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A Marxian Alternative to the Traditional "Transformation Problem"

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ABSTRACT: This paper offers a unique Marxian formulation of the transformation of values in prices of production. This formulation — based upon a specific reading of Marx's economics not previously applied to the "transformation problem" — permits a radically new conception and solution to that problem. The authors underscore the theoretical distance separating this Marxian formulation not only from the generally Ricardian framework of the debates over value-price transformation, but also from certain other Marxian critiques of that framework. This intervention in the transformation debates is shown to be closely linked to and warranted by a specific view of the basic differences between Marxian and classical economic theories.

INTRODUCTION

The last twenty years have seen a resurgence of interest in classical — chiefly Ricardian, but also Marxian — economics. This "reconsideration" of classical economic theories has emphasized similarities among these theories, stressing especially a continuity of theoretical development in Ricardo and Marx. One reason for this particular form of the reconsideration is its basic goal of critiquing neoclassical theory. However, more is at issue than simply this critique. These critics tend generally to view both past and present theoretical debates within economics as variations on a theme of confrontation between only two broad conceptual frameworks or paradigms: a "classical synthesis" in theoretical struggle with its neoclassical analog.

We are opposed to the tendency manifest in this literature to read Marx in the light of Ricardian problems and concerns. Of course, we value the theoretical and political challenge to the neoclassical theory of value and distribution that the collaboration between such authors as Dobb and Sraffa has represented.[1] However, we will argue that Ricardo and Marx employed fundamentally different frameworks of analysis. Nowhere are these differences more substantial and significant than in the realm of value theory. In the major point of this paper, we utilize our "different theoretical frameworks" approach to reformulate and solve Marx's (as distinguished from Ricardo's) problem of the transformation of values into prices in a new and unique manner.

Some recent Marxist reactions against the treatment of Marx as an exponent of "classical economics" have argued, as we do, for fundamental conceptual differences between Marx's theory of value and Ricardian value theory in all its variants. Among others, Gerstein (1976), Shaikh (1977), Himmelweit and

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Mohun (1978) and Fine and Harris (1979) have stressed that Marx's method, his focus on the class relations of capitalism, and his use of value categories are bound together, and are unique in ways that are not simply "derived from Ricardo." Gerstein, for example, argued that, for Marx, "categories established at one level of analysis are 'transformed' into new categories, or at least given new meanings" (1976:254). Part of our interpretation may seem familiar to readers of these works; we acknowledge some similarities. However, as will be seen, our view of Marx's method and theory has implications that differ markedly from these previous interpretations of the meaning and function of "value" as a Marxian category.

Our interpretation builds upon a considerable literature in the history and philosophy of science, a literature frequently associated with the names of Althusser, Foucault and Kuhn.[2] Drawing selectively on the insights of these and other authors, particularly of Althusser, we argue that Ricardo and Marx designated fundamentally different objects for their respective analyses and articulated correspondingly different basic concepts.[3] Further, they pursued different strategies in developing and elaborating their concepts; that is, they theorized in different ways. Finally, and perhaps most importantly, they followed different basic principles guiding their investigations; they had very different "points of entry" into the complex web of relationships which they examined.

Our thesis is that whereas Ricardo, the classical economist, did not distinguish capitalism as a specific system of social production, Marx's goal was exactly to theorize the "differentia specifica" of capitalism. Marx distanced his theory of alternative economic systems from that of the classical economists on the grounds that they conceived society and economy in terms of a singular natural order of things.[4] To this end, Marx not only introduced the concept of labor-power as a commodity, but also transformed the concept of value he had inherited from classical theory.

RICARDO, THE CLASSICAL ECONOMIST

The classicals regarded the human propensity to acquire wealth as the essence of the natural social order. The classicals' concept of wealth was specific: wealth was an aggregation of *use-values* whose accumulation they understood to be *the* economic objective of social life.[5]

The implications of this classical conception of wealth and society are far-reaching. When classical economics analyzed market processes, it reduced them to mechanisms expressing the evolution of society towards that particular organizational structure most conducive to the production of use values. Thus, Smith emphasized the extension of the market as a way of promoting the division of labor. Similarly, Ricardo stressed the need to abolish the Corn Laws to postpone or prevent the coming of the stationary state. When the classicals analyzed "classes," they sought to reduce the system of economic class distinctions to an expression of a set of "natural" differences underlying the production and accumulation of use values. The class structure of early capitalism was, therefore, the more or less natural order of things (not, as for Marx, a historically determined and variable form of social order). Capitalists were defined by their natural human propensity to accumulate wealth; workers by their lack of such a propensity; and landlords by their propensity to consume without directly contributing to the production of use-values. This functionalist sociology of human nature assigned a ''function'' — and thus a class role — in the system of wealth production to different human beings according to their particular natural propensities.[6]

These general features of classical economics may be further specified by analyzing Ricardo's *Principles*. In his original Preface, Ricardo made plain the object of his economics: ''To determine the laws which regulate this distribution... the natural course of rent, profit, and wages.'' The Preface explained that income distribution depends on conditions of soil productivity, capital accumulation, population, and technology. This Preface is noteworthy in two related ways. First, it conceives of income distribution as the immediate expression (the effect or phenomenon) of the conditions of production of use-values (the cause or essence whose manifestation is the phenomenon). Ricardo conceived of production as a constant, rather undifferentiated process in which change is limited to the purely quantitative dimensions of the specific conditions mentioned above. Alterations in income distribution are directly determined by — immediate expressions of — such quantitative changes in production conditions.

Second, the Preface is silent about, and hence rejects, any other basic object of analysis. Ricardo did not conceive of different qualitative dimensions, i.e., different *social* arrangements of the production process. Neither the specifics of variable social orders nor changes in such orders occupied his attention as objects of analysis. Hence, he did not examine the effects of different particular social arrangements upon the production process or upon income distribution. Indeed, Ricardo could not have recognized such differences since, for him, production and income distribution were understood in the limited context of use-value production and distribution.

For Ricardo, the conditions of production reduced to soil fertility (nature), the quantitative extent of capital accumulation (natural human behavior), the Malthusian population pattern (natural human behavior), and the technology (nature and human behavior) obtaining at any particular moment. These production conditions are given by nature, both non-human and human. Moreover, these conditions constitute the environment that determines income distribution, given only that human nature includes cash-income maximizing behavior. That environment and that behavior exist independently of any particular social arrangement among the three classes of income recipients. Ricardo's theoretical system is indifferent to any distinctions between feudal, slave, or capitalist social arrangements for assigning functions to individuals involved in the production process. These functions, too, are reduced to expressions of natural relations among capital, land, and labor. We stress this point because Ricardo's limited object of analysis — capitalist distribution — had effects on his economic theory and because Marx's object of analysis was very different.

These general points bear upon the particular form taken by the Ricardian labor theory of value, which was also structured by this (classical) preoccupation with the production of use-values. Especially since Sraffa's introduction to the *Principles,* Ricardo is known for the attempt to reduce commodity value to a magnitude of physically embodied labor-time. For Marx also, value was to be a labor-time magnitude, but for Marx the magnitude of labor-time expressing a commodity's value was explicitly grounded in the capitalist *social* conditions of its production, while for Ricardo this magnitude was, in effect, determined by only the technical conditions of production. For Ricardo, commodity value was determined by the quantity of labor-time — both living and embodied in the used-up means of production — technically required to produce it (making the usual classical allowances for skilled differentials among the workers). This Ricardian theory of value we call the "physical quantity labor theory of value."

We do not argue that Ricardo's conception of value was technologically, as *opposed* to socially, determined. Ricardo's determination was as fully social as Marx's was to be. The difference is that, for Ricardo, since society was understood in terms of the production of use-values — for him a purely technological determination — there was no *further* social determination left to be considered beyond the technological one. Indeed, this reduction of the social to the technical continually reappears in Ricardo's tendency to abstract from any conditions of circulation or distribution which posed problems for his technological determination of value.[7] Here we stress the abstraction from circulation conditions in the Ricardian theory of value, because it is crucial to an understanding of the differences between Marx and Ricardo and to the reconsideration of the transformation problem offered below.[8]

Ricardo's abstraction from circulation typifies the classical approach to "the market," i.e., competitive capitalist commodity circulation. In that approach, markets were the optimal institutional arrangement for the production and accumulation of use-values. The market was thus both the goal and the product of humanity's historical struggle to establish a society in harmony with natural laws. However, while the market therefore became the *all-important* form or mechanism necessary to realize the natural social order, it simultaneously became merely *formal,* just a mechanism. In that sense, the market was unimportant in conceptualizing the essence of society. The market was simply the institutional medium within which the production and accumulation of use-values best occurred. The natural conditions underlying such production and accumulation were the essence of society, and while non-competitive markets might constrain or distort this essence, market conditions did not themselves define or constitute it.

A corollary of this Ricardian abstraction from circulation was his agreement with Say that there cannot be crises, "general gluts." Market circulation cannot produce crises because it is only a formal act of intermediation between commodity producers whose relations to each other are expressed in the system of natural prices.[9] Conceiving of competitive markets as the optimal arrangement for the production of use-values, Ricardo could not view any aspect of the market system as a barrier to wealth production. While admitting that accumulation could encounter difficulties, he located these difficulties in the essence of wealth production — in human nature (procreation, rent maximization by landlords) and non-human nature (soil fertility) — not in "the market" itself.

MARX

Marx conceptualized his object of analysis in reaction to classical economics. His central object was neither the distribution of income nor the set of conditions of production in Ricardo's sense, but rather the specifically capitalist form in which surplus-labor is performed and appropriated: capitalist class relations. Marx's "point of entry," his theoretical focus, is thus the production of surplus-value, and not "production in general," the production of use-values. Marx, of course, sometimes analyzed aspects of production common to different forms of class relations. However, such analyses — generally rare in Marx's work — were vehicles for his specification of the distinctive conditions for and consequences of capitalist class relations.

As a result, Marx's strategy was different from that of Ricardo and of the classicals in general, who subsumed all aspects of society, including class relations, to the production of use-values. Within their functionalist approach to class, classical political economists viewed the role of each class as dependent on and derived from the general social need to coordinate production so as to maximize the production of use-values. For Marx, by contrast, the class relation was itself the object of inquiry, and rather than subsuming capitalist production to the production of use-values, Marx turned the classicals, so to say, "on their head" and subsumed the production of use-values to capitalist production. To argue against the historically determining role that "use-value" had played in classical economics, Marx historicized the category, making it historically *determined* as well as determining. He conceived of consumption (use-values) not as fixed or given but as a variable, affecting class relations but dependent on them as well (1973:83–111). We shall elaborate and build upon that conception.

Marx opposed Ricardo's tendency to reduce capitalist production to production in general. Indeed, he specifically attacked Ricardo's treatment of market processes as surface phenomena which merely express effects made necessary by the underlying conditions of production:

> If Ricardo thinks that the commodity form makes no difference... then this is in fact in line with his presuppostion that the bourgeois mode of production is the absolute mode of production, hence it is a mode of production without any definite specific characteristics, its distinctive traits are merely formal (Marx 1968:527).

> Money and exchange itself therefore appear as only purely formal elements in his economics. And although according to him, economics is concerned only with exchange value, profit appears there only as a percentage share of the product, which happens just as much on the basis of slavery. He never investigated the form of the mediation (Marx 1973:327, 1977:185–186).

Marx not only differed sharply from Ricardo on the interdependence of production and circulation, their complex mutual determination, but he also worked with a very different concept of class. For Marx, class is a particular social process; the performance and appropriation of surplus labor as well as the consequent distribution of the surplus product (Resnick and Wolff 1982). To so define class as a process, Marx had to differentiate necessary and surplus labor (Marx 1977:324–329, 1967:632–633). The former he defined as the labor required to reproduce the direct producers, while the latter is any additional labor performed by these producers beyond necessary labor. Surplus labor, eventuating in surplus produce, may be appropriated from the direct producers by a social group distinct from them, whose class position is thereby defined. Class relations are thus, first and foremost, relations between the performers and the appropriators of surplus labor.

That Marx placed class relations at the center of his social theory means that "laws" governing any social process — distribution, circulation, production, etc. — could only be theoretically developed in reference to and constrained by specific types of class relations. *Capital's* "laws" of capital accumulation, population, technology, etc., are thus all conceptualized by Marx within the context of his specification of capitalist class relations. Thus, Marx's object of analysis — capitalist class relations — was different from Ricardo's object — use-value production/distribution in general.

It is important to note that, while class relations functioned as Marx's point of entry, or organizing principle, in the analysis of capitalism, class was not treated as the ultimate or essential causal determinant of all other aspects of society. This characteristic of Marx's method contrasts sharply with the essentialism of the classicals. By that we mean that the classical concept of use-value or wealth was both the entry point (in that they defined and ordered all of their other categories of analysis by reference to this concept) and a causal essence (in that they *reduced* all social processes and related individual and class behaviors to the effects of the principle of maximizing the production of wealth). Much of what we see as unique in Marx's economics stems from our view that Marx did not seek to reduce all social processes to effects of the production and appropriation of surplus-value. What he did was merely to analyze the class *aspects* of these social processes without essentializing them.

Marx employed a pointedly anti-essentialist strategy in theorizing the capitalist social formation. Each social process, including the class process, is seen by Marx as the product (outcome of the interaction) of all other processes in the social formation. This view does not simply treat each process as influenced by every other process, as in notions of "multiple causality." It is the different and stronger formulation that each process is *constituted* as nothing other than the intersection of all the influences exerted by all the other (similarly constituted) processes. Georg Lukacs and then, more systematically, Louis Althusser sought to grasp this theoretical strategy in Marx by the term "overdetermination," which is intended to distance Marx from the determinism of essentialist theories, e.g. classical economics.[10] To read Marx in this fashion means that every object of inquiry in Marx's economics — commodity, value, price, class relations, etc. — is understood as constituted by the interaction of all the different processes of the social formation. For example, the distinct processes of capitalist production and market circulation of commodites interact with each other, and with other processes in the social formation, to overdetermine value. For Marx, there could be no question of reducing value to production determinants alone, as in the essentialist "physical quantity labor theory of value" of Ricardo.[11]

Within this approach to Marx's method, his criticisms of Ricardo's general abstraction from market (circulation) conditions become especially significant.

In this paper, we will primarily be concerned to reevaluate the effects of circulation conditions on value relations. Even more broadly, we see *Capital's* various discussions of circulation as expressions of a consistent theme of opposition to the essentialism of the classicals. For example, Marx (1977:208–10) used his analysis of circulation to criticize Say's Law, by which the classicals had subordinated circulation to production, and that in turn to consumption. Or again, Marx used his reproduction schemas to theorize the departmental subdivision of the capitalist economy on the basis of the production and circulation of surplus-value. The classicals, conceiving the economic structure in the immediately human terms of the production and consumption of use-values, gave no comparable autonomy and effectivity to the means of production department of capitalist industry.

More important, we will argue that Marx conceptualized value as overdetermined by all the conditions of existence of the capitalist production and appropriation of surplus value, including circulation as a determining element for value. The effects of circulation on value are implied by Marx's definition of value as a magnitude of "socially necessary" labor-time. By examining explicitly the meaning of the term "socially necessary" and noting that Marx and the classicals had different conceptions of society, we argue that they also had quite thoroughly different senses of what it *means* to refer to the magnitude of value of a capitalist commodity. It was Ricardo who, abstracting from circulation, constructed his value categories as unmediated expressions of use-value productivity. For Marx, in contrast, the analysis of circulation was indispensable for the determination of these "socially necessary" magnitudes of labor-time.

As noted, other commentators have focussed on Marx's use of labor-time and, seeing that the classicals did in fact treat labor-time as the essence of value, have argued that Marx and the classicals produced analytically homogeneous texts. Indeed, ever since Bortkiewicz's original critique of Marx's transformation, the dominant interpretation of the transformation problem has been premised on a fundamental similarity between Marx and Ricardo. Blaug, for example, states: "The Marxian quest for the appropriate transformation of values into prices is nothing else than the Ricardian hunt for a perfect 'invariable measure of value.' The whole problem is derived from Ricardo" (1978:244–245).

Marx and Ricardo are argued to have the same goal — the definition of a long-run distributional equilibrium — and to use the same mode of reasoning — from the existence of a surplus to its distribution between wages and profits. Most importantly, they are treated as having the same basic concept of value from which "their" analysis proceeds. Provoked especially by Sraffa (1960), a general consensus has emerged, albeit with contending variations, including many Marxist as well as non-Marxist authors.[12] For this consensus Marx's analysis is flawed since he failed to reach the correct (internally consistent) answers derived by Sraffa. In this view, moreover, when the necesarry corrections are made, the mathematical necessity for a single normalization invalidates Marx's oft-stated claim of an aggregate equality both between surplus value and profit and between value and production price. The simultaneous satisfaction of the two aggregate equalities is understood by the consensus to be a result of Marx's flawed analysis, a result invalidated by the correct application of Marx's own categories.

There is, however, a quite different interpretation of the relevant passages, one which views the two aggregate equalities not as a falsifiable result, but rather as components of the very *meanings* of the value categories Marx is developing in *Capital,* vol. 3. Marx's "labor theory of value" (he does not use this phrase) is itself a progressively elaborated conceptualization evolving across the three volumes of *Capital*. The task of *Capital,* vol. 1, is to delineate the basic class relations of capitalism and show how capitalist income derives from unpaid labor-time; on that basis, the task of the transformation discussions in *Capital,* vol. 3, is to show that the particular form taken by that income (average profit) can be conceived as a further development of the concept of unpaid labor. In neither volume, however, is value ever presented as the essence of price; value is never reduced to *merely* a matter of production, of average physically embodied abstract labor. That essentialist view of value is rather found in Ricardo (Marx 1968:164–65), in critics of Marx such as Böhm-Bawerk, and in most participants on all sides of the continuing debate on the "transformation problem." As we argue further below, that debate's focus on deducing prices of production from a vector of physically-embodied abstract labor-times involves a Ricardian reading of Marx, since it neglects the dimension of Marx's value categories expressed in the phrase "socially necessary." Ricardo struggled theoretically to reduce prices of production to embodied labor; Marx, in our view, did not. This most basic theoretical difference is, among other things, a matter of Ricardian essentialism as against Marxian anti-essentialism or "overdetermination."[13]

VALUE AND THE FORM OF VALUE IN EXCHANGE[14]

Although other major theorists, Ricardo included, understood each commodity as having a price which must be theoretically explained, Marx alone approached the problem of price by posing it differently. For Marx, each commodity has *two* quantitative dimensions, two numbers simultaneously "attached" to it; the value of the commodity, on the one hand, and the form taken by that value in exchange, on the other. The mere presence of these two distinct quantitative categories makes Marx's approach absolutely unique in its formal and logical structure.

Our contention is that at every level of his argument, Marx's general concepts of value and value-form are *interdependent* in meaning. More precisely, each depends, for its specific meaning, on the specific form of the social processes which together comprise the capitalism Marx theorizes. For us, Marx's method of analysis is unique, in significant part, because its progressive application and reapplication of general concepts like value and value-form results in the development of different concrete meanings for these concepts. Each such successively developed meaning depends on the particular set of social processes under consideration. Indeed, it is only by progressively and jointly reapplying the concepts of value and value-form that Marx is able to quantitatively specify the magnitude of surplus labor in its distinctively capitalist form as surplus value.

Early in *Capital,* vol. 1, Marx defines the value of a commodity as "the [abstract] labor-time socially necessary for its production" (1977:129). This general definition is consistently maintained across the three volumes of *Capital,* but its precise meaning must be developed with reference to the specific social conditions of production and exchange being considered at each stage of Marx's argument. *Value,* then, is the quantity of social labor-time "attached to" the commodity in production, given the nature and functioning of the processes involved in commodity circulation. The form of value in exchange is perhaps most succinctly defined as that which is received for a commodity in an equivalent exchange; it is, in other words, a market equivalent for the value of the commodity. *Value-form,* as a magnitude, is then the quantity of social labor-time "attached-to" the commodity in circulation, given the particular processes of production.

The nature of this pair of general definitions has important consequences for Marx's discourse. Clearly Marx cannot quantitatively specify the value-form of a commodity until he has presented a "rule" of exchange equivalence, a basis, rooted in the behaviors of market exchangers, for stating what exchange equivalence is. Marx always approached commodity circulation as tending to establish the exchange of equivalents, arguing that any other result involves short-changing and the subsequent alteration of the supplies and/or demands which establish the market exchange ratios. The question at each level of discourse is: equivalents in what sense? As we will argue, the answer to this question has consequences for the meanings of both basic concepts — value as well as value-form.

The interdependence of production and circulation spheres in capitalism creates for Marx a kind of dilemma of discourse that must be confronted immediately. The specifically capitalist mode of appropriating surplus labor involves the circulation as well as the production of commodities. Therefore, any initial specification of that class relation necessarily presupposes some explicit or implicit conception of commodity exchange. On the other hand, any more developed specification of *capitalist* exchange (or, for that matter, capitalist production) requires for Marx the preliminary specification of the basic class relations. The particular, and we believe different, concepts of the *magnitudes* of commodity value in Volumes 1 and 3 derive from this basic problem of discourse: *some* set of exchange categories is necessary from the start, simply in order to begin the discussion of capitalist relations of production, but the development of categories to express the specifically *capitalist* conditions of exchange requires the prior consideration of what capitalism is, as a class relation.

Marx's response to this problem was his initial assumption of value-equivalent exchange. The particular "rule" of equivalence defined in Part 1 of *Capital,* vol. 1, and maintained throughout Volumes 1 and 2 is a carefully chosen device. Marx assumed that the particular circulation processes under consideration tend to establish exchange ratios defined by the equivalence of labor-time magnitudes determined *solely in production*. The value-form of a commodity is thus identical to its value, because Marx assumed that a market equivalent for the value of a commodity is another commodity (or a quantity of the money commodity) with an equal *value.*[15] Each exchange, and thus the circulation process encompassing all exchanges, is so specified as to effect no transformation on the quantity of value held by the commodity owner before and after the sale or purchase.

Because of this special assumption, the only quantitative determinants of *either* value or value-form are production conditions. Since circulation is specifically excluded from any role in determining the "social necessity" of labor-time expended in production, the labor-time socially necessary to produce a commodity becomes identical to the labor-time physically/technically necessary under average conditions of productivity. In effect, Marx's initial presupposition specifies a social situation in which, so far as quantities are concerned, anything that holds in production, holds in circulation; anything which holds for commodities holds for the money for which they exchange, and therefore for capital as the advance of money. As a result, the social determinants of both value and value-form are deliberately restricted and constrained, so that only production conditions are relevant to each.[16]

Why should Marx proceed in this fashion? First, as noted, *some* specific rule of exchange equivalence is necessary simply to apply the categories of value-form and value, simply in order to begin the specification of capitalist class relations. Secondly, this particular assumption of value-equivalent exchange is important to Marx because it allows him to focus initially where he wishes, on the production sphere as the site of the performance and appropriation of surplus labor-time: the class process. Marx is thus able to stress from the beginning the importance of value-form, and of circulation conditions, while nevertheless getting those circulation conditions "out of the way" of his primary focus. Without this prior direct examination of production relations, no theory of exchange or distribution can be a class theory in the Marxian sense. Thus it is Marx's method of class analysis which requires him to proceed in this fashion, by levels of argument, through what he called the "intermediary stages" (1968:174).[17]

The contrast with Ricardo is significant. In *Capital,* vol. 1, commodity value is the sum of direct and indirect physically embodied labor-time, not because this is the only *possible* meaning of the definition of the category, but because this particular meaning of the concept of "socially necessary labor-time" is required by Marx's initial assumption of value-equivalent exchange. The social necessity of labor in production is never *simply* identical to its technical necessity, just as the form of value in exchange is never *simply* identical to value itself, yet Marx initially assumes both as a means to focus on class relations in production. For Marx, it was crucial to discuss the class relation and develop the notion of *what* it is that is distributed via circulation (commodities containing unpaid labor-time) as the necessary prior step to the problem of *how* a capitalist distribution of those commodites takes place. The Volume 1 assumptions were in turn necessary to accomplish this prior step.

In summary, then, to say, as Marx does in *Capital,* vol. 1, that value-form directly reflects value because we assume value-equivalent exchange is also immediately to say that values are determined by production conditions alone, independent of circulation. However, as we will argue, once Marx ceases to assert the former point (by dropping the assumption of value-equivalent exchange), the latter point must also be reconsidered and modified.

CAPITALIST EXCHANGE EQUIVALENCE AND THE NATURE OF MARX'S TRANSFORMATION

The transformation sections with which *Capital,* vol. 3, begins are Marx's theoretical effort to develop, rather than assume, the equivalence of *capitalist* exchange. As always Marx, treated commodities, including the money commodity, as representing magnitudes of social-labor time. Thus, the amount received as an equivalent for any commodity is always expressible as some amount of labor-time. Under the cirumstances considered, exchange equivalence is rooted in those processes specific to competitive capitalism which tend to establish a proportional distribution of unpaid labor-time in the form of an average rate of profit on total capital.[18] With commodity exchange equivalence understood on this basis, then the magnitude of labor-time received as an equivalent for commodities sold by a capitalist producer is that amount consistent with a uniform rate of profit on the aggregate capital of each industry.

Marx defined this latter magnitude as the production price of the commodity, the specific form of value under the social conditions considered in *Capital,* vol. 3. The point is crucial: the capitalist competitive criterion of equal profitability requires that exchange equivalence be defined in terms of *value-form*; it is an equivalence between the prices of production of commodities which exchange as equals despite their different values. The quantity of labor-time each commodity represents in an equivalent exchange, the amount *realized* by the producer, must be by definition an amount exactly sufficient both to repurchase the means of production and labor-power used up in its production and to provide the average profit on the capital advanced. And, of course, this quantity of advanced capital is itself a price of production magnitude, the sum of the production prices paid for the necessary physical and labor inputs.

Price of production is therefore that magnitude of labor-time just exactly large enough (socially necessary) to reproduce the *capitals* of each industry on an equal profit footing with those in all other industries.[19] As a magnitude, then, price of production, the relevant particular *form* of value in exchange, will in general deviate from the value of the commodity (though they are dimensionally the same — both are magnitudes of social labor-time). This systematic deviation from value has been the focus of virtually all writings on the "transformation problem." But Marx made a further conceptual advance which is central in our interpretation. This new form of value, as a constitutive element of the capitalist economy, enters directly into the determination of commodity value, i.e., into the determination of the abstract labor-time "socially necessary" to reproduce the *commodity*. This general definition must, we argue, be concretized by constructing its particular meaning within the context of the particular production and circulation processes considered in Volume 3. As Marx stated several times (for example 1967:175), this requires consideration of the factors socially necessary to reproduce the commodity *as a product of capital*.[20] Thus, the specifically capitalist conditions of social circulation, initially assumed away in Volume 1, will now impact on the social necessity of the labor-time involved in production.

To reproduce a commodity, it is necessary to combine means of production and living labor; therefore, to quantify the value of that commodity, it is necessary to sum two magnitudes of labor-time which express the size of these two constituent elements of the production process. One of these two components of value is unchanged from Marx's previous analysis: whatever the cost of the labor-power involved, the contribution to commodity value made by living labor is the amount of that labor expressed as abstract labor-time. Thus, Volume 3 circulation conditions have no effect on the living labor component of commodity value, which is, as before, solely determined within the production sphere.

The contribution to value made by consumed means of production is, however, different here, and its quantification is therefore the key conceptual step. The question is, given the processes of production and circulation, what quantity of social labor-time associated with the consumed means of production represents the amount *socially necessary* to reproduce the commodity output as the product of *capital*? Since Marx's object here is a social situation in which circulation processes are effective pre-conditions for production, the relevant magnitude must be the *price of production* of the consumed means of production and *not* the abstract labor-time physically embodied in them. We interpret Marx in this way since, within the socioeconomic context specified, it is only through the advance of money representing this price of production that the necessary means of production can be procured.

The important point at issue can be clarified through a summary of our interpretation. Under specifically capitalist exchange as well as production conditions, value-form is no longer quantitatively equal to value; to signify this transformation of value-form, "price of production" supplants "exchange value" as the relevant category. However, this transformation affects value itself: the quantity of labor-time physically/technically embodied in the means of production is no longer adequate to express what is *socially necessary* for the reproduction of output. Given the altered nature of exchange equivalence, the quantity of labor-time in money form which each capitalist must actually *advance* to get his constant capital goods (their production price) becomes a constituent part of the *value* of the output produced with those constant capital goods. Since production price is "a prerequisite of supply, of the reproduction of commodities in every individual sphere" (Marx 1967:198), the *form of value* in exchange is then a constituent element in determining the magnitude of commodity value.

In effect, *both* quantities (value-form *and* value) are transformed. Where commodity exchange-values are transformed into production prices via market exchange of equivalents, this transformation must include those commodities purchased as elements of constant capital. Their prices of production are then incorporated into the value of newly produced output, since those production prices express the labor-time now socially necessary to produce that output. (Equation (3), in the Appendix, states this central point formally.)

We recognize that our interpretation represents a departure from the traditional understanding of Marx's value concept, but our reading of Marx's texts finds ample support.[21] To cite one of many examples, Marx here virtually paraphrases our argument:

> It is clear that what applies to the difference between the [price of production] and the value of the commodity as such — as a result of the production process — likewise applies to the commodity insofar as, in the form of constant capital, it becomes an ingredient, a precondition of the production process. Variable capital, whatever difference between value and [price of production] it may contain, is replaced by a certain quantity of labor which forms a constituent part of the value of the new commodity, irrespective of whether its price expresses its value correctly or stands above or below the value. On the other hand, the *difference* between [price of production] and value, insofar as it enters into the price of the new commodity independently of is own production process, *is incorporated into the value of the new commodity as an antecedent element* (1971:167).[22]

Such passages are simply not comprehensible within the traditional — what we call the Ricardian — interpretation of Marx's concept of value, an interpretation which treats value as determined solely by the physical and technical conditions of production. Nor, we stress, is the passage quoted consistent with the positions advanced by any of those recent commentators, e.g., Gerstein (1976), Himmelweit and Mohun (1978), Fine and Harris (1979) whose goal, like ours, is to distinguish Marx's value theory from Ricardian and "neo-Ricardian" treatments of value and price. Each of these authors cites the transformation system presented by Seton (1957) as a valid and mathematically sufficient correction of the errors or incompleteness found in Marx's handling of the issue. In doing so, these authors accept a posing of transformation in the Ricardian mold; as a theoretical act in which only *one* set of unknowns is solved for, i.e., in which the derivation of production prices *from* commodity values has no conceptually important effect on the meaning or the magnitude of those commodity *values* themselves. In contrast, if one recognizes with Marx the reverse dependence of value on production price, then a full specification of transformation must treat commodity values as "dependent variables" which must be specified ("solved for") *alongside* the other unknowns in the system. This recognition, which we believe is crucial to an argument for the uniqueness of Marx's value theory, is explicit in our formal transformation system presented below. It is the most obvious feature separating our argument from those of others who also differentiate Marxian and Ricardian value theories.

In the quotation above, Marx affirms an interdependence of value and value-form (price of production) which cannot be expressed by treating the relation between the two as merely a functional relation between dependent and independent variables. Instead, Marx constructs each concept from and by means of the other. Marx's theoretical commitment to overdetermination, as discussed above, gives rise to a particular methodological approach: the step-by-step development of the interdependence between value and value-form. On the one hand, the fact that surplus value is distributed via commodity circulation necessarily involves the circulation process in the determination of value. Surplus labor in its distinctively capitalist form is *unpaid* labor, labor-time for which no equivalent is received; the magnitude of surplus value can therefore only be determined with reference to the capitalist basis for payment equivalence. But on the other hand, the fact that surplus value is created only in production, by the performance of surplus labor, places absolute constraints on production prices as magnitudes expressed in labor-time terms. Price of production, as an absolute magnitude of labor-time, can only be conceived as a specific deviation from value, since the production price of any individual commodity is constrained by the aggregate amount of unpaid labor-time performed in the economy. The profit component of price of production is then simply a proportional share of the aggregate surplus value generated.

This conceptual interdependence is broadly an effect of the way Marx conceives the capitalist economy: as a network of class relations within which both production and circulation processes jointly and interactively condition the quantitative outcomes which result. Thus, in the mathematics of transformation (the construction of a particular outcome by *imposing* an equalized distribution between industries), both spheres contribute to the determination of both values and production prices. Value and value-form are different concepts, but they do not have different basic determinants.

The contrast with Ricardo is significant theoretically and politically. Ricardo's notion of value as physically embodied labor is applicable to *any* commodity-producing society regardless of its class relations. Marx does use this notion to begin his study of capitalism, since the circulation of products as commodities is a basic condition of existence of capitalist class relations. But to interpret Marx's transformation in the traditional way (as an attempt to derive specifically capitalist quantitative results by mathematically manipulating a vector of values given independently of the particular circulation practices which make an economy capitalist) strikes us as imposing on Marx an essentialist and fundamentally Ricardian notion of the role of labor-time categories. Steedman (1977), for example, does just this. In our view, to conceive quantitatively the process of capitalist competition in both production and circulation, the concept of value itself must be transformed. The passage quoted above is merely the most explicit of many which suggest that Marx was doing just that.

In the Appendix below we present a formal treatment of our interpretation of Marx's transformation, including a precise specification of value, production price, and the relation between them. The solution is unique, in that *both* of Marx's aggregate equalities (between value and production price, and between surplus value and profit) hold simultaneously. Indeed, they hold as *identities*, as properties of the meanings of the concepts employed. The profit rate is expressed as a ratio of aggregate quantities of labor-time, just as Marx insisted it could be understood; in this system there is no divergence between "price" and "value" rates of profit. Moreover, the solutions for the profit rate and *numeraire* prices (distinct from Marx's concept of production price) are identical to those produced with the Sraffa physical quantities model. That numerical similarity notwithstanding, the Sraffian approach is quite different, since it makes no use, analytic or conceptual, of either value or value-form as labor-time magnitudes. A Sraffian linear price system uses a concept of "surplus" only in the restricted sense of a physical surplus *product* whose distribution depends upon a uniform profit rate. In contrast, Marx's focus on class relations as his object of discourse requires him constantly to link the existence within capitalism of a physical surplus to the parallel necessity for there to be surplus *labor* which creates surplus *value*. Our solution makes explicit precisely that linkage, since it specifies both the amount of labor performed for which no equivalent is received, and also the pattern in which that surplus labor is realized as profit.

CONCLUSION

Marx's transformation persists as a "problem" partly because it touches the basic issue of analytical method. Our argument here stems from our reading of Marx's work as unique in its method of and entry-point into theoretical elaboration, and as particularly different in just these respects from the essentialism of the Ricardian approach. Our reading places the role of labor-time categories in Marxian discourse in an entirely different light from any in the literature. Even those authors who, like us, have sought to emphasize Marx's uniqueness have acquiesced in the customary view of transformation as the derivation of a single set of dependent variables (production prices) from a known and given set of purely production-determined values. Instead, we regard values (and surplus values) as themselves "dependent variables" which must also be transformed in order to be applicable, alongside production prices, as the means to understand the capitalist economy as an object of theory in the specifically Marxian sense; as a class relationship.

We suspect some readers may view this paper as an attempt to "salvage" Marx's value theory by defining out of existence the problems others have found. We would respond that, in our view, many of those problems were created in the first place by that all-too-common tendency to collapse the different Marxian and Ricardian sciences into one, all-encompassing "classical" framework. However valuable such a "classical synthesis" has been in sharpening the theoretical criticisms of neo-classical orthodoxy, it now stands as a barrier to the further development of Marxian analysis.

APPENDIX

A FORMAL REINTERPRETATION OF THE "TRANSFORMATION PROBLEM"

Here we present our interpretation in a formal transformation system focussing on the simplest general case, that of n single-product industries with no fixed capital. One must always distinguish Marx's production prices from "money" prices in numeraire units (expressing exchange ratios between commodities in terms of some particular commodity — the "money" commodity — whose price is arbitrarily set equal to one). These price ratios depend, for Marx, on the n prices of production, each of which is a definite quantity of social (abstract) labor-time per unit of commodity. Thus, with the k^{th} commodity as numeraire:

$$P_j = \frac{1}{\rho_k} P_j \qquad (j = 1 \ldots . n) \tag{1}$$

where P_j is any numeraire price and ρ_j is any price of production. Numeraire prices, though related, are clearly not expressed in the labor-time units of Marx's production prices.

Define: $\mathbf{A} = [a_{ij}]$, matrix of physical commodity inputs per unit output;

$\mathbf{L} = [L_j]$, row vector of direct (living) labor inputs per unit output;[23]

$\mathbf{b} = [b_i]$, column vector of commodities advanced per unit direct labor (the "real wage bundle");

$\mathbf{X} = [X_i]$, column vector of gross output levels in physical units;

$\mathbf{Y} = [Y_i]$, column vector of net output levels in physical units, such that $\mathbf{Y} = [\mathbf{I} - \mathbf{A}]\mathbf{X}$;

$\mathbf{V} = [V_j]$, row vector of commodity values (value per unit commodity);

$\rho = [\rho_j]$, row vector of production prices per unit commodity;

$\mathbf{P} = [P_j]$, row vector of numeraire prices, with $P_k = 1$;

r, the general rate of profit.

For purposes of transformation, **A, L, b, X,** and **Y** are taken as historically determined and given—the result of capitalists' choices, accumulation, class struggle, etc. **P**, ρ, **V**, and r are the variables to be determined.

The following equations express the basic transformation system:

$$\rho = [\rho\mathbf{A} + \rho\mathbf{bL}]\,(1+r) \tag{2}$$

$$\mathbf{V} = \rho\mathbf{A} + \mathbf{L} \tag{3}$$

$$r = \frac{\mathbf{LX} - \rho\mathbf{bLX}}{\rho\mathbf{AX} + \rho\mathbf{bLX}} \tag{4}$$

Production prices are defined in equation (2) as the sum of the advances made for means of production and labor-power (Marx's cost price) marked up by the general rate of profit. Though the equation is structurally identical to a Sraffian price equation, all its terms are magnitudes of labor-time per unit output. Equation (3) expresses the conclusion of our interpretation of Marx in the preceding pages, that the value of each commodity should be understood as the sum of the prices of production of its means of production plus the living labor required.

Equation (4) expresses the general rate of profit, a pure number, as a ratio of aggregate quantities of labor-time: total unpaid labor performed divided by total capital advanced in labor-time terms. The numerator of this fraction, total living labor minus the aggregate wage bill evaluated in price of production terms, is the total surplus value realized in the economy. Marx stated that "the value of labor power . . . is determined by the production price of the means of subsistence" (1967:868), thereby designating the vector product, ρ**bLX**, as the aggregate expression for the total necessary (paid) labor performed in the economy.[24] Any labor performed in excess of this amount is surplus (unpaid) labor, creative of surplus value. The denominator is the total advanced capital, expressed in terms of labor-time production prices. Thus, equation (4) directly satisfies Marx's condition that total profit is equal to total surplus value (unpaid labor-time). Moreover, the system simultaneously fulfills Marx's other condition, that total value and total price of production are equal. Adding one to each side of equation (4) and multiplying through yields:

$$(\rho\mathbf{AX} + \rho\mathbf{bLX})\,(1+r) = \mathbf{LX} + \rho\mathbf{AX} \tag{5}$$

Applying equations (2) and (3) yields:

$$\rho\mathbf{X} = \mathbf{VX} \tag{6}$$

which states Marx's second aggregate equality.

Each of the equations (2), (3), and (4) expresses for Marx a conceptual definition, yet the system as a whole is solvable in a consistent fashion. Under certain well-known conditions, equation (2) can be solved independently for the uniquely meaningful profit rate known to exist via the Perron–Frobenius theorem.[25] Equations (3) and (4) then contribute to the specification of a unique normalization. From equation (5):

$$\rho[\mathbf{X} - \mathbf{AX}] = \mathbf{LX}$$

implying
$$\rho\mathbf{Y} = \mathbf{LX} \tag{7}$$

This equation expresses what for Marx (1967:877) is a necessary equality between, on the one hand, the direct labor-time expression of the net product (**LX**), and, on the other, the expression in labor-time terms for the revenues which are realized by the two classes together when that net product is distributed between them via circulation (ρ**Y**). Equation (7) provides a unique normalization condition which, in combination with (2), yields a solution for ρ and, via (3) and (1), for **V** and **P** as well.

It is a characteristic of the system presented that both production price and *value* are conceived as varying with *all* the givens — the real wage and the composition of output, as well as technology. This is in apparent conflict with certain arguments by Marx stating that changes in wages do not affect the values of commodities.[26] In our transformation system, where advanced capital is evaluated at the production prices implied by the full set of givens, wage changes do affect values (e.g., with **A, L** and **X** given, a change in **b** would alter *both* **V** and ρ). However, we stress that Marx often chose for expository purposes to treat the advances made for means of production as given prior to the production period in question. As a result, the contribution of means of production to value is taken as fixed and independent of the "replacement prices" implied by current conditions of production, so that commodity values are then unaffected by real wage changes which alter the relation between necessary and surplus labor. Marx frequently made this sort of assumption, especially when presenting numerical illustrations (see 1967:154–157).

In contrast to traditional interpretations which consider these numerical examples to embody Marx's full transformation theory, we understand Marx to present a consciously partial treatment of the issue, designed to illustrate numerically certain aspects of the relation between value and value-form while abstracting from others. Marx never attempted to unify the various strands of his argument into a mathematically complete transformation system, as we have above, preferring instead to treat the difficult conceptual issues verbally and separately. However, the text (Marx 1967:110–124) demonstrates that he was fully aware both of the revaluation of capital implied by changes in prices, and of the implications of this for his value categories.[27] Marx argued that factors which alter the prices (or, equally, the production prices) of commodities (e.g., a change in the real wage) will cause simultaneous changes, not only in the valuation of capital in those industries which use such commodities as inputs, but also in the *value* of the commodity *output* in these industries (1967:112–13).[28] Only with a specification of value like ours is it possible to understand commodity values as affected in this way by changes in the production prices of constant capital goods. Thus, while real wage changes have no *direct* impact on values (the direct labor component of value is independent of wages), Marx was quite aware of the possible *indirect* effects on value via changes in the replacement cost of means of production.

NOTES

1. Both cooperated on the Cambridge University Press edition of Ricardo's works. The publication of Sraffa (1960) occasioned the remarkable reflections in Dobb (1973:247–272). The convergence toward a unified framework, a common Ricardo-Marx tradition, makes further progress in Meek (1973), Eatwell (1974) and Bharadwaj (1978).
2. France has been the source of much of the work in this tradition; see especially Bachelard (1938, 1949, 1953), Canguilhem (1965, 1968), Althusser (1970a, 1970b, 1976), Foucault (1973, 1976). A tentative critical overview of the project of this group exists in the work of Lecourt (1975). Similar, although in other ways divergent, arguments emerged later in the United States in the works of Kuhn (1962), Lakatos and Musgrove (1970), Feyerabend (1975) and Rorty (1979).
3. For the very careful formulations that lie behind the brevity of our text at this point, see Foucault (1976:21–78), whose view of the relations among theory, science and knowledge, to which we subscribe, is summarized on pp. 178–198.
4. See, for example, Marx (1973:83), where he ridicules Smith and Ricardo for conceiving of a "Natural Individual appropriate to their notion of human nature, not arising historically, but posited by nature."
5. For an extended analysis of the role of wealth (use-values) in classical economics, see Callari (1981).
6. In the extension of this trait to all economic agents and in the reduction of production to a process conceivable in terms of disutility lie the bases for the conceptions of neoclassical theory. The distinction between classical and neoclassical theory is, thus, less a qualitative difference in sociology than a quantitative extension of the fundamental sociological principle of classical theory.
7. Ricardo's theoretical problems with value (natural price) were simply an attempt to abstract from distribution, as was his search for an invariable measure of value, i.e., a commodity whose

''value'' would not vary with changes in wages. As Sraffa (1960:93) shows, Ricardo's attempts to produce this invariable measure were attempts to reduce the profit rate — a specifically capitalist relation — to an expression of the conditions of soil fertility. This, of course, fits well within our description of his approach, his reduction of the capitalist social order to an expression of the principle of wealth.

8. The essentialism in Ricardo is inextricably tied to his eternalization of capitalist relations of production. This link between a given set of social relations and an essentialist theoretical strategy has not been sufficiently stressed in many works which have attempted to specify the differences between Marx and Ricardo. We believe, however, that a non-essentialist treatment of the interaction of production and circulation is necessary if Marx and Ricardo are to be distinguished analytically, and, moreover, that it is only the adoption of a non-essentialist reading of *Capital* which makes that treatment possible: see Althusser (1970a: 87–128) and (1970b:11–193).

9. See Ricardo (1971:291) and Marx's direct critique (1973:410–13).

10. See Resnick and Wolff (1982) and Althusser (1970a:87–128). Althusser's use of this term differs substantially from the mathematical use in reference to solutions of systems of simultaneous equations. Overdetermination is much more than multiple determination; it denotes the interaction between variables which constitute one another rather than merely influencing each other's magnitudes. See Resnick and Wolff (1979).

11. This point is made by Marx (1973:99–100), who distinguished between ''production'' in the narrow, ''one-sided'' sense in which we use the term here, and ''production'' as the determinate totality (social formation, production relation) comprising its consumption, distribution, exchange, and (one-sidely) production moments. He explicitly insisted that ''production'' in the narrow sense is ''itself determined by the other moments.''

12. Among Marxist authors, see, for example, Dobb (1973), Meek (1973), Sweezy (1975: xii–xxx), and a host of similar contributions by younger Marxist economists in recent years, including Steedman (1977:29–49). For a review of the broader literature on transformation, see Roberts (1981:71–130).

13. Although we use the ''overdetermination'' approach to deal only with the transformation problem, the approach has wider implications. Two recent analyses are especially relevant as efforts to conceptualize the history and structure of capitalism along the theoretical lines presented in this paper. See Resnick and Wolff (1982) and also Aglietta (1979), who presents an analysis of the United States social formation emphasizing different forms of competition/concentration of capital. He argues that to these different forms there correspond ''different modes of transformation of value according to the nature of the constraints that the division of capital into different fractions imposes on exchange relations'' (1979:21). In particular, Aglietta discusses how different forms of competition/concentration involve different quantitative revaluations of capital.

14. An earlier version of part of the following argument appeared in Wolff, Roberts, and Callari (1982).

15. Lest it be doubted that this is indeed an *assumption* made quite explicitly by Marx, note that, as he begins his consideration of transformation in Volume 3, Marx refers back to ''the assumption that has been the basis of all our analyses so far, namely, that commodities are sold at their values'' (1967:153). Not noticing that this was an assumption made and then dropped by Marx does, of course, facilitate assimilation of Marx to Ricardo.

16. Note that because of the assumed rule of equivalence, there is no quantitative difference between the value of the *money capital* advanced for means of production and the value of the *commodities* which represent that capital in the actual production process. Therefore (in contrast to the situation in *Capital*, vol. 3), it makes no difference for the magnitude of the constant capital component of output value whether the ''value of constant capital'' is considered to be the labor embodied in the commodities consumed in production or the labor represented by the money paid out for those commodities. Value-equivalent exchange was initially assumed precisely to create this simplification. Marx stressed the importance of value-form by insisting that ''the point of departure in the process of the production and circulation of capital, is the independent form of value. . ., whatever changes the commodities in which it manifests itself may undergo'' (1971:131). But because equivalent exchange is initially conceived as the trading of equal values, the crucial question of the relation between the value antecedent to production and the value which results from it was deliberately posed by Marx so as to allow quantitative determinations to be considered solely within the production sphere. However, once capitalist exchange equivalence is admitted, the importance of value-form reemerges in an altered conception of the constant capital component of value. See below.

17. Marx often criticized Ricardo for immediately assuming an average profit rate, thereby presupposing its consistency with his value concept, rather than developing the relation between value and an average rate of profit.
18. Marx conceived the average rate of profit — continually approximated but never actually realized — as the outcome of ceaseless interactions between production and circulation. The profit rate for any individual capital is tied to the market prices for its inputs and output. Market prices are determined by supply and demand, but supplies and demands vary continuously as new decisions are made on the basis of realized profit rates. The existence of profit rate differentials would then provoke changes in the allocation of capital perhaps sufficient to alter the average technical basis of production, as less efficient capitals within low profit industries shut down and capital flows to the more efficient techniques within high profit sectors. In any case, there would certainly be changes in the composition of output, implying altered reproduction demands, a new set of prices, different realized profit rates, etc.
19. Such a Marxian solution in no sense defines a "long-period" position or equilibrium. The factors taken as given by Marx (the conditions and scales of production and the historically determined real wage) are given only for the immediate period in question since capitalists' responses to differential profit rates change the (average) conditions from which "the" rate of profit is derived.
20. Marx also argues: ". . . as the result, the product of capital, the commodity, changes in form (and later on, in the price of production, it will be changed in substance, too)" (1977:969).
21. To cite merely one example, see Marx (1967:206–208), concerning the production price of commodities of average composition. The passage implies that the "average composition" of capital is an average of production price magnitudes, not values ("80c may be greater or smaller than the value of c"). As a result, Marx's claim that the production price of the output of such a capital is "in practice. . . equal to the value of the commodity" can be understood as an application of the value concept in the sense we have presented. For the varied and extensive textual evidence for our interpretation, see Roberts (1981:131–92).
22. Emphasis added. There are occasional terminological differences in Marx's various works. *Theories* uses the term "cost-price" to refer to what Marx in *Capital* called "price of production." Identifying the meaning from the context, we have, for clarity, substituted the latter term for the former.
23. **A** and **L** are intended to express the average conditions of production, i.e., given **X** (the vector of gross output levels), **A** and **L** are constructed as weighted averages of all the various techniques involved in producing the given output of each of the commodities. See Marx (1967:178–79).
24. The worker's necessary labor-time is originally referred to as "that part of his day's labor in which he produces. . . an equivalent for the value of his labor-power already advanced by the capitalist" (Marx 1977:324–25). A parallel point is made later when Marx refers to "the portion of the working day required by the laborer for the production and reproduction of an equivalent for the value of [the] necessary means of subsistence" (1967:859). The careful use of language is significant: necessary labor reproduces not the value of the means of subsistence, but an *equivalent* for that value. As stated in the quotation above in the text, in the context of Marx's focus in Volume 3 on *capitalist* circulation, the specification of that equivalence can only be accomplished in price of production terms. Cf. also Marx (1967:207).
25. Note also that equation (4) expresses the profit rate as a ratio of labor-time magnitudes summed across *all* industries. Since the explicitly Ricardian work of Bortkiewicz (1975:207–209), it has become common to criticize Marx for implying that "luxury" or non-basic industries have equal status in determining the profit rate. However, with our conception of Marx's categories at this stage of his discourse, the conditions of production in non-basic industries are indeed relevant to the *expression* of the profit rate as a ratio of labor-time magnitudes, even though it is of course true that the production conditions of only basic industries are involved in the actual mathematical determination of the solution.
26. The effects of a change in real wages are considered explicitly by Marx (1967:200–204), but with special restrictive assumptions which limit the generality of his conclusion that values are independent of wage payments. Had he instead considered such a change in a context which permitted the revaluation effects which his own arguments had already described, we believe, as the text below states, that the effects on both the production prices and the *values* of output would have been clear and unavoidable.
27. Capital revaluation has, of course, implications broader than those considered here. Marx's writings on capital appreciation and depreciation focussed largely on the dynamic effects of such

changes. For a recent attempt to extend this aspect of Marx's concerns and to integrate capital revaluations into the dynamic theory of capitalist crises, see Aglietta (1979:273–297). Our concern here is limited to the implications of revaluation for the categories and conceptual relations within Marx's theory of value in its Volume 3 form.
28. Although Marx had not yet introduced the concept of production price, he argued that "[t]he present statements apply equally if prices rise or fall under the influence of the credit system, competition, etc., and not on account of fluctuations in value" (1967:113). These influences are precisely those which give rise to production prices different from values. For an extended discussion, see Roberts (1981:214–222).

REFERENCES

Aglietta, Michel. 1979. *A Theory of Capitalist Regulation*. London: New Left Books.
Althusser, Louis. 1970a. *For Marx*. New York: New Left Books.
______. 1970b. *Reading Capital*. London: New Left Books.
______. 1976. *Essays in Self-Criticism*. London: New Left Books.
Bachelard, Gaston. 1938. *La formation de l'esprit scientifique*. Paris: Vrin.
______. 1949. *Le rationalisme appliqué*. Paris: P.U.F.
______. 1953. *Le materalisme rationnel*. Paris: P.U.F.
Bharadwaj, Krishna. 1978. Maurice Dobb's Critique of Theories of Value and Distribution. *Cambridge Journal of Economics* 2(2):153–74.
Blaug, Mark. 1978. *Economic Theory in Retrospect*. Cambridge: Cambridge University Press.
Bortkiewicz, Ladislaus von. 1975. On the Correction of Marx's Fundamental Theoretical Construction in the Third Volume of Capital. In, *Karl Marx and the Close of His System,* Paul Sweezy (ed.). London: Merlin Press.
Callari, Antonino. 1981. *The Classicals' Analysis of Capitalism*. Unpublished Ph.D. Dissertation, University of Massachusetts, Amherst, MA.
Canguilhem, Georges. 1965. *La connaissance de la vie*. Paris: Vrin.
______. 1968. *Etudes d'histoire et de philosophie des sciences*. Paris: Vrin.
Dobb, Maurice. 1973. *Theories of Value and Distribution Since Adam Smith*. Cambridge: Cambridge University Press.
Eatwell, John. 1974. Controversies in the Theory of Surplus Value: Old and New! *Science and Society* 38(3):281–303.
Feyerabend, P. 1975. *Against Method*. London: New Left Books.
Fine, Ben, and Laurance Harris. 1979. *Rereading Capital*. New York: Columbia University Press.
Foucault, Michel. 1973. *Madness and Civilization*. New York: Vintage.
______. 1976. *The Archaeology of Knowledge*. New York: Harper and Row.
Freud, Sigmund. 1938. The Dream Work. In, *The Basic Writings of Sigmund Freud,* A. A. Brill (ed.). New York: Random House.
Gerstein, Ira. 1976. Production, Circulation and Value: The Significance of the 'Transformation Problem' in Marx's Critique of Political Economy. *Economy and Society* 5(3):243–91.
Himmelweit, Susan, and Simon Mohun. 1978. The Anomalies of Capital. *Capital and Class* 6(3):67–105.
Kuhn, Thomas. 1962. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press.
Lakotas, Imre, and Alan Musgrove, eds. 1970. *Criticism and the Growth of Knowledge*. Cambridge: Cambridge University Press.
Lecourt, Dominique. 1975. *Marxism and Epistemology*. London: New Left Books.
Marx, Karl. 1967. *Capital,* Vol. 3. New York: International Publishers.
______. 1968. *Theories of Surplus Value,* Vol. 2. Moscow: Progress Publishers.
______. 1971. *Theories of Surplus Value,* Vol. 3. Moscow: Progress Publishers.
______. 1973. *Grundrisse*. New York: Vintage.
______. 1977. *Capital,* Vol. 1. New York: Vintage.
Meek, Ronald. 1973. *Studies in the Labor Theory of Value*. New York: Monthly Review Press.
Resnick, Stephen and Richard D. Wolff. 1979. The Theory of Transitional Conjunctures. *Review of Radical Political Economics* 11(3):3–22, 32–36.
______. 1982. Classes in Marxian Theory. *Review of Radical Political Economics* 13(4):1–18.

Ricardo, David. 1971. *On the Principles of Political Economy and Taxation*. Harmondsworth: Penguin Books.

Roberts, Bruce. 1981. *Value Categories and Marxian Method: A Different View of Value-Price Transformation*. Unpublished Ph.D. Dissertation, University of Massachusetts, Amherst, MA.

Rorty, Richard. 1979. *Philosophy and the Mirror of Nature*. Princeton: Princeton University Press.

Seton, Francis. 1957. The Transformation Problem. *Review of Economic Studies* 29(3):149–60.

Shaikh, Anwar. 1977. Marx's Theory of Value and the 'Transformation Problem.' In, *The Subtle Anatomy of Capitalism,* Jesse Schwartz (ed.). Santa Monica: Goodyear Publishing Co.

Smith, Adam. 1937. *The Wealth of Nations*. New York: Random House.

Sraffa, Piero. 1960. *Production of Commodities by Means of Commodities*. Cambridge: Cambridge University Press.

Steedman, Ian. 1977. *Marx After Sraffa*. London: New Left Books.

Sweezy, Paul, ed. 1975. *Karl Marx and the Close of His System by Eugen von Böhm-Bawerk*. London: Merlin Press.

Wolff, Richard D., Bruce Roberts and Antonino Callari. 1982. Marx's (not Ricardo's) 'Transformation Problem': A Radical Reconceptualization. *History of Political Economy* 14(4):564–82.