The "Structure of Revolutions" in Economic Thought

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I

THIS ESSAY has a simple thesis. That thesis is that neither conventional incrementalism or "uniformitarianism" on the one hand, nor Thomas Kuhn's "catastrophic" theory of scientific revolution[1] on the other, fits the broad sweep of economic doctrinal history particularly well, over its quarter-millennium of relative independence from "moral philosophy». Furthermore, a crude Hegelian dialectic of thesis-antithesis-synthesis may fit the principal facts of that history less badly than either of the two rivals I have mentioned.

All this may mean only that economics is a branch of study insufficiently developed, insufficiently innovative, or insufficiently scientific to have undergone scientific revolutions in Kuhn's sense. It may mean that people's individual and class interests have shunted economics off into "ideology" in the pejorative sense of that term. It may also be that Kuhn has generalized too rapidly from too small a sample of revolutions within the natural sciences which he treats. I shall not venture upon so controversial a controversy as these three subtheses would require. My immediate sympathies are with the third and last. Many people's sympathies are with the other two, if I may judge by the discussion which followed an oral seminar presentation of this paper in preliminary form.[2]

By "incrementalism" I mean a conventional interpretation of a science as developing from one experiment to the next or from one volume of a journal to the next, via a gradually changing "paradigm" of "normal science", in Kuhn's terms. The historians' term is "uniformitarianism», which stresses the almost unchanging paradigm which is supposedly at the root of the successive increments of progress. The label "catastrophic" for Kuhn's rival theory also comes from the historians of science. The "catastrophe" involved is the complete disappearance of a paradigm, or a mode or framework of thought 'and language in some branch of science, following a revolutionary upheaval.[3] Professor A. W. Coats seems to have been the first to apply this type of analysis to the history of economic thought in particular.[4]

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[1] Kuhn, *The Structure of Scientific Revolutions* (Chicago, 1962).

[2] This seminar took place at Temple University, Philadelphia, on 22 February 1968. I am grateful to Professor Karl Niebyl for inviting mo to give the paper at Temple, for leading the subsequent discussion, and for stimulating comments thereafter.

[3] Professor George J. Stigler notes–as an obstacle to an empirical testing of Kuhn's theory–the imprecision of his definition of the key term "paradigm". "Has Economics a Useful Past?" *History of Political Economy* 1 (Fall 1969): 223. The definition in the present text is my own.

[4] A. W. Coats, "Is There a 'Structure of Scientific Revolutions' in Economics?" *Kyklos* 22 (1969) :289-94.

II

According to the incremental-uniformitarian theory, *scientia*, like *natura, non facit saltum.* This is hardly the whole truth, Alfred Marshall's authority to the contrary notwithstanding. It would be difficult for any of my middle-aged contemporaries to maintain otherwise, after living through the Keynesian *émeute*—if it was not a true "revolution"—the Chicago counterattack—if it is not a true "counterrevolution"—and more recently the revival of radical political economy, all in the span of a normal professional career.

The difficulty with the catastrophic theory is that, if I understand Kuhn correctly, it maintains that paradigms, once displaced, are displaced definitively and relegated to the antiquarian's dustbin. Ptolemaic astronomy, phlogistonic chemistry, and humoral medicine are examples from natural sciences; Social Darwinism may be an example from anthropology and sociology. But in economics, where are their equivalents? Currently fashionable incomes-policy proposals are based on elements of the medieval *justum pretium.* Synonyms for "forestalling", "engrossing", and "regrating" grace contemporary trade-regulation decisions toy both courts and administrative agencies. Few elements in anyone's form of mercantilism have missed revival in connection with my generation's dollar-shortage, dollar-glut, and world-liquidity crises. A French, physiocrat or *économiste* of the eighteenth century is brain brother to an American agricultural fundamentalist of the twentieth. The Keynesian and the Hicksian crosses—paradigms in the most literal sense of the term—have supplemented but never displaced the Marshallian cross of supply and demand. The quantity theory of money, once considered moribund, has been resuscitated, after a brief trance, by Professor Milton Friedman and his Chicago colleagues. Economic paradigms, economic "normal science», both display a certain tenacity Kuhn has not found in the natural sciences across the quadrangle. (The explanation and significance of this difference I have already promised not to explore).

III

When considering revolution in the history of economic thought, one faces at least four sub-subjects. The first three of these are situations which approximate such revolutions in the past. The fourth sub-subject is the present state of the discipline, viewed as potentially prerevolutionary.

The first two possible revolutions are related to the classical school. The first is a laissez-faire revolution, associated with the rise of this school. A conventional date is 1776, when Adam Smith's *Wealth of Nations* was published; I should myself prefer 1752, the publication date of David Hume's *Political Discourses,* which anticipated Smith in so many matters of both positive and normative economics. The second possible revolution is the breakup of the classical school which followed Smith, and which was led in turn by David Ricardo and John Stuart Mill. A conventional date for this second, or "utility", revolution is 1870. The third possible revolution is the breakup of the neoclassical Cambridge School which arose from the utility revolution under the aegis of Alfred Marshall and his successor A. C. Pigou. This revolution occurred during the Great Depression. A conventional date is 1936, the appearance of J. M. Keynes's *General*

Theory, although the initial skirmishes were fought in 1933 on the quite different front of imperfect competition[5] None of these three revolutions would rank—for a noneconomist, at least—with the Copernican, Newtonian, and Darwinian revolutions in astronomy, physics, and biology, but they are the best economics has to offer.

IV

In thinking about these watersheds in the history of economic thought, I became accustomed to use an elementary sort of Hegelian dialectic. Some hints of it appeared in a review article written in 1953.[6] In reading Kuhn's work, which has set off so much later discussion, I have wondered about the extent to which it may be indebted directly or indirectly to some similar notion. (Kuhn's own catastrophic theory sounds sometimes like a sophisticated grandson or grandnephew of the Hegelian or Marxian dialectic).

The Hegelian dialectic, as is well known, involves a basic thesis or orthodoxy. This corresponds to Kuhn's term "normal science" and includes a set of what Kuhn calls "standard paradigms". An example is the classical economics of the Ricardian system. Two of its standard paradigms are the law of diminishing returns to labor and the differential theory of rent. With the passing of the generations, a thesis hardens from doctrine to dogma. Its choirs of angels become choirs of parrots, chanting "supply and demand", "full employment", or "planned society" as the case may be. At the same time, according to Professor Samuel Bowles, there is leached out of the original thesis whatever implications seem threatening to the ruling class. In the classical-economic case, the "economic disharmony" between the worker and the capitalist and that between the landlord and the rest of society are examples.[7]

Because the thesis turns apologetic, repetitive, and lifeless and also because problems arise for which the answers stemming from orthodox paradigms are either lacking or unacceptable, there develop antitheses to every thesis. (I use the plural intentionally; there usually develop more than one antithesis at a time). Antitheses often begin as objections to one or another conclusion or implication of orthodox analysis, or of what is called *die Schule* in Germany. They subsequently spread to cover a broad spectrum of the analytical techniques, insights, and methodology of the entire orthodox system. An example is the neo-Cambridge school, led by such economists as Nicholas Kaldor and Joan Robinson. Their revolt was directed originally against certain apologetic implications of pure competition. Opposition spread, to include the orthodox advocacy of wage cuts as the sovereign remedy for unemployment. It currently threatens such orthodox bastions as the definability of capital, the validity of the production function, and the usefulness of comparative statics as an approximation to economic dynamics.

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[5] E. H. Chamberlin's *Monopolistic Competition* and Joan Robinson's *Imperfect Competition* both appeared in that year.

[6] M. Bronfenbrenner, "Contemporary Economics Resurveyed" *Journal of Political Economy* 61 (1953):167 f.

[7] Bowles, cited in *Union for Radical Political Economics Newsletter* (Fall 1969), p. 3. Another of Bowles's examples, utility theory, fails to fit his pattern. The apologetic aspects of utility theory seem to have been strongest among its earlier Austrian proponents, not to mention the American J. B. Clark. The development of skeptical doubts among the generally orthodox came relatively late. The first (1913) edition of Pigou's *Wealth and Welfare* is the major case in point.

In their early stages, antitheses are often intuitive and ill-structured. They are sometimes childish and emotional; they are not always immune from raving and ranting. They may be based on special cases, or on misunderstandings of the thesis which is being attacked. Even so great an antithesistician as Thorstein Veblen is not immune from such criticism.

This discussion of antitheses involves two departures from Kuhn's *Structure of Scientific Revolutions.* It denies, for economics, Kuhn's statement that "once it has achieved the status of a paradigm, a scientific theory is declared invalid only if an alternate candidate is available to take its place".[8] It also denies that a "catastrophe" is required before what we call an antithesis can hope for great success. Kuhn's first proposition seems to be inaccurate, because social scientists, including economists, have such great patience with "illogical negativism", with the man who says of received doctrine, "It simply isn't so. It's just 'theory. I don't know what's wrong with it, but it isn't helpful, it isn't relevant, and I won't accept it", (This kind of thought-substitute is unfortunately more prevalent among social scientists, including economists, than among natural scientists). Kuhn's second proposition, about a crisis being required for the emergence of a successful antithesis, seems almost meaningless. I accept Stigler's claim that, in the absence of operational definitions of "paradigm" and "catastrophe", "Kuhn's assertion that a crisis is necessary for the emergence of a new paradigm is virtually a tautology".[9]

So much for antitheses. What has developed out of the conflict between thesis and antithesis is, in most cases, some sort of synthesis which comprises the normal science, the orthodoxy, the paradigm, or the *Schule* of the next generation or two. In the process of this synthesis some of the preceding antitheses are not only absorbed but take over the leading positions. Other antitheses are ignored or neglected. They survive, if they do survive, hibernating in a kind of intellectual underworld, and remain antithetical until the next revolution. (Technocracy is an example of the hibernation I have in mind). The old "thesis" often survives too, with relatively slight modifications, like eighteenth-century mercantilism in contemporary trade-policy discussions. It is this fact which has led our critics to doubt whether economics has really had any scientific revolutions in any sense at all.

V

Let us begin to illustrate this elementary schema in connection with the formation of the classical school. I am not sure whether what preceded it was an orthodoxy of the "normal science" or "paradigm" variety. My conception of pre-Smithian or pre-Humian economics is an odd collection of ethical preachments, bullionism, mercantilism, and physiocracy, plus a considerable body of embryonic laissez-faire. One can, however, discern a thesis and an antithesis in it, connected with the question of which economic class or interest group is bound up most closely with the interests of society as a whole, and is thereby entitled to special fostering or protection. The mercantilists find this class in those persons, merchants and manufacturers for the most part, who engage directly or indirectly in the export trades or in the provision of substitutes for imports. The reason is

[8] Kuhn, p. 77.
[9] Stigler, p. 223.

that these occupations contribute to favorable balances of trade and payments. Although mercantilist writers were sometimes unclear, and never in agreement, as to why this was an important and a good thing, they seem to have agreed that it was. The principal offsetting antithesis to the mercantilist thesis appears to have been physiocracy. The physiocrats identified the interests of society with those of its agricultural classes, which alone produced a net social surplus, or return over cost, which could be used, through rents and taxes, to maintain the higher amenities of civilization. Aside from the landholding class, obviously, the physiocrats saw society as living at the margin of subsistence.

The classical or laissez-faire synthesis, arising from the Hume-Smith economic revolution, was that there was no economic class whose interests represent those of society in any unique manner. Society should therefore refrain from encouraging any class at the expense of any other, and treat the interests of all classes as complementary rather than competitive. (A partial exception to this generalization is 'the Ricardian landlord, who gains by the "niggardliness of nature", and whose rising claims will eventually choke off both profits and progress). Both the foreign balances and the social surplus over the cost of subsistence can be left to take care of themselves, via the quantity theory of money and price levels in the first case, and via the Malthusian principle of population in the second.

VI

The same elementary schema can be applied to the eventual breakup of the classical school, which is usually located in the early years of the final third of the nineteenth century. The classical tenets had never been completely accepted even in England, let alone the Continent or America, although its prestige was sufficient for opponents to cast themselves in the not uncongenial role of independent thinkers persecuted for heresy.

What were the principal objections (antitheses) to the classical thesis of Smith, Ricardo, and the two Mills, father and son? They ran at the outset mainly in terms of policy. They centered upon the cosmopolitan doctrines of free trade and laissez-faire and were often mercantilist revivals. Spokesmen for the landed interests, not usually influenced by physiocracy, spoke out at the same time against the class-disharmony implications, which we have noted, in Ricardian rent theory. (This was considered dangerously disruptive by the harmonist protesters, who included Malthus in England and Bastiat in Prance).

At the opposite end of the scale from the harmony economists, other and more important critics objected to the harmony remaining in the classical teachings, which maintained that workers and employers had common interests in economic progress and particularly in the accumulation by saving of a large "wage fund" out of which alone workers could be paid. The antithesis arising from objection to this aspect of classical harmony centered in the English "Ricardian socialists", and was one of the roots of Marxism. Incidentally, one of the best summaries of the Ricardian socialist objections to classical laissez-faire is to be found, not in any history of economic or philosophical thought, but in one of the less-known novels of Dickens, *Hard Times.*

Later, from these objections to specific conclusions and implications of classical economics, there involved a higher-level objection to the way the classical economists had reached their conclusions quite generally. There were such issues as the classical writers' neglect of the demand side, and the deductive and hypothetical nature of Ricardian reasoning in particular, with its supposed neglect of the facts of history.[10] The materialistic or hedonistic psychology and philosophy underlying the classical deductions also came under attack, as when Thomas Carlyle attacked the whole structure of classical economics root and branch as “pig philosophy”.

Several of these antitheses crystallized, particularly in Germany, into the romantic and historical schools of economics, both of which were inductive, nationalist, and protectionist in implication. There was, according to the romantic and historical writers, an appropriate political economy for each country at each period, based upon its history and national character. Generalization to the sort of overall theory embodied in classical economics was either premature *or* completely futile by the mature of the ease.

A more important antithesis was formed by the set of objections which developed into socialist economics. The Ricardian socialists we have already mentioned. There were also other varieties of socialists, mostly Utopians of various sorts, all anti-laissez-faire, mainly given to detailed advance planning of the economy. The most important socialist school on the world scene was of course Marxian, which developed relatively late and embodied many elements of Ricardian economics. (The first volume of *Das Kapital* appeared only in 1867).

A third antithesis, and the last which we shall consider, was provided by the utility economists. They stood political economy on its head, so to speak, by placing their major emphasis upon demand and basing demand upon utility. They developed their ideas at various times; among the earliest utility theorists was Jean-Baptiste Say, more widely known for his law of markets. The early utility theories suffered by failure to distinguish precisely between what we would today call total, average, and marginal utility. They became more respectable in the Austrian school, centered at the University of Vienna, which used calculus notions although shunning advanced mathematical notation.

A great methodological debate between German and Austrian economists, known as the *Methodenstreit*, followed the breakup of the classical school. It has seemed interesting to me that this debate, in the middle and later 1880s, was not between classical economists and their critics, i.e., between thesis and antithesis. It was between partisans of two rival antitheses: the inductive historical economists, represented by Professor Gustav Schmoller of Strassburg, and the deductive utility economists, represented by Professor Carl Menger of Vienna.

VII

A second great synthesis came out of all this; it is known as neoclassicism. At the risk of offending some Continental economists, we may say that, like the classical school itself, neoclassicism was predominantly British. Its greatest name was Alfred Marshall; its great compendium of paradigms was Marshall's *Principles of Economics* (1890). The best-remembered synthetic feature of Marshall's theory is the “Marshallian scissors”. The

[10] Neither Adam Smith nor John Stuart Mill could justly be faulted as unhistorical in their major writings.

supply-side blade of the scissors is the classical real-cost theory of Ricardo, whom Marshall especially admired. It bases supply on cost, and cost on such “real” or “pain” elements as labor and the postponement of consumption. The demand-side blade of the Marshallian scissors, however, is a marginal-utility theory taken over more largely from Stanley Jevons than from any Austrian writer. But utility was there, along with real cost; so Marshall had synthesized the two antagonistic principles.

A feature of Marshall's style makes him at once somewhat boring to read and a synthesizer *par excellence.* He is always the statesman, the conciliator, the reasonable man. He is always alert to take account of elements which writers of the antitheses consider neglected. He enjoys the accumulation of inductive evidence, historical detail, special cases; in all this, he recalls Adam Smith. Some antitheses, however, could not find their places in Marshall. Socialism, for example, was largely relegated to the whipping-boy role, and Marx is mentioned only once or twice in passing.

Antitheses to the grand Marshallian thesis were not slow to develop. The thesis became somewhat ossified in Marshall's later years and with successive editions of his *Principles,* and later under the aegis of A. C. Pigou in England and F. W. Taussig in the United States. One important antithesis which arose relatively early related to the apparent breakdown of pure competition. It took the form of imperfect competition theory, and attempted to treat monopoly, total or partial, as the general case, of which competition was only one extreme. The acceptance and vogue of theories of monopolistic competition, imperfect competition, oligopoly, and so forth, dates, as we have seen, from the 1930s, although precursors may be found as far back as 1838, with Cournot's *Mathematical Principles of the Theory of Wealth.*

Shortly thereafter there arose the more basic antithesis of cyclical depression or stagnation. This was the notion that perhaps, after all, there is no tendency for a capitalist economy to reach its overall equilibrium at a position of full employment, that Say's Law is wrong, and that aggregate supply does not create its own aggregate demand. This antithesis arose out of the Great Depression of the 1930s more obviously and directly than antitheses have usually been related to the conditions of their time. It is, of course, associated particularly with John Maynard Keynes's *General Theory* (1936), but there is a long line of precursors dating back to Marx, to Malthus, and further back to mercantilist times.

Nor should we forget, in considering antitheses to Marshallian neoclassicism, that neither historicism nor Marxian socialism had ever died out. They both receded, in Western Europe and America, into the intellectual underworld, but there they survived. They were joined, in Marshall's own day, by methodological objections to the psychological foundations of utility theory. This was regarded as unrealistically hedonistic; as J. M. Clark put it, utility theory involved “an irrational passion for dispassionate rationality”. Another antithetical objection was that neoclassical economics had no evolutionary elements, but tended to be static in a way that classical economics had not. These charges were stressed by Thorstein Veblen and his disciples in the United States, most notably by Clarence Ayres, Wesley Mitchell, and other American institutionalists, who were united by little more than their objections to “standard

economics".[11] A final objection or antithesis, which persists today, as that economics was degenerating into technique for its own sake, so that major social problems are put aside in favor of refinements of applied mathematics.

VIII

So much for the antitheses which flowered in the 1930s. During the postwar period, a new synthesis developed in economics, which absorbed many but not all of them. This brings us, however sketchily, to our third revolution in economic thought, resulting in a thesis for which no single work plays quite the role of Smith's *Wealth of Nations,* Ricardo's or Marshall's *Principles,* in its predecessors.

Of the current texts, the most influential has been Paul Samuelson's *Economics.* In these texts, and also in more advanced works like Samuelson's own *Foundations of Economic Analysis,* the aggregative economics or macroeconomics is predominantly Keynesian. The ruling doctrine is the one we have encountered in the last section as a Keynesian antithesis, namely, that full employment is neither attained nor maintained automatically and that various devices of monetary and fiscal policy are also required to maintain it, perhaps at the cost of some price inflation. Then, when we talk about the microeconomics of individual firms and industries, a great deal must be said of imperfect along with atomistic competition. This combination or sandwich is called by Samuelson the neoclassical synthesis.

There should also be included in this synthesis a fortuitous component that does not come out of previous antitheses at all, but out of postwar developments in world history. This is a stress on both the formal dynamics of economic growth and the special problems of developing economies. Here we have worked out a basically neoclassical theory which underlines the importance of capital formation, both private and public, and includes human capital along with the standard physical varieties.

Methodologically speaking, the neoclassical synthesis assigns a major role to statistical economics or econometrics—to the setting up of theories in refutable form, rather than evading tests by tautological formulations. It has as yet produced no great name comparable with Smith or Ricardo or Marshall. Lord Keynes, who antedates the synthesis proper, is the major name to conjure with; we might also mention Sir John Hicks in Britain and Professor Samuelson in the United States.

IX

These are our three revolutions in economic thought, which some would doubtless downgrade to palace revolts or *coups d'état.* Something should also be said about the current crop of antitheses, which may produce a fourth revolution. One actively dissenting group is the Chicago school, but its dissent is relatively mild. The relationship between Professor Milton Friedman—the leader of the Chicago group—and say, Paul

[11] Another important American group of dissidents, also calling itself institutionalist stressed the economics of social valuation, collective bargaining, trade regulation, and other forms of "collective action in control of individual action". This group springs from John R. Commons; there is little connection, beyond the institutionalist name, between the Commons and the Veblen traditions.

Samuelson is comparable to the relations between Say or Malthus and Ricardo or Mill (in the classical period), or between Irving Fisher and Alfred Marshall (in the neoclassical one). Friedman does not, in other words, play the role of a Karl Marx or a Thorstein Veblen vis-à-vis the orthodoxies of each man's day. *Sub specie aeternitatis*, the differences between Chicagoism and standard neoclassicism are not tremendously important.

What then are the true antitheses, if any? One is the radical economics of the New Left. It is a compound, or rather a mixture, of Marxism, anarchism, and Utopian equalitarianism. Its newness is more a matter of tactics and life style than of substantive ideas. A less flamboyant but more important antithesis may be the linear economies of operational research and the so-called Sraffa revolution springing from Cambridge University in Britain. This is technological determinism applied to the economic system and to centralized planning, although the basic distribution of the society's income is left to public-policy decision. It too is a basically old doctrine, traceable to Marx and Veblen, but the requisite mathematics for practical numerical solutions are only now being developed, with the aid of modern computing machinery, both in the planned economies and in the Western world. The initial Nobel Prizes in economics were awarded to two representatives of this antithesis, Professor Ragnar Frisch of Norway and Professor Jan Tinbergen of the Netherlands. There are doubts, which I share, about the compatibility of this sort of planning, particularly the Frisch version, with the maintenance of personal liberty—for example, with the right to divide one's time as one wishes between leisure and various sorts of labor.

Another important antithesis is the involvement in economics of the behavioral sciences of psychology and sociology. The behavioralists view individuals and organizations as acting out of “satisficing” rather than “maximizing” motives, as satisfying certain levels of aspiration rather than maximizing anything at all. Many business firms, for example, are viewed as having multiple goals. They are not trying single-mindedly to maximize profits, like firms in the neoclassical model, but are trying to accomplish many things simultaneously, of which a satisfactory growth rate or satisfactory labor relations may be as important as a satisfactory profit position.

The policy implications of this behavioralist view are questionable. Many of the arguments are used to make imperfect competition palatable to the general public, and have conservative implications. “The soulful corporation” and “business feudalism” are two of the epithets that have been applied to it. On the other hand, behavioralism is used by Professor J. Kenneth Galbraith to make a case for public regulation and price controls. Since firms have multiple goals anyway, cannot a firm's “mix” of goals be improved by having the public help frame them, or by setting additional constraints within which the corporation must act? This, I think, is one of the morals of Galbraith's *New Industrial State*.

There have also developed behavioral theories of economic growth and change, as antitheses to our standard neoclassical view. They concentrate upon social rather than purely economic factors. One of the more interesting examples concentrates upon people's attitudes toward personal achievement, as against inherited social status. A society in which the measured need for achievement is high, as compared with the desire to fill one's inherited place in society, is expected to grow faster than one in which the reverse is the case.

Another antithesis which may be important is our increased emphasis on the economics of induced innovation and induced technical change. In standard economics, innovation and technical progress are treated as exogenous factors. They are introduced from outside the economic system proper; they are like changes in the weather. The new economics of induced technical change makes innovation part of the system itself, arguing for example that a high labor share in the product of some industry will prompt the concentration of inventive activity upon labor-saving and capital-using improvements. The policy implication of this work is sometimes the defense of monopoly and imperfect competition, which are frequently means of reducing the risk of innovation, and of accumulating funds to finance research and development. There have also been less conservative implications drawn, as for example the desirability of public and philanthropic subsidy of innovation and invention in order to counteract the near-monopoly of the large firm over organized research, and raise the economic growth rate as a whole.

These are the antitheses which I see as developing and as becoming more important than they have been in the past. In addition, of course, there are surviving antitheses of past periods which show no signs of dying out. Examples are ordinary institutionalism and "old left" Marxism.

Finally, I must confess ignorance about both the what and the when of the next synthesis. One cannot even be certain that there will be a next synthesis. However, this dialectical view of the development of economic thought suggests that such a synthesis is more likely than either indefinite maintenance of the status quo, or than some "cultural revolution" which finds all we need to know in a single little red book which we can wave.

X

This synoptic account of revolutions in economic thought has used an elementary dialectic to identify three such revolutions. They might be called the laissez-faire revolution, the utility revolution, and the macroeconomic revolution. These three revolutions are identified, however, only by modifying Kuhn's *Structure of Scientific Revolutions,* as it applies to economies, in two directions. (Coats, following Kuhn more closely, found only one revolution in economic thought, namely, the macroeconomic or Keynesian revolution of the 1930s).[12]

The differences ('between this approach and Kuhn's) may result from certain more basic differences between economics and the natural sciences, to which Kuhn's catastrophic theory referred.[13] I should like to hope, however, that something more is involved in both the differences, and that what I call a dialectic approach may be somewhat more general than Kuhn's.

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[12] Coats, p. 293.

[13] Kuhn may himself believe something of the sort, to judge by a brief passage (Kuhn, p. 15) questioning the existence of social-science paradigms. Coats (p. 292) speaks of economics as dominated by "a single paradigm—the theory of economic equilibrium via the market mechanism". In my own view, theoretical economics includes a large number of paradigms, some of them conventionally expressed in equational or diagrammatic form—the law of supply and demand, the equation of exchange, and the Hicksian IS-LM cross being three elementary examples which come to mind.

Conversely, Kuhn's catastrophic paradigm shifts may reduce, in my view, to special cases where antitheses carry the entire field before them and sweep away the preceding theses.

(i) The first difference between our dialectic and Kuhn's is, to repeat, that it allows "outmoded" ideas longer lives in economics than Kuhn grants them in the natural sciences, so that displacement is both less rapid and less complete. My examples have been the notions of just price in microeconomic exchange and the various mercantilist "fallacies" in international trade.

(ii) The second difference between two dialectic structures is that, in the present case, important advances tend to be major *accretions* without any corresponding rejections of existing paradigms. Utility theories of value did not displace cost theories except in special cases of fixed supply of productive factors; more generally, utility and preference theory has taken over the demand side, leaving the supply side to cost. Marxian economics has not, after all, displaced bourgeois economics in any country which preserves a free market in ideas, and I have argued elsewhere that it anticipated much of modern macroeconomics.[14] It is even difficult to think of an important tenet of pre-Keynesian economics that Keynes displaced permanently, except as a consequence of price, or wage, or interest-rate rigidity, or of some critical elasticity being zero or infinite;[15] yet no one denies the importance of the *General Theory*.

For economics, I feel that the schema outlined in this paper fits our brief history considerably better than does, e.g., Coats's transplantation of Kuhn's catastrophic position. About the natural sciences, with their longer history, their easier resort to crucial laboratory experiments, and their more sharply defined paradigms, I am incompetent to venture any similar guess. But perhaps there too, purposeful synopses of the complete history of particular branches of science might yield results more similar to our own for economics than to Kuhn's for science as a whole, or with a capital S.

[14] M. Bronfenbrenner, "Marxian Influences in "Bourgeois' Economics" *American Economic Review* 57 (May 1967).

[15] A possible exception is Say's identity, the statement that aggregate supply equals aggregate demand *at any price level*. As Patinkin points out, it is not certain that Keynes's predecessors actually accepted this extreme form of Say's law. Don Patinkin, *Money, Interest, and Prices*, 2d ed. (New York, 1965), pp. 193-95.