantity Theories Old and New: A Comment", *Journal of Money, Banking and Credit*, **2**, 504-12.
- Robinson, J. (1971), *Economic Heresies*, London and Basingstoke: Macmillan.
- Robinson, J. (1973a), *Collected Economic Papers*, vol. IV, Oxford: Basil Blackwell.

- Robinson, J. (1973b), "Introduction to *On Re-Reading Marx*", in *Collected Economic Papers*, vol. IV, Oxford: Blackwell.
- Robinson, J. (1973c), "Would You Believe It?", in *Collected Economic Papers*, vol. IV, Oxford: Blackwell. First published 1953.
- Robinson, J. (1973d), "Preface" to J. A. Kregel, *The Reconstruction of Political Economy: an Introduction to Post-Keynesian Economics*, London: Macmillan.
- Robinson, J. (1974), "History versus Equilibrium", *Thames Papers in Political Economy*, Thames Polytechnic, London. Reprinted in Joan Robinson (1979a), pp. 48-58.
- Robinson, J. (1975a), "The Unimportance of Reswitching", *Quarterly Journal of Economics*, **89** (1), 32-9.
- Robinson, J. (1975b), *Collected Economic Papers*, vol. II, Oxford: Basil Blackwell. 2nd edition.
- Robinson, J. (1977a), "What are the Questions?", *Journal of Economic Literature*, **15** (4), 1318-39.
- Robinson, J. (1977b), "The Meaning of Capital", *Revue d'Economie Politique*, English language draft in Robinson (1979a), pp. 59-70.
- Robinson, J. (1977c), "Michal Kalecki on the Economics of Capitalism", *Bulletin of the Oxford Institute of Economics and Statistics*, **39**, 7-17.
- Robinson, J. (1978a), *Contributions to Modern Economics*, Oxford: Blackwell.
- Robinson, J. (1978b), "Reminiscences" in Robinson (1978a).
- Robinson, J. (1978c), "The Production Function and the Theory of Capital", in Robinson (1978a).
- Robinson, J. (1978d), "Keynes and Ricardo", in Robinson (1979a), pp. 210-16.
- Robinson, J. (1979a), *Collected Economic Papers*, vol. V, Oxford: Basil Blackwell.
- Robinson, J. (1979b), *Aspects of Development and Underdevelopment*, Cambridge: Cambridge University Press, 2nd edition, 1981.
- Robinson, J. (1979c), "Introduction" in *The Generalization of the General Theory and other Essays*, London: Macmillan.
- Robinson, J. (1980a), *What Are the Questions? And Other Essays*, Armonk, NY: Sharpe.
- Robinson, J. (1980b), "Survey: 1950s", in *Further Contributions to Modern Economics*, Oxford: Blackwell.
- Robinson, J. (1980c), "Debate: 1970s", in *Further Contributions to Modern Economics*, Oxford: Blackwell.

- Robinson, J. (1980d), "Misunderstanding in the Theory of Production", in *Further Contributions to Modern Economics*, Oxford: Blackwell.
- Robinson, J. (1980e), "Debate: 1980", in *Further Contributions to Modern Economics*, Oxford: Blackwell.
- Robinson, J. (1980f), "Spring Cleaning", Cambridge, mimeo. Published as "The Theory of Normal Prices and the Reconstruction of Economic Theory", in Feiwel (1985b), pp. 157-65.
- Robinson, J. (1985), "The Theory of Normal Prices and the Reconstruction of Economic Theory", in Feiwel (1985b).
- Robinson, J. and A. Bhaduri (1980), "Accumulation and Exploitation: an Analysis in the Tradition of Marx, Sraffa, and Kalecki", *Cambridge Journal of Economics*, **4** (2), 103-15.
- Robinson, J. and D. Morison (1951), "Beauty and the Beast", *Collected Economic Papers*, I, 1951, pp. 225-33.
- Robinson, J. and K. A. Naqvi (1967), "The Badly Behaved Production Function", *Quarterly Journal of Economics*, **81** (4), 579-91.
- Rochon, L.-P. (1997), "Keynes's Finance Motive: A Re-Assessment. Credit, Liquidity Preference And The Rate Of Interest", *Review Of Political Economy*, **9** (3), 277-93.
- Rochon, L.-P. (1999), *Credit, Money and Production: An Alternative Post-Keynesian Approach*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
- Rochon, L.-P. (2001), "Cambridge's Contribution to Endogenous Money: Robinson and Kahn and Credit and Money", *Review of Political Economy*, **13** (3), 287-307.
- Rochon, L.-P. and S. Rossi (2005), "Endogenous Money: the Evolutionary versus Revolutionary views", Laurentian University and University of Fribourg.
- Rodrik, D. (1997), *Has Globalization Gone Too Far?*, Washington, DC: Institute for International Economics.
- Rodrik, D. (1998), "Who Needs Capital-Account Convertibility?", in S. Fischer *et al.* (eds), *Should the IMF Pursue Capital Account Convertibility? Essays in International Finance*, no. 207, Princeton, NJ: International Finance Section, Department of Economics, Princeton University, May.
- Rogoff, K. (1996), "The Purchasing Power Parity Puzzle", *Journal of Economic Literature*, **34** (2), 647-68.
- Romer, P. M. (1990), "Endogenous Technological Change", *The Journal of Political Economy*, **98** (5) Part 2: "The Problem of Development: A Conference of the Institute for the Study of Free Enterprise Systems", pp. S71-S102.

- Rosenstein-Rodan, P. N. (1943), "Problems of Industrialization of Eastern and South-eastern Europe", *Economic Journal*, **53**, 202-21.
- Rosselli, A. (2001), "Piero Sraffa and Joan V. Robinson", in M. C. Marcuzzo (2001c).
- Rosselli, A. (2004), "The Unlooked for Proselytiser. J. Robinson and the Correspondence with Sraffa, Harrod and Kaldor", in M. C. Marcuzzo and A. Rosselli (eds) (2005).
- Rothschild, E. (2002), *Economic Sentiments: Adam Smith, Condorcet, and the Enlightenment*, Cambridge: Cambridge University Press.
- Rousseas, S. (1960), "Velocity Changes and the Effectiveness of Monetary Policy, 1951-1957", *Review of Economics and Statistics*, February, **42** (1), 27-36.
- Rowthorn, B. (1982), "Demand, Real Wages, and Economic Growth", *Studi Economici*, **18**, 3-53.
- Rymes, T. K. (1971), *On Concepts of Capital and Technical Change*, Cambridge: Cambridge University Press.
- Sachs, J. (1987), "High Unemployment in Europe. Diagnosis and Policy Implications", in C. Henrie (ed.), *Unemployment in Europe*, Stockholm: Timbro.
- Sachs, J. and H. Shatz (1998), "International Trade and Wage Inequality in the United States: Some New Results", in S. M. Collins (ed.), *Imports, Exports, and the American Worker*, Washington, DC: Brookings Institution.
- Salanti, A. (1996), "Joan Robinson's changing views on method", in M. C. Marcuzzo, *et al.* (eds) (1996) pp. 285-99.
- Salvadori, N. (1996), "Productivity Curves in *The Accumulation of Capital*", in Marcuzzo, *et al.*, pp. 232-48.
- Samuelson, P. (1947), *Foundations of Economic Analysis*, Cambridge, MA: Harvard University Press.
- Samuelson, P. (1949), "International Factor-Price Equalisation Once Again", *Economic Journal*, **59**, 181-97.
- Samuelson, P. (1962a), "The Gains from International Trade Once Again", *Economic Journal*, **72**, 820-29.
- Samuelson, P. (1962b), "Parable and Realism in Capital Theory: the Surrogate Production Function", *Review of Economic Studies*, **29**, 193-206.
- Samuelson, P. (1966), in Symposium (1966).
- Samuelson, P. (1967), "Indeterminacy of Development in a Heterogeneous-capital model with Constant Saving Propensity", in Shell (1967), pp. 219-31.

- Samuelson, P. (1975), "Steady-state and Transient Relations: a Reply on Reswitching", *Quarterly Journal of Economics*, **89** (1), 40-47.
- Samuelson, P. (1989), "Remembering Joan", in Feiwel (1989b).
- Sardoni, C. (1987), *Marx and Keynes on Economic Recession*, New York: New York University Press.
- Sardoni, C. (1989), "Some Aspects of Kalecki's Theory of Profits: Its Relationship to Marx's Schemes of Reproduction", in M. Sebastiani (ed.) (1989), pp. 206-19.
- Sardoni, C. (1997), "Keynes and Marx", in G. Harcourt and P. Riach (eds) (1997), pp. 261-83.
- Sardoni, C. (1998), "Marx's Theory of Money and Interest: A Reconsideration in the light of Robertson and Keynes", in Bellofiore (1998).
- Saxton, J. (2003), "Argentina's Economic Crisis: Causes and Cures", Joint Economic Committee, United States Congress, Washington, DC.
- Schefold, B. (1976), "Different Forms of Technical Progress", *Economic Journal*, **86** (344), 806-19.
- Schefold, B. (1979), "Capital, Growth, and Definitions of Technical progress", *Kyklos*, **32**, 236-50.
- Schefold, B. (1980), "Fixed Capital as a Joint Product and the Analysis of Accumulation with Different Forms of Technical Progress", in Pasinetti (1980).
- Schefold, B. (1997), *Normal Prices, Technical Change and Accumulation*, Basingstoke: Macmillan Press.
- Schefold, B. (2000), "Paradoxes of Capital and Counterintuitive Changes of Distribution in an Intertemporal Equilibrium Model," in H. Kurz, (ed) *Critical Essays on Piero Sraffa's Legacy in Economics*, Cambridge: University Press, pp. 363-91.
- Schelling, T. (1978), *Micromotives and Macrobehavior*, New York: Norton.
- Schlicht, E. (1985), *Isolation and Aggregation in Economics*, Berlin: Springer-Verlag.
- Schumpeter, J. (1912), *Theory of Economic Development*, Cambridge, MA: Harvard University Press, English translation, 1934.
- Schumpeter, J. (1943), *Capitalism, Socialism and Democracy*, London: George Allen Unwin.
- Schumpeter, J. (1954), *The History of Economic Analysis*, Oxford: Oxford University Press.
- Sebastiani, M. (ed.) (1989), *Kalecki's Relevance Today*, London: Macmillan.
- Seccareccia, M. (1996), "Post-Keynesian Fundism And Monetary Circulation", in Deleplace and Nell (eds) (1996), pp. 400-16.

- Semmler, W. (ed.) (1986), *Competition, Instability, and Nonlinear Cycles*, Berlin: Springer-Verlag.
- Semmler, W. (ed.) (1989), *Financial Dynamics and Business Cycles, New Perspectives*, Armonk, NY: M. E. Sharpe.
- Sen, A. K. (1960), *Choice of Techniques. An Aspect of the Theory of Planned Development*, Oxford: Blackwell.
- Setterfield, M. (1997a), "Should Economists Dispense with the Notion of Equilibrium?", *Journal of Post Keynesian Economics*, **20** (1), 47-76.
- Setterfield, M. (1997b), *Rapid Growth and Relative Decline. Modelling Macroeconomic Dynamic with Hysteresis*, London and Basingstoke: Macmillan.
- Setterfield, M. (1997c), "'History versus Equilibrium' and the Theory of Economic Growth", *Cambridge Journal of Economics*, **21**, 365-78.
- Setterfield, M. (2001), "Cumulative Causation, Interrelatedness and the Theory of Economic Growth: a Reply to Argyrous and Toner", *Cambridge Journal of Economics*, **25**, 107-12.
- Setterfield, M. (2003), "Keynes's Dialectic?", *Cambridge Journal of Economics*, **27**, 359-76.
- Setterfield, M. and J. Cornwall (2002), "A Neo-Kaldorian Perspective on the Rise and Decline of the Golden Age", in M. Setterfield (ed.), *The Economics of Demand-led Growth: Challenging the Supply-side Vision of the Long Run*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
- Shackle, G. (1968), *A Scheme of Economic Theory*, Cambridge, UK: Cambridge University Press.
- Shafir, E. and D. Kahneman (1999), "Heuristics and Biases", in P. Earl and S. Kemp (eds), *The Elgar Companion to Consumer Research and Economic Psychology*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
- Shell, K. (ed.) (1967), *Essays on the Theory of Optimal Economic Growth*, Cambridge, MA: MIT Press.
- Shell, K. and J. Stiglitz (1967), "The Allocation of Investment in a Dynamic Economy", *Quarterly Journal of Economics*, **81**(4), 592-609.
- Shove, G. F. (1944), "Mrs. Robinson on Marxian Economics", *Economic Journal*, **54**, 47-61.
- Silberberg, E. and W. Suen (2001), *The Structure of Economics: A Mathematical Analysis*, New York: Irwin/McGraw-Hill.
- Silverberg, G., G. Dosi and L. Orsenigo (1988), "Innovation, Diversity and Diffusion: a Self-organization Model", *Economic Journal*, **98**, 1032-54.

Skillman, G. (1991), "Efficiency vs. Control: A Strategic Bargaining Analysis of Capitalist Production", *Review of Radical Political Economics*, **23**, 12-21.

Skott, P. (1984), "The Non-existence of Disequilibrium", in P. Nøregård Rasmussen (ed.) *Økonomiske Essays*, Copenhagen: Akademisk Forlag.

Skott, P. (1989), *Conflict and Effective Demand in Economic Growth*, Cambridge: Cambridge University Press.

Smith, A. (1776), *An Inquiry into the Nature and Causes of the Wealth of Nations*, (ed.) Edwin Cannan, New York: Modern Library, 1937.

Smith, M. A. M. (1979), "Intertemporal Gains from Trade", *Journal of International Economics*, **9**, 239-48.

Smithin, J. (1994), *Controversies In Monetary Economics: Ideas, Issues And Policy*, Aldershot, UK and Brookfield, VT, USA: Edward Elgar.

Smithin, J. (2000), *What is Money?*, London: Routledge.

Solow, R. M. (1956), "A Contribution to the Theory of Economic Growth", *Quarterly Journal of Economics*, **70**, 65-94.

Solow, R. M. (1957), "Technical Change and the Aggregate Production Function", *Review of Economics and Statistics*, **39**, 312-20.

Spaventa, L. (1968), "Realism without Parables in Capital Theory", in *Recherches récentes sur la fonction de production*, Namur: Centre d'Etudes et de Recherches, Universitaire de Namur.

Spaventa, L. (1970), "Rate of Profit, Rate of Growth and Capital Intensity in a Simple Production Model", *Oxford Economic Papers*, **22**, 129-47.

Sraffa, P. (1925), "Sulle relazioni fra costo e quantità prodotta", *Annali di Economica*, **11**, 277-328.

Sraffa, P. (1926), "The Laws of Returns Under Competitive Conditions", *Economic Journal*, **36**, 535-50.

Sraffa, P. (1936), "Letter to Joan Robinson", reprinted in W. Bradford and G. C. Harcourt (eds) (1997), "Units and Definitions", Ch. 7 in G. C. Harcourt and P. Riach (eds), pp. 130-31.

Sraffa, P. (1951), "Introduction to D. Ricardo, *Principles of Political Economy and Taxation*", in P. Sraffa (ed.) with the collaboration of M. Dobb, *Works and Correspondence of David Ricardo*, vol. I, Cambridge: Cambridge University Press.

Sraffa, P. (1960), *Production of Commodities by Means of Commodities. Prelude to a Critique of Economic Theory*, Cambridge: Cambridge University Press.

Steedman, I. (ed.) (1979a), *Fundamental Issues in Trade Theory*, New York: St. Martin's Press.

Steedman, I. (1979b), *Trade Amongst Growing Economies*, Cambridge: Cambridge University Press.

Steedman, I. (1984), "Natural Prices, Differential Profit-rates and the Classical Competitive Process", *Manchester School*, **52** (2), 123-40.

Steedman, I. and J. S. Metcalfe (1973), "On Foreign Trade," *Economia Internazionale*. Reprinted in Steedman (ed.) (1979a).

Steedman, I. and J. S. Metcalfe (1977), "Reswitching, Primary Inputs and the Heckscher-Ohlin-Samuelson Theory of Trade", *Journal of International Economics*, reprinted in Steedman (ed.) (1979a).

Steindl, J. (1952), *Maturity and Stagnation in American Capitalism*, Oxford: Blackwell. Reprinted New York: Monthly Review Press, 1976.

Stigler, G. (1987) [1952, 1966] *The Theory of Price*, New York: Macmillan, 4th edition.

Stiglitz, J. (2002), *Globalization and its Discontents*, New York, NY: W. W. Norton and Company.

Stolper, W. and P. Samuelson (1941), "Protection and Real Wages", *Review of Economic Studies*, **9**, November, 58-73.

Strachey, J. (1935), *The Nature of Capitalist Crises*, London: Victor Gollancz.

Swan, T. W. (1956), "Economic Growth and Capital Accumulation", *Economic Record*, **32**, 334-62.

Symposium (1966), "Paradoxes in Capital Theory: A Symposium", *Quarterly Journal of Economics*, **80** (4), 503-83.

Tahir, P. (1990a), *Some Aspects of Development and Underdevelopment: Critical Perspectives on Joan Robinson*, unpublished Ph.D dissertation, Cambridge.

Tahir, P. (1990b), "Making Sense of Joan Robinson on China", mimeo, Cambridge.

Tahir, P., G. C. Harcourt and P. Kerr (2002), "On Joan Robinson and China", in P. Kerr. and G. C. Harcourt (eds) (2002), pp. 267-80.

Targetti, F. and A. Thirlwall (1989), *The Essential Kaldor*, London: Duckworth.

Taylor, L. (1981), "South-North Trade and Southern Growth: Bleak Prospects from a Structuralist Point of View", *Journal of International Economics*, **11**, 589-602.

Taylor, L. (1983), *Structuralist Macroeconomics*, New York: Basic Books.

Taylor, L. (1988), *Varieties of Stabilization Experience: Toward Sensible Macroeconomics in the Third World*, Oxford: Clarendon/Oxford University Press.

Taylor, L. (1991), *Income Distribution Inflation and Growth: Lectures on Structuralist Macroeconomic Theory*, Cambridge, MA: MIT Press.

Taylor, L. (2004), "Exchange Rate Indeterminacy in Portfolio Balance, Mundell-Fleming, and Uncovered Interest Parity Models", *Cambridge Journal of Economics*, **28** (2), 205-27.

Taylor, L., E. Bacha, E. Cardoso and F. Lysy (1980), *Models of Growth and Distribution for Brazil*, New York and London: Oxford University Press.

Termini V. (1981), "Logical, Mechanical and Historical Time in Economics", *Economic Notes*, Montel dei Paschi di Siena **10** (3), 58-74.

Thurow, L. (1977), "Economics, 1977", *Daedalus*, **5** (106), 79-94.

Tobin, J. (1975), "Keynesian Models of Recession and Depression", *American Economic Review*, **65** (2), 195-202.

Trefler, D. (1993), "International Factor Price Differences: Leontief Was Right!", *Journal of Political Economy*, **101** (6), 961-87.

Trefler, D. (1995), "The Case of the Missing Trade and Other Mysteries", *American Economic Review*, **85** (5), 1029-46.

Turner, M. S. (1989), *Joan Robinson and the Americans*, Armonk, NY: M. E. Sharpe.

Uzawa, H. (1961), "On a Two-Sector Model of Economic Growth", *Review of Economic Studies*, **29** (1), 40-47.

Uzawa, H. (1963), "On a Two-Sector Model of Economic Growth II", *Review of Economic Studies*, **30** (2), 105-18.

Van de Klundert, T. and A. Van Schaik (1990), "Unemployment Persistence and Loss of Productive Capacity: A Keynesian Approach", *Journal of Macroeconomics*, **12** (3), 363-80.

Vanek, J. (1963), "Variable Factor Proportions and Inter-Industry Flows in the Theory of International Trade", *Quarterly Journal of Economics*, **77**, 129-42.

Weller, C. and L. Singleton (2002), "Reining in Exchange Rates: A Better Way to Stabilize the Global Economy", Briefing Paper, Economic Policy Institute, Washington, DC.

Williams, J. H. (1929), "The Theory of International Trade Reconsidered", *Economic Journal*, **39**, June, 195-209. Reprinted in H. Ellis and L. Metzler (eds) (1950).

Williamson, J. and M. H. Miller (1987), *Targets and Indicators: A Blueprint for the International Coordination of Economic Policy*, Washington, DC: Institute for International Economics.

Wray, R. (1990), *Money And Credit In Capitalist Economies: The Endogenous Money Approach*, Aldershot, UK and Brookfield, VT, USA: Edward Elgar.

World Bank (2004), *World Development Indicators* online <http://www.worldbank.org/data/wdi2005/index.html>.

Worswick, G. D. N. (1959), "Mrs. Robinson on Simple Accumulation: A Comment with Algebra", *Oxford Economic Papers*, **11**, 129-141.

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