On Marx, the Transformation Problem and Opacity

Baumol - Samuelson - Morishima

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Editor's Note: *Few articles in the history of the* JEL *have stirred the controversy that Paul A. Samuelson's "Understanding the Marxian Notion of Exploitation: A Summary of the So-called Transformation Problem between Marxian Values and Competitive Prices,"* J. Econ. Lit., *June 1971,* 9 *(2), pp. 399–431, did. We have already had one "terminal" discussion of the reaction—Bronfenbrenner, M. "Samuelson, Marx, and Their Latest Critics," and "Samuelson's 'Reply on Marxian Matters',"* J. Econ. Lit., *March 1973,* 11 *(1), pp. 59–63. Professor Baumol has found a history of thought approach to the topic which deserves the attention of all economists who have an interest in Marx, Marxism, or the evolution of classical economic thought. We print his essay here. Professor Samuelson sought to comment on Baumol's work, and we give his views, as well. In the course of Samuelson's reply, he "took on" Professor Morishima, who quite naturally wanted to add a few words of further explanation. We have finally allowed Professors Baumol and Samuelson to share in what we hope are the "last words." M.P.*

The Transformation of Values: What Marx "Really" Meant (An Interpretation)

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I would like to thank the students in my seminar on doctrinal history at Princeton University whose discussions contributed greatly to the ideas in this paper. I am also grateful to Elizabeth Bailey, Fritz Machlup, Michio Morishima and Paul Samuelson for their very helpful comments on earlier drafts of this paper. I am particularly indebted to Professor Samuelson for an extensive, illuminating and delightful correspondence on the subject.

THIS PAPER will suggest that the meaning of the relationship between values and prices described in *Capital* has been widely misunderstood. Commentators as eminent as Mrs. Robinson and Professor Samuelson have sought in the transformation discussion issues which Karl Marx never meant it to contain. Writers on "the transformation problem" since L. Bortkiewicz have focussed on an issue that is largely peripheral; and others like E. Böhm-Bawerk have asserted that there is a contradiction between the analyses of Volumes I and III which is certainly not to be found there unless 1ne reads into them an interpretation different from that which Marx repeatedly emphasized.

Interpretation of the intentions of the writings of the dead is always a questionable undertaking, particularly since defunct authors cannot defend themselves. Yet there are some cases in which a careful rereading of the pertinent writings indicates that the author *did* speak for himself and spoke very clearly—the trouble in such cases seems to be that something about the original presentation prevents most readers, even some very careful ones, from seeing what the writer intended.

A notable case in point is D. Ricardo's discussion of the labor theory of value. It is hard to understand how a careful reader of any edition of the *Principles* can overlook Ricardo's recognition of the role of the quantity and the durability of capital in the determination of price. The labor theory is explicitly proposed as a remarkably good approximation to the determination of competitive price. But, ultimately, Ricardo holds to a cost of production theory of pricing, not to a pure labor theory. Yet until Stigler's fine article on the subject (1958),[2] in which this is documented beyond any shadow of a doubt, virtually any text was prepared to ascribe to Ricardo the purest of labor theories, and even J. H. Hollander and E. Cannan (see G. J. Stigler for references) suggested that Ricardo retreated grudgingly under fire to the cost of production model of the third edition. Only a few commentators, notably A. Marshall, J. Viner, and P. Sraffa, saw Ricardo's analysis for what it so plainly was from the first edition on.[3]

I emphasize this case for two reasons; first, because I will try to show that the correct interpretation of Marx' intentions is equally evident, and second, because I will suggest that the false analogy between Ricardo's and Marx' value theories may help to explain our misunderstanding of the latter.

Marx' Interpretation of the Transformation Problem: Summary

In Ricardo, the labor theory of value *was* meant as a good approximation to a full explanation of the determination of prices. However Marx probably never intended to produce such an approximation and it certainly was not his intention when he wrote about the transformation problem; yet that objective, or something close to it, is often attributed to Marx.

I will provide evidence that Marx did not intend his transformation analysis to show how prices can be *deduced* from values. Marx was well aware that market prices do not have to be deduced from values (nor, for that matter, values from prices). Rather, the two sets of magnitudes which are derived more or less[4] independently were recognized by Marx to differ in a substantial and a systematic manner.[5] A subsidiary purpose of the transformation calculation was to determine the nature of these deviations. But this objective and, indeed, any explanation of pricing as an end in itself, was of very little consequence to Marx, for the primary transformation was not from values into prices but, as Marx and Engels repeatedly emphasize, from *surplus* values into the non-labor income categories that are recognized by "vulgar economists," *i.e.,* profits, interest, and rent.

Thus we must surely reexamine the implications of Samuelson's conclusion:

> The truth has now been laid bare. Stripped of logical complication and confusion, anybody's method of solving the famous transformation problem is seen to involve returning from the unnecessary detour taken in Volume I's analysis of values. . . . [S]uch a "transformation" is precisely like that in which an eraser is used to rub out an earlier entry, after which we make a new start to end up with the properly calculated entry [13, 1971, p. 421].

[1] I must emphasize that it is not the purpose of this paper to attack or defend the substance of Marx' transformation discussion or to argue the significance of the insights it offers. This issue can be discussed profitably only after clarification of the content of his analysis—which is the only objective of this article.

[2] Obviously, I disagree emphatically with Samuelson's judgment that "It is a sad reflection on the decadence of literary economics that so much printer's ink has been wasted on the sterile and ambiguous question of whether Ricardo had or didn't have a labor theory of value, or a 93 percent labor theory, or . . ." [13, 1971, p. 405]. If an author speaks for himself as clearly as Ricardo did, it is surely more appropriate to discuss what he did say than what some commentator has somehow inferred he ought to have said.

[3] For references on these matters, see Stigler [15, 1958]. Note that Marx himself understood Ricardo correctly on this issue. Thus in a letter to Engels dated July 6, 1863, Marx wrote "You know that according to *Adam Smith the 'natural' or 'necessary price'* is composed of wages, profit (interest), rent. . . . This nonsense was taken over by Ricardo, although he excludes rent, as merely accidental. . . ." (Marx' italics.) All translations, unless otherwise noted, are taken from [8, 1956]. The preceding quotation appears on p. 174.

I have chosen to follow the published translations of the correspondence, which seem to be reasonably accurate. In a few cases some of the English phrases that Marx scattered through his letters have been edited by the translator.

[4] Not entirely, since labor time (Marxian value) is a technological datum which enters the determination of cost and, hence, competitive price.

[5] R. L. Meek [9, 1956] and M. Morishima [10, 1973, Chapter 7] in my view may be the only current authors who have described the transformation problem correctly.

I will argue that this conclusion represents no real conflict with Marx' intentions, as Samuelson seems to suggest. Marx knew perfectly well that price determination can be explained in terms of the competitive process by itself, just as the classical economists had done, so that if the objective were an analysis of pricing, Volume I would indeed represent an "unnecessary detour." But Marx' interests were not focused on price theory, and as I will show, he was well aware that competitive prices can be deduced without prior recourse to Marxian values.

My contention is that Marx' interest in the transformation analysis as a sequel to his value theory was not a matter of pricing. Rather it sought to describe how *non* wage incomes are *produced* and then how this aggregate is *redistributed,* the first of these being the substantive issue to Marx and the one he discusses in Volume I, while the latter is the surface manifestation known to all bourgeois economists and which Marx only deigns to consider in Volume III.

The substance of Marx' analysis can be summarized in a simple parable, in which the economy is described as an aggregation of industries each of which contributes to a storehouse containing total surplus value. The contribution of each industry is its total output minus the consumption of its labor force. If we use labor units to measure these quantities, each industry's contribution is proportionate to the quantity of labor it uses, for reasons to be noted in a later footnote. This, then, is how society's surplus value is *produced.*

The *distribution* of society's surplus value from the central storehouse now takes place via the competitive process which assigns to each industry for profit, interest payment, and rent an amount strictly proportionate to its capital investment. This is the heart of the transformation process—the conversion of surplus value into profit, interest, and rent. It takes from each according to its work force, and returns to each according to its total investment.

The object of the discussion of the conversion of surplus value into "average profit" is then straightforward. Given the contribution of some one industry to the social surplus (as described by the value analysis) and the largely independent determination of that same industry's withdrawals in the form of profits, interest payments, and rent, the question is how those two compare. Put another way, the question is, under what circumstances will a given industry withdraw more than it has contributed, and when will the reverse be true?

This is a question which cannot, I believe, be answered with the aid of an eraser. Marx proposed part of the answer, but his argument for even that portion was incomplete. Morishima, (especially pp. 80–84) in his excellent book, is, as far as I know, the first to have supplied a careful answer [10, 1973].

The Value Theory Reconsidered

In Volume I, Marx does occasionally speak of values as if they were meant to approximate prices. For example, he asserts "It is true, commodities may be sold at prices deviating from their values, but those deviations are to be considered as infractions of the laws of the exchange of commodities . . . ."[6] He goes on to describe these deviations as "temporary" ascribing them to "Market disturbances." However, his comments must be interpreted in context: at this point Marx is merely arguing that profits or surplus values cannot be *ascribed* to a process of inflation of prices above values since in such a universal inflation no one can gain. His language at such points generally seems to be explainable primarily in terms of his expository objectives. Certainly by the time we come to Volume III, values and prices are clearly dissociated, with "cost prices" based on equality of rates of return on investment in different industries.

There seem to be three plausible ways to account for the distinction between the role of value in the two volumes. The first is that Marx originally intended his values as equilibrium relative prices and only retreated from this position when he began to realize it was untenable, doing his best to explain away his retreat as a planned regrouping of his forces.[7] This view has been implied by a number of writers.[8] The second and more common interpretation is that Marx intended the value theory as a simplified approximation to the correct analysis

[6] Volume I. [6, 1906], Chapter V, pp. 176–77—all references to *Capital* are to the Charles Kerr edition.

[7] R. Hilferding (p. 155) seems to ascribe this view to Böhm-Bawerk but I have not been able to find any such assertion by the latter. Böhm-Bawerk does assert that there is an irreconcilable contradiction between the value theory of Volume I and the price theory of Volume III (p. 29 and Chapter III in general). However, he does not attempt to account for its origin [2, Böhm-Bawerk, 1949].

[8] For an illustrative reference see Sweezy [16, 1942, p. 111].

of prices (somewhat in the manner of Ricardo) and that the transformation calculation of Volume III is his way of producing the appropriate correction.[9] The third explanation, which I suspect is the correct one, is that the value theory was never intended as a theory of price, which, as a superficial manifestation of the bourgeois economy, Marx considered worth very little attention, but was instead designed to explain something to him far more fundamental: the process of production, *i.e.,* the extraction of surplus values in the various sectors of the economy.

Turning to the first of the hypotheses, we cannot hope to prove that Marx never changed his mind on the relation of his values to prices. But we do know that at least half a decade before the completion of the preface to Volume I his views of the transformation problem were quite fully formed. A letter from Marx to Engels, written five years before the publication of Volume I, provides a clear statement of the transformation problem and Marx' proposed solution.[10] Moreover, Engels tells us that "Volume III . . . was written for the greater part in 1864 and 1865" (Preface to Volume II, p. 9), that is, two years before the appearance of Volume I.[11] In fact, in that same place Engels states Marx had reached his solution "even in his manuscript for His 'Critique of Political Economy' " on which Marx had worked in the 1850's (p. 28).[12]

But substance rather than tedious arguments about dating is our real purpose here. Later, I will show explicitly that what Marx had revealed in his Volume III analysis of price he considered to be no improvement over his Volume I analysis of value. On the contrary, from his point of view the price analysis of Volume III dealt with the "outward

[9] See M. Bronfenbrenner [3, 1973] where Marx' "approximation" is explicitly likened to Ricardo's. P. M. Sweezy also argues in a way that tempts the reader to impute this position to him:

> It is perfectly legitimate to postulate a capitalist system in which organic compositions of capital are everywhere equal and hence the law of value does hold. . . . Whether or not this procedure is valid . . . must be tested by dropping the assumption. . . . [I]n Volume III [Marx] abandons this assumption and attempts to show that, from the point of view of the problems which he was attempting to solve, the modifications which result are of a relatively minor character. (*Ibid,* p. 70.)

However, in a very helpful letter to me, Sweezy rejects this interpretation of his views:

> I never had any inclination to accept what you call the "second and more common interpretation . . . that Marx intended the value theory as a simplified approximation to the correct analysis of prices." On certain assumptions, most importantly equal organic compositions of capital, value theory was *also* a valid price theory; but of course Marx never for a moment entertained the notion that the equal organic compositions assumption was realistic, from which it follows that for him the notion of values "approximating" prices was nonsense.

[10] For example, Marx writes in this letter:

> . . . with *equal* exploitation of the worker in *different* trades, different capitals of the *same size* will yield very *different* amounts of surplus value in different spheres of production and therefore *very different rates of profit,* since profit is nothing but the proportion of the surplus value to the total capital advanced. This will depend on the *organic composition* of the capital, *i.e.,* on how it is divided into constant and variable capital. . . . And capitalists are brothers. Competition (transfer of capital or withdrawal of capital from one trade to another) brings it about that *equal sums* of capital in *different* trades, despite their different organic compositions, yield the *same average* rate of profit. In other words: the *average* profit which a capital of £100, for instance, yields in a certain trade it yields not as the capital employed in this particular way, nor in the proportion, therefore, in which it itself produces surplus value, but as an *aliquot part* of the aggregate capital of the capitalist class. It is a share on which, in proportion to its size, dividends are paid from the total sum of surplus value (or unpaid labour) which the total variable capital (laid out in wages) of the class produces [8, 1956, pp. 158–59, Marx' italics].

[11] On p. 209 of Volume III in a footnote, Engels explicitly dates at least that portion of the transformation discussion as 1865.

A bit of chronology may be helpful in following the dating issue.

Marx' preface to Volume I is dated July 24, 1867. The letter telling Engels he had finally finished reading proof for the volume is dated 2 A.M., August 16, 1867. There are at least four letters in which Marx and Engels discuss the transformation problem. The first is dated August 2, 1862, five years before the publication of Volume I. There is an exchange dated June 26 and June 27, 1867, written while Marx and Engels were reading proof for the volume and one dated April 30, 1868, less than one year after publication of Volume I [8, 1956].

Quotations from all four letters are offered later in this paper. They show clearly that there was no significant change in Marx' position on the subject over the period.

[12] Hilferding and Sweezy are among those who have previously pointed out that Marx had worked through the transformation issue before Volume I was published. See Hilferding [2, 1949, p. 155] and Sweezy [16, 1942, p. 111fn].

disguise" assumed by the subject of his discussion. Only the analysis of the relation of profit and surplus value permitted "the actual state of things [to be] revealed for the first time" (Vol. III, Chapter IX, p. 199). Thus Marx tells us he had something more in mind than mere revision of the value theory in accord with the workings of competitive equilibrating forces.

One must also reject the assertion that Marx thought prices had to be *deduced* from values via his transformation calculation. Marx knew very well that his "prices of production" were the same as the "natural values" of classical economics. He apparently ascribes to Malthus the basic observation underlying their construction: "The theoretical conception . . . according to which every part of the capital yields uniformly the same profit. . . ." [6, 1909, Vol. III, Chapter IX, p. 200; see also, Chapter I, pp. 48–49]. In his first letter on the transformation problem (1862), Marx is quite explicit on the identity of his prices with the classical prices based on cost of production: "*Price* regulated in this way [*i.e.*, via the transformation process] = the expenses of capital + the average profit . . . is what Smith calls the *natural price, cost price,* etc." (p. 160, Marx' italics). Thus, he does *not* accuse the classical authors of having erred in deducing their price relationships without using Marxian values in the process. Rather, the charge repeatedly reasserted is that they dealt only with "this form of appearance."

Prices and values are, in short, not the same thing. Values are not approximations to prices nor a necessary step in their calculation. Rather, one is a surface manifestation, while the latter is intended to reveal an underlying reality. But what are these values and what is their rationale?

An Interpretation of Marxian Values

T. B. Veblen calls to our attention a mystery which no one since seems to have attempted to clear up. Veblen writes

> It is scarcely worth while to question what serves as the beginning of wisdom in the current criticisms of Marx; namely, that he offers no adequate proof of his labor-value theory. It is even safe to go farther, and say that he offers no proof of it. The feint which occupies the opening paragraphs of the *Kapital* and the corresponding passages of *Zur Kritik*, etc., is not to be taken seriously as an attempt to prove his position on this head by the ordinary recourse to argument. It is rather a self-satisfied superior's playful mystification of those readers (critics) whose limited powers do not enable them to see that his proposition is self-evident [17, 1919, pp. 419–20].

This failure to attempt any rationalization should be evident to anyone who rereads carefully the few pages in Volume I that are ostensibly devoted to an explanation of the workings of his value theory. (See especially Chapter I, section 1, pp. 44–46.)

Now, this lacuna seems strange in light of two facts: Marx' near-talmudic skill in conducting an argument and his avowed intention to write *Capital* in as prolix a style as possible.[13] If Marx had in mind or felt he needed some substitute for the competitive mechanism in the Ricardian analysis of prices, why does he not bring it out? In the discussion of values such a mechanism is never mentioned while, by contrast, it plays a clear and explicit role in the determination of prices in Volume III and in the justification of the premise that the rate of surplus value tends to be equal in all industries.[14]

Presumably, the reason Marx attempts no rationalization of his theory of value is, in Veblen's words, that at least to him it was "self-evident."[15] This

[13] Letter to Engels, June 18, 1862. "I am stretching out this volume, since those German dogs estimate the value of books by their cubic contents" [8, 1956, p. 156].

[14] The argument for the equality of rates of surplus values in all industries is straightforward, and applies only to a capitalist economy in which labor is free to move. On Marx' assumption (which is shared by Ricardo as well as J. von Neumann, R. Solow, H. Uzawa and many other contemporary writers) that labor is homogeneous and receives equal wages and if all work is equally unpleasant, the working day in all industries must tend to equality, for otherwise workers would move from industries with long working days to those in which working days are shorter. With working days everywhere equal, total value production per laborer (measured in hours of "socially necessary labor") must also be equal. Subtract from this in every industry the same subsistence wage (also measured in value units), and we are left with the same surplus value per worker everywhere. (See Volume III, p. 206.)

[15] In his *Critique of political economy,* the fragment published eight years before Volume I of *Capital,* Marx stated explicitly that he took his value theory to be a tautology:

> Since the exchange value of commodities is, in fact, nothing but a mutual relation of the labours of individuals . . . it is a tautology to say that labour is the *only* source of exchange value and consequently of wealth, in so far as the latter consists of exchange values. Similarly, it is a tautology to say that matter in its natural state has no exchange value, because it does not contain any labour. . . .

(pp. 31–2, Marx' italics). In other words, "exvalue theory was intended to explain the gestation, *i.e.*, the production of total surplus value, describing the contribution of each activity in the economy to that total. The tautology used by Marx in this explanation is that each industry contributes to the total surplus its entire output minus the amount used up in supporting labor. The part of the assertion that is not tautological or self-evident is that the "freedom" (mobility) of labor, which Marx stresses so heavily in Volume I as a prerequisite of the historical stage of capitalist production, guarantees a tendency toward equality of surplus value per laborer in every industry, when value is measured in terms of labor.

Moreover, as is now generally recognized, certainly the determination of the magnitudes of the values is straightforward on the Ricardo-Marx-Leontief assumption of fixed production coefficients. To summarize the standard interpretation of the matter as described, *e.g.*, by Morishima, a set of input-output equations can be used to express the value of each output as the amount of labor used directly in its production plus the amount of labor used up indirectly in the form of capital ("congealed labor"), where that indirect labor component is determined by the unit values of the capital inputs.[16]

These values are entirely determined by technological relationships and, under the simple fixed coefficient assumptions shared by both modern and classical models, are entirely independent of pricing.[17] That is, the input-output formulation of the problem puts to rest Joan Robinson's suggestion [11, 1959, p. 362] that ". . . the *values* which have to be 'transformed into prices' are arrived at in the first instance by transforming prices into values."

Values into Prices or Surplus Values into Profits?

Let us turn now to the textual evidence for the preceding discussion. If the interpretation proposed here is valid, Marx was concerned primarily with the relationship between profits and surplus value and only incidentally (as a means to get at the former) with that between prices and values. As a first piece of evidence, I reproduce in full Engels' famous challenge in the preface to Volume II, the first public statement of the transformation problem, in which it will be noted that the word "price" does not appear even once:

> According to the Ricardian law of value, two capitals employing the same and equally paid labor, all other conditions being equal, produce the same value and surplus-value, or profit, in the same time. But if they employ unequal quantities of actual labor, they cannot produce equal surplus-values, or, as the Ricardians say, equal profits. Now in reality, the exact opposite takes place. As a matter of fact, equal capitals, regardless of the quantity of actual labor employed by them, produce equal average profits in equal times. Here we have, therefore, a clash with the law of value, which had been noticed by Ricardo himself, but which his school was unable to reconcile. Rodbertus likewise could not but note this contradiction. But instead of solving it, he made it a starting point of his utopia (Zur Erkenntniss, etc.). Marx had solved this contradiction even in his manuscript for his "CRITIQUE OF POLITICAL ECONOMY."
> According to the plan of "CAPITAL," this solution will be made public in Volume III. Several months will pass before this can be published. Hence those economists, who claim to have discovered that Rodbertus is the secret source and the superior predecessor of Marx, have now an opportunity to demonstrate what the economics of Rodbertus can accomplish. If they can show in which way an equal average rate of profit can and must come about, not only without a violation of the law of value, but by means of it, I am willing to discuss the matter further with them (Vol. II, pps. 27–8).[18]

Turning to Marx' own words, we notice that he entitled the two books in Volume III that are devoted to the subject "Part I: The Conversion of Surplus-value into Profit and of the Rate of Surplus-

change value" is, *by definition*, related to labor content, and consequently not necessarily the same as price [5,1904].

[16] For an explicit discussion of this construction, see Morishima, [10, 1973, Chapter 1]. Of course, this interpretation also appears in various other writings.

[17] Note also that by treating the training of labor as investment in human capital it removes any difficulty of comparing the value contribution of different *qualities* of labor. When the coefficients of production of different types of labor are constant, the Ricardian and Marxian treatment of an hour of skilled labor as several hours of unskilled labor, with their ratio based on relative training costs, runs into no logical difficulty.

[18] In a letter to me Samuelson writes:

> By the way, Engels' 'challenge' is absurd; there was no 1830's crisis of the Ricardian system; there was no contradiction in it, for as you remind people, when Ricardo is not assuming the labor theory of value he is not assuming it and there is no reason why such cases should not disagree with the labor-theory-of-value cases. . . . When you revise your paper you might point this out.

value into the Rate of Profit" and "Part II: Conversion of Profit into Average Profit." Pricing is again not mentioned. It is true that in Chapter IX of Part II he does get around to dealing with prices and says so in the title "Formation of a General Rate of Profit (Average Rate of Profit) and Transformation of the Values of Commodities into Prices of Production." But is should be clear from the ordering which issue has the star billing.

Finally, we may note how Marx described the issue to Engels in his 1868 letter:

> . . . it is proper that you should know the method by which the rate of profit is developed. I will therefore give you the *most general features* of the process. . . . In Book III we come to the transformation of surplus value into its different forms and separate component parts. . . .
>
> *Profit* is for us first of all only *another name* or another category of *surplus value* . . . *surplus value* gets the form of *profit, without any quantitative* difference between the one and the other. This is only the illusory form in which surplus value appears [8, 1956, pp. 245–6; all italics are Marx'].

The Parable: "Capitalist Communism"

I have attempted to explain the transformation process in terms of a parable in which the economy's total surplus value is first aggregated[19] and then redivided by the competitive process. It is easy to show by a quotation from *Capital* that this parable describes Marx' intentions accurately.[20]

> . . . the capitalists in the various spheres of production . . . do not secure the surplus-value, and consequently the profit, created in their own sphere by the production of these commodities, but only as much surplus-value, and profit, as falls to the share of every aliquot part of the total social capital out of the total social surplus-value, or social profit produced by the total capital of society in all spheres of production . . . . *The various capitalists, so far as profits are concerned, are so many stockholders in a stock company in which the shares of profit are uniformly divided for every 100 shares of capital,* so that profits differ in the case of the individual capitalists only according to the amount of capital invested by each one of them in the social enterprise, according to his investment in social production as a whole, according to his shares. (Vol. III, Chapter IX, pp. 186–7. My italics.)

The Transformed Profits as a Mere Surface Manifestation

We economists have always had a somewhat warmer spot in our hearts for Volume III, and have tended to treat Volume I as an "unnecessary detour" to the issue that really matters—the explanation of competitive pricing. But that is merely a reflection of our own prejudices as bourgeois (shall I say, "vulgar"?) economists. From the point of view of the objectives of Marx' analysis, what is all that important about an explanation of the determination of competitive prices?[21] To Marx, indeed, it was worth discussing only to reveal its irrelevance

[19] To Marx this aggregation was of fundamental importance. He lists it as the first of

> . . . the three fundamentally new elements of the book [*Capital,* Vol. I] . . . that in contrast to *all* former political economy, which *from the very outset* treats the particular fragments of surplus value with their fixed forms of rent, profit, and interest as already given, I first deal with the general form of surplus value, in which all these fragments are still undifferentiated—in solution, as it were (Marx to Engels, January 8, 1868, p. 238).

The other two fundamentally new contributions of Volume I, are, in Marx' view, the difference between the use value and the exchange value of labor, and the evaluation of wages as an "irrational form in which a relation hidden behind them appears." Note these are all matters relating to income distribution, not pricing of commodities in general.

[20] The parable is also described several times in Marx' correspondence. For example in his later 1868 transformation problem letter he wrote:

> What competition between the various masses of capital—differently composed and invested in different spheres of production—is striving to produce is *capitalist communism,* namely that the *mass of capital belonging to each sphere of production* should snatch an aliquot part of the total surplus value proportionate to the part of the total social capital which it forms [8,1956, p. 248, Marx' italics].

Recall from our first quotation from that letter, that the parable also appears in the earliest (1862) transformation letter, which uses the phrase "and all capitalists are brothers" for what has here become "capitalist communism." In the text of Volume III it becomes the metaphor about proportionate dividends on shares in a joint stock company, a metaphor that had also been used in the 1862 letter.

[21] Note that to Marx, Volume I deals with "The *Process of Capitalist* Production" (Marx' italics), that is, not (primarily) with *price* theory (Marx to S. Meyer, April 30, 1867, p. 224). Similarly, in two letters to Engels, dated August 24, 1867 and January 8, 1868 (the one cited in the preceding footnote) Marx gives his lists of the main contributions of Volume I, none of which relates to the pricing of commodities [8, 1956].

and to tear away the curtain it formed before our eyes, so that the basic truth about the production of surplus value could be revealed. *That* is why the first volume is indeed the important one for Marx and his followers. To argue that he and Engels stuck by Volume I in order to put up a brave show when they had realized the weakness of its analysis is to reveal one's own misunderstanding of Marx' purpose.

Once again it is easy to document this conclusion. I quote a rather long but very significant passage from *Capital:*

> . . . the mass of the surplus-value produced in any particular sphere of production . . . has any importance for the individual capitalist only to the extent that the quantity of surplus-value produced in his line plays a determining role in regulating the average profit. But this is a process which takes place behind his back, which he does not see, nor understand, and which indeed does not interest him at all. The actual difference of magnitude between profit and surplus-value—not merely between the rate of profit and of surplus-value—in the various spheres of production now conceals completely the true nature and origin of profit, not only for the capitalist, who has a special interest in deceiving himself on this score, but also for the laborer. By the *transformation of values into prices of production, the basis of the determination of value is itself removed from direct observation* . . . The fact that the actual state of things is here revealed for the first time; that political economy up to the present time . . . [has clung] to the obvious phenomena of these differences—this confusion of the theoretical economists demonstrates most strikingly the utter incapacity of the capitalist, when blinded by competition, to penetrate through the outward disguise into the internal essence and the inner form of the capitalist process of production. (Volume III, Chapter IX, pp. 198–99, my italics.)

The Significance of the Transformation to Marx

If Marx considered pricing an unimportant phenomenon which only served to obscure the relevant relationships, then why did he devote so much effort and space to the transformation problem? The answer has already been suggested in the preceding section—it must be explained in order to get it out of the way. It is important because it had misled so many people—capitalists, laborers (see the preceding quote), vulgar economists and even economists as considerable as Ricardo.

But—and this is the essential issue—what is this truth that Marx is trying to reveal? In other words, what is the value theory really about? Is it just a bit of revolutionary propaganda, or mere playing with persuasive definitions, or a bit of Hegelian mysticism?[22]

I believe that the answer is none of the above, but to see why, it is suggestive to look ahead in time. Think of the economists at the turn of the century who were seeking evidence of justice in the capitalistic process of distribution with the aid of marginal productivity theory. It is not totally unfair to characterize their argument as proceeding from the position that labor, land,[23] and capital each contributes toward the production of society's output. It is surely only just, therefore, that each of these should share in that output. Since, regrettably, mother nature is not available to collect her share, it is indeed fortunate that the landlord is willing to accept it in her stead.[24]

Such nonsense is precisely what Marx' analysis anticipates and what it is intended to expose. Again, let Marx speak for himself.

> In Capital—Profit, or better Capital—Interest, Land—Rent, Labor—Wages of Labor, in this economic trinity expressing professedly the connection of value and of wealth in general with their sources, we have the complete mystification of the capitalist

[22] "Taken on the Hegelian (neo-Hegelian) ground, and seen in the light of the general materialistic conception, the proposition that value = labor-cost is self-evident, not to say tautological. Seen in any other light, it has no particular force." (Veblen, *loc. cit.*)

[23] Marx was at pains to emphasize the contribution of land to the *productive process:*

> The use-values, coat, linen, etc., *i.e.*, the bodies of commodities, are combinations of two elements—matter and labour. If we take away the useful labour expended upon them, a material substratum is always left, which is furnished by Nature without the help of man. . . . As William Petty puts it, labour is its father and the earth its mother. (Vol. I, Chapter I, section 2, p. 50.)

Why Marx denied that "land" contributed *value* to the product should soon become clear.

[24] Marx' objections to Adam Smith on this score presumably arise out of passages such as the following:

> . . . rent may be considered as the produce of those powers of Nature, the use of which the landlord lends to the farmer. . . . It is the work of Nature which remains after deducting or compensating every thing which can be regarded as the work of man [14, 1937, Book II, Chapter V, pp. 344–5].

mode of production. . . . It is an enchanted, perverted, topsy-turvy world, in which Mister Capital and Mistress Land carry on their goblin tricks as social characters and at the same time as mere things . . . it is . . . natural that the actual agents of production felt completely at home in these estranged and irrational forms of Capital—Interest, Land—Rent, Labor—Wages of Labor, for these are the forms of the illusion, in which they move about and in which they find their daily occupation. It is also quite natural that vulgar economy, which is nothing but a didactic, more or less dogmatic, translation of the ordinary conceptions of the agents of production and which arranges them in a certain intelligent order, should see in this trinity, which is devoid of all internal connection, the natural and indubitable basis of its shallow assumption of importance. This formula corresponds at the same time to the interests of the ruling classes, *by proclaiming the natural necessity and eternal justification of their sources of revenue* and raising them to the position of a dogma. (Volume III, Chapter 48, pp. 966–67, my italics.)

This discussion is clearly pertinent to an understanding of the significance of the value theory to Marx. But if it is relevant for the transformation analysis it may well be asked why he let some 700 pages intervene between this passage and the transformation discussion in Volume III. We can never be sure of the answer but it must be remembered that Engels tells us (in the preface to Volume II) that the manuscript from which he produced Volumes II and III was made up of many bits and pieces which he fitted together as best he could. Part VII of Volume III, from which the preceding quotation is taken, is one of the most fragmentary, with sentences reported to have been illegible, (*e.g.*, Ch. 48, p. 948) and pieces of manuscript left uncompleted, (*e.g.*, p. 950). It might only have been natural for Engels to have put it off to the end.[25]

But we are not forced to rely on conjectures on this issue either. Once again, Marx tells us about the matter; for in his later transformation letter to Engels (1868), he juxtaposes the two issues very clearly, completing his discussion of the transformation issue thus:

V. We have now reduced profit to the form in which it appears in practice . . . *Next comes the splitting up of this profit into entrepreneur's profit and interest. Interest-bearing capital. The credit system.*

VI. *Transformation of surplus profit into ground rent.*

VII. At last we have arrived at the *forms of appearance* which serve as the *starting point* in the vulgar conception: ground rent coming from the earth, profit (interest) from capital, wages from labour. But from our point of view the thing is now seen differently. The apparent movement is explained. Moreover, Adam Smith's nonsense, which has become the *main pillar* of all economics hitherto existing, that the price of a commodity consists of those three revenues, *i.e.*, only of variable capital (wages) and surplus value (ground rent, profit (interest)), is overthrown. Then—the whole movement takes place in this form of appearance. Finally since these three (wages, ground rent, profit (interest)) constitute the respective sources of income of the three classes of landowners, capitalists and wage labourers, we have, in conclusion, the *class struggle*, into which the movement and the smash-up of the whole business resolves itself. . . .[26]

The point of the value theory may then be summed up as follows: goods are indeed produced by labor and natural resources together. But the relevant *social* source of production is labor, not an inanimate "land." Thus profits, interest, and rent must also be attributed to labor, and their total is equal (tautologically) to the total value produced by labor minus the amount consumed by labor itself. The competitive process, that appears to show that land is the source of rent and capital the source of profits and interest, is merely a distributive phenomenon and conceals the fact that labor is the only socially relevant source of output. This is the significance of the value theory and the transformation analysis to Marx.

Conclusion: Sources of Misunderstanding

Having come to so unequivocal a conclusion about what Marx hoped to accomplish through his notion of a transformation process one may well ask how the apparent misunderstanding of so many commentators might have arisen. But before turning to this it should be noted again that Meek and Morishima are very clear cut exceptions and that my interpretation is very close to theirs. Thus, Morishima reminds us of Samuelson's remark that

[25] Engels also reported that the transformation discussion "(relation of Mehrwertsrate to Profit rate)" required "a great deal of work" on his part to prepare it for publication (Letter to N. F. Danielson, November 13, 1885.) [8, 1956, p. 464].

[26] The (anonymous) Russian translator exhibits some delicacy in this rendition. The word he translates as "business" is *"scheisse"* in the original [8, 1956, p. 250].

"the proportionality of market price to labor content applies validly only when surplus value is zero and not worth talking about!" [12, 1957, p. 888].

On this Morishima remarks:

> . . . in the transformation problem Marx did not intend to establish a proportionality between values and prices but, on the contrary, to show that individual exploitation and individual profit are disproportional unless some restrictive conditions are imposed. . . . Thus it is clear that the transformation problem has the aim of showing how 'the aggregate exploitation of labour on the part of the total social capital' is, in a capitalist economy, obscured by the distortion of prices from values; the other aim is to show how living labour can be the sole source of profit" [10, 1973, pp. 85–6.].

Meek begins his discussion with a statement of the issue that is just as clear. However, he does go on to treat the transformation problem as though it were primarily a matter of explaining *price* determination.

Sweezy [16, 1942, esp. pp. 125–130] also comes close to the Meek-Morishima position arguing that prices and profits of individual capitalists are micro issues while Marxian values are intended to deal with the macro issues of distribution in which Marx is interested (pp. 125–6). He notes that the "price calculation . . . mystifies the underlying social relations of capitalist production. Since profit is calculated as a return on total capital, the idea inevitably arises that capital as such is in some way 'productive' " (p. 129).

His book does follow the Bortkiewicz tradition in treating prices as magnitudes to be determined from values. However, Sweezy's letter to me also casts additional light on this matter. He writes:

> To the best of my recollection, I never treated 'the transformation problem primarily as a matter of determining prices from values.' Values are in fact an abstraction from capitalist reality, not an observable phenomenon, and could not possibly 'determine' prices of production (which are also an abstraction albeit on a lower level). The justification for such abstractions, esp. value, is that they reveal the essence of capitalist reality as opposed to the appearance—an argument which orthodox economics of course is totally unable to comprehend.

In any event, it is clear that with these and perhaps a few other exceptions, the interpretation I have offered and sought to document is hardly the view that is held universally. I have already suggested one explanatory hypothesis—that many readers may have been misled by the analogy with Ricardo. Ricardo tells us explicitly when he gets to the role of capital in price determination that the "labor theory" model gives us answers that are still very nearly correct, so that in his view it remains a good model to use in explaining the determination of individual prices. Marx, on the other hand, points out that the deviations between the two models are systematic and significant enough to conceal the underlying relationships from other observers. Moreover, as we have seen, at this point, at least, Marx is not even interested to any significant degree in the theory of price.

Yet Marx himself must bear a good share of the blame for the confusion. Since it seems true that Volume I and Volume III were written with perfectly consistent intentions he should surely not have adopted the word "value" for the magnitude on which he focuses his discussion. He was perfectly aware that "value theory" was used in the economic literature to refer to the theory of price determination (though he felt that Ricardo had also groped, albeit unsuccessfully, for a deeper phenomenon when he discussed values). Consequently, if he deliberately used the term to denote a magnitude that differs from price in a significant and systematic manner he was certainly asking for the sort of misunderstanding to which the work has been subject. Moreover, in the bulk of Volume I Marx does speak as though the "exchange value" which he explains in terms of labor were a normal market price. If he meant otherwise he hardly hinted at it.[27]

[27] There seem to be only three points in Volume I where the reader is given some warning on the matter; on pp. 184–5, footnote, p. 244, footnote, and on pp. 335–6. In the second of these, he writes "We have in fact assumed that prices = values. We shall, however, see, in Volume III, that even in the case of average prices the assumption cannot be made in this very simple manner."

Similarly on p. 335–6 we have the statement

> This law [that the masses of surplus value produced by different capitals vary directly as the variable constituents of these capitals] clearly contradicts all experience based on appearance. Everyone knows that a cotton spinner, who, reckoning the percentage on the whole of his applied capital, employs much constant and little variable capital, does not, on account of this, pocket less profit or surplus-value than a baker, who relatively sets in motion much variable and little constant capital. For the solution of this apparent contradic-

This too constitutes something of a mystery. Since Marx did have his transformation analysis worked out before Volume I was published, why is there no clear statement of the issue there? But this mystery does have a known solution. The definitive answer is provided in an exchange of letters between Marx and Engels. As they were making the final corrections for Volume I, Engels (gently) rebuked Marx for his failure to deal with the issue in Volume I. In a letter dated June 26, 1867 he wrote

> . . . As for the origin of surplus value, the following: The manufacturer, and with him the vulgar economist, will at once object: If the capitalist pays the worker only the price of 6 hours for his 12 hours of working time, no surplus value can originate from this, for then every hour of labor of the factory worker is only equal to half an hour of labor—equal to what is paid for it—and enters into the value of the product of labor as worth only that much. . . . No matter how terribly shallow this argument is, no matter how much it identifies exchange-value and price, value of labor and wages, no matter how absurd its assumption that one hour of labor enters into value as only half an hour if it is paid for as only half an hour, I marvel that you have not taken this into consideration already, for it will *quite certainly* be held up to you at once and it is better to dispose of it in advance. Perhaps you will return to it in the next [printer's proof] sheet . . . (Engels' italics).

To this Marx replied on the next day . . .

> . . . As for the inevitable objections you mention of the philistine and the vulgar economist . . . [The answer to this problem] presupposes [among other matters] . . . that the *conversion of surplus value into profit, of profit into average profit,* etc., is set forth. This presupposes a previous account of the *process of the circulation of capital,* since the turnover of capital, etc. plays a part here. Hence this matter can be set forth only in the third book. . . .
>
> If I were to *silence* all such objections *in advance,* I should ruin the whole dialectical method of development. On the contrary, this method has the advantage of continually *setting traps* for these fellows which provoke them to untimely demonstrations of their asininity. (Marx' italics.)[28]

tion, many intermediate terms are as yet wanted. . . . It will be seen later how the school of Ricardo has come to grief over this stumbling-block. Vulgar economy which, indeed, "has really learnt nothing" here as everywhere sticks to appearances in opposition to the law which regulates and explains them [6, 1906].

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[28] I came across this exchange of letters quite accidentally (thanks to a fortunate find by my secretary in a 6th Avenue trash can!) after an earlier draft of this paper had been completed. Note how remarkably it confirms Veblen's conjecture about Marx' attitude toward some of his expected readers, as well as several of the hypotheses of this article. The translation here is taken from Mins, in whose little volume (presented to me by my secretary) I first came across the exchange [4, 1937].

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Insight and Detour in the Theory of Exploitation: A Reply to Baumol

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I am grateful for editorial assistance of Norma Wasser, and financial aid from the National Science Foundation. Despite our friendly differences, I've benefitted from correspondence with Professors Baumol and Morishima.

Thesis

THE THESIS Professor Baumol advances about the proper interpretation of Marx deserves careful analysis because it duplicates a point that many think important [1, Baumol, 1974]. Essentially, it can be put in 38 words, 38 of Marx's actual words:

> "We shall see, in Book III, that the rate of profit is no mystery, so soon as we know the laws of surplus-value. If we reverse the process, we cannot comprehend the one or the other" [5, 1906, p. 239, n. 2].

The valuable Meek paper that I cited in my 1971 survey of the transformation problem[1] put the essential point this way:

[1] See also my September 1970 *Proceedings of the National Academy of Sciences* (*PNAS*), [17, 1970] reproduced in my *Collected scientific papers,* [10, 1972], as Ch. 154, pp. 309–311; my May 1967 AER centennial paper [13, 1967], reproduced there as Ch. 152, pp. 268–275; my June 1971 paper with C. C. von Weizsäcker in the *PNAS,* [20, 1971], reproduced as Ch. 155, pp. 312–316. Also two replies by me in the *JEL* 10 and 11 [15, 1972; 14, 1973]. My paper in the July 1973 *PNAS,* "The Optimality of Profit-Inducing Prices Under Ideal Planning," [16, 1973] carries further the Weizsäcker-Samuelson demonstration that, even in a planned socialist society, uniform $R^* = S_j/(C_j + V_j)$, rather than $r^* = s_j/v_j$, would be needed for efficient dynamic asymptotes. In the George Halm *Festschrift* [4, 1973] and Alice Bourneuf *Festschrift* [2, forthcoming], I present analysis relevant to A. Emmanuel's neo-Marxian analysis in *Unequal exchange: A study of the imperialism of trade* [3, 1972]. My earlier 1957 *AER* and 1959 *QJE* articles on Marx and on Ricardo are also relevant [19, 1957; 9, 1959]; they are reproduced in the 1965 *Collected scientific papers,* [10, 1965] Chapters 29–32, pp. 339–408. The ninth edition of my *Economics* (McGraw-Hill, New York, 1973), Ch. 42 Appendix gives the elements of Marxian analysis [11, 1973].

". . . according to him [Marx], the profit which the capitalists receive in each industry must be conceived of as accruing to them by virtue of a sort of redivision of the aggregate surplus value produced by the economy as a whole" [6, 1956, p. 95].

Baumol's own words are these:

". . . the primary transformation was not from values into prices but, as Marx and Engels repeatedly emphasize, from *surplus* values into the non-labor income categories that are recognized by 'vulgar economists,' *i.e.*, profits, interest, and rent." [1, 1974, p. 52].

Baumol believes in homeopathic remedies. To offset my mathematical-economic misconceptions, he invokes the high authority of Professor Morishima's mathematical analysis of Marx in his new book [8, 1973]. Baumol's citations are from Chapter 7, pp. 72–86, and most particularly to pp. 80–84. The following Morishima passages seem germane.

Marx thought he had successfully removed the mask of capitalism . . . [writing in Volume III] 'the rate of profit is from the very outset distinct from the rate of surplus value . . . this serves . . . to obscure and mystify the actual origin of surplus value . . . The individual capitalist . . . rightly believes that his profit is not derived solely from the labour employed by him . . . This is quite true as far as his average profit is concerned. To what extent this profit is due to aggregate exploitation of labour on the part of the total social capital . . . this interrelation is a complete mystery to the individual capitalist; all the more so, since no bourgeois theorists, the political economists, have so far revealed it.'

"Thus it is clear that the transformation problem has the aim of showing how 'the aggregate exploitation of labour on the part of the total social capital' is, in a capitalist economy, obscured by the distortion of prices from values; the other aim is to show how living labour can be the sole source of profit . . . Marx . . . was very successful in [his conclusion about] the necessity of aggregate exploitation of labour by capitalists for the existence of positive profit. (Morishima, pp. 85–6.)

On p. 52, Morishima examines "Marx's proposition that surplus value is the source of profit . . . This result may be claimed as the Fundamental Marxian Theorem."

One could list another score of similar quotations.[2]

[2] The reader must judge whether Baumol's citing of the "famous challenge in the Engels 1885 preface to Volume II" has relevance [1, 1974, p. 56].

Antithesis

I deny that "surplus value is the source of profit" in any useful sense. I deny that Marx (or Morishima or Baumol) have anywhere cogently given us reason to believe that one can get to profits *only after* we know the laws of surplus value. And I accept Baumol's challenge to show that my "erase and replace" demonstration of the transformation problem applies, not merely to the transition from industry microeconomic "values" to industry "prices," but *equally* to the (unnecessary-detour) transition from "*surplus* values into profits." It will be seen to be logically untenable to agree with my "erase and replace" analysis of the values-prices transformation, and withhold agreement from my "erase and replace" analysis of the surplus-value-profit transformation. For these are identical.

I shall show that a useful Morishima theorem,[3]

Actually, Ricardo never had reason to expect industries with *different* direct-labor intensities to have equal rates of surplus value (*i.e.*, to have equal ratios of profits to direct-wage outlays). So there is nothing to be reconciled. And of course when Volume III came in 1894, and after its proposals were audited by Veblen, Böhm-Bawerk, Bortkiewicz, Sweezy, Dobb, Meek, Winternitz, Seton, Morishima (including his 1973 book), it was never shown (and was never possible to show) that one can reconcile equal positive $S_j/V_j = S_i/V_i$ with unequal $V_j/C_j \neq V_i/C_i$ and equal $S_j/(V_j + C_j) = S_i/(V_i + C_i)$ — in either the "prices" (accounting) regime or in the 1867–1885 "values" (accounting) regime so long as we stay in *any one* regime. Only by going, with or without the use of an eraser, from one to the other of the mutually-incompatible regimes, can one go from one of the equality sets to the other. (By mutually-incompatible accounting regimes, one signifies the fact that competitive capitalism can *empirically* conform in its exact configuration to *at most one* of the two alternative regimes.)

Baumol's quotations from the Engels-Marx correspondence of the 1860's shows that Engels was aware of difficulties in the case which, after Marx's 1883 death, he was forced to argue for. Engels' challenge was not one of his happier performances as my later quotation from Veblen suggests.

[3] As in my 1971 paper [18, 1971], I write a_0 for the direct labor requirements row vector, a for the square matrix of input-output raw material coefficients, m for the column vector of each worker's subsistence requirements. But to keep all "prices" variables distinct from "values" variables, I use capital letters for prices-variables and lowercase letters for values-variables, writing the profit rate as R and the rate of surplus value as r. Likewise $c_j + v_j + s_j = c_j + v_j + rv_j$ is the values counterpart of the prices relation $C_j + V_j + S_j = C_j + V_j + R(C_j + V_j)$. Morishima writes my a_0 as (l_j), my a as $\begin{bmatrix} A_I & A_{II} \\ 0 & 0 \end{bmatrix}$, my $c_j + v_j + s_j$ as

to any non-antiquarian, can dispense completely with all the $s_j/v_j = s_i/v_i$ innovations of Volume I (innovations which I claim to be uninsightful diversions and detours). And, for those who like me have an antiquarian's interest in relating Marx's detour to the geodesic turnpikes of competitive analysis, I shall show that there is complete reversible symmetry between the two alternative accounting regimes: "profit is the source of surplus value" is as formally valid as vice versa; "only if the profit rate R^* can be positive [in the matrix sense, $R^* > 0$ in $a_0(1 + R^*)\,[I\text{-}a\,(1+R^*)]^{-1}\,m = 1$], can the rate of surplus value r^* be positive [in the sense, $r^* > 0$ in $a_0\,[I\text{-}a]^{-1}\,(1+r^*)m = 1$]"—this is as valid as vice versa; and preferable to either is the strengthened Hawkins-Simon condition $a_0\,[I\text{-}a]^{-1}m < 1$ if and only if $R^* > 0$].

Since I have recently covered some of this ground elsewhere, I shall here be brief [12, 1974].

★ ★ ★

Let me clear the decks of some extraneous details to concentrate on Marx's thesis, which if valid, would be of considerable interest.

First, although Baumol apparently believes that a writer is allowed only one thesis—or one primary thesis—one may deem it safer to assume that there may be more than one. And certainly Marx and the school of Marxism have been concerned with many different facets other than that which Baumol concentrates on. Therefore, the many writers—non-Marxist or Marxist—whom Baumol chides for not seeing *his* simple truth I think need not plead guilty to any mortal sins.

Second, and related, may we put down to the account of conscious or unconscious humor any writer's belief that there is plainly to be read by any intelligent reader some simple resolution of the ambiguities discerned in an early writer like David Ricardo or Karl Marx? There is Wittgenstein humor in a sentence like this gem of Baumol's: "Only a very few [!] commentators, notably R. Marshall and J. Viner and P. Sraffa, saw Ricardo's analysis for what it so plainly [!] was . . ." Years ago the world's greatest living authority laughed at the naiveté of my question: "Did Ricardo 'believe' in a labour theory of value?" And, as a student of Viner and a reader of Marshall, I can testify that both those teachers recognized that Ricardo's mode of exposition laid him intrinsically open to misunderstandings. (When one highway corner claims 50 times the number of lives of another, we are obtuse to explain its accidents by the propensity of *its* drivers to drink or to nap. Why don't people argue about the "meanings" of Wicksell the way they do about those of Ricardo and Marx?)

Third, the diligent reader can judge whether I am right in thinking that the present Baumol thesis was *not* overlooked in my earlier writings on the transformation problem—which is not to suggest that the present reincarnation of the issue is a waste of time.

How does one go about "proving" assertions like these above? I see no way other than to isolate the final insights agreed to by all parties, and examine how one arrives at them. How, via the analysis of rates of surplus value, do we arrive at the goal of explained distribution of actual incomes? What other paths can lead to that distribution? Which paths cannot? What are the arguments advanced by the various protagonists, and what is their cogency?

★ ★ ★

Baumol's testimony. Most of Baumol's paper is concerned with what Marx's purpose was. On the question of whether that purpose was successful in some sense or another, I can find only a few relevant paragraphs in Baumol's text.

First, there is his simple parable, describing how "*non* wage incomes are *produced* and then how this aggregate is *redistributed*." [Baumol's italics.] Upon exegesis, the jury will conclude that there is no cogency in this contention. There exists in actuality no *prior* determination of the total non-wage surplus, after which its aggregate can be redistributed. I do not say this as a bourgeois economist writing within a non-Marxian paradigm. I say this within the Volume I-II-III paradigm, and as a matter of

$C_j + V_j + S_j$, my $C_j + V_j + S_j$ as $C_j^p + V_j^p + S_j^p$, my R as π, my r as e, my $P[1 + 0] = a_0[I\text{-}a]^{-1}$ as $(\lambda_1, \ldots,)$, my n as $n + m$, my $P[1 + R] = a_0(1 + R)[I - a(1 + R)]^{-1}$ as $(p_{j,w})$. In the "values" tableaux, $(c_j + v_j + rv_j)$, I use $p[1 + r] = a_0[\mathrm{I} - a]^{-1}\,(1 + r) = p[1](1 + r)$, to signify $p[1 + r]aX + a_0X + ra_0X = p[1 + r]X$; what I express as $p[1 + r]$ or $p[1 + e]$ would for Morishima become $(\lambda_j(1 + e))$. My $(m_1, \ldots, m_i, \ldots)$ Morishima writes as $(0, \ldots, 0, b_{n+1}, \ldots, b_m)$. Some of the discrepancies between us vanish when one realizes the differences in notations. For brevity only, I shall assume the length of the working day, T in Morishima's notation, to be fixed at unity; to assume it variable, as Marx often did, would only strengthen my argument.

logic.[4] It involves the fallacy of *petitio principii* to assert, as Baumol does, to explain Marx's *intention,* "each [industry] . . . contributes to a storehouse containing total surplus value . . . [which] contribution is proportionate to the quantity of labor it uses . . . the transformation process . . . takes from each according to its work force, and returns to each according to its total investment" [1, 1974, p. 53]. Let's see what is actually involved in competitive income distribution.

(i) If there were zero profit or surplus, the value-added in each industry would be wages only: this is the pre-Marx classical labor theory of value. The simultaneous determination by long-run competitive supply and demand would determine goods' prices at their embodied labor contents, direct-plus-indirect labor. All the Net National Products would go to wages, and the consumption expenditure of such incomes would go for the flow of final NNP product. No quarrels here.

(ii) Suppose the profit rate is positive for whatever reason (*e.g.,* because labor can be reproduced at the cost of its subsistence bundle, *m,* which is less than what the labor can produce in the steady state net after reproducing its used up cooperating raw materials). Then the NNP flow of final product is composed of labor's consumption plus that of the capitalist property owners; within each industry, the prosaic accounting of value-added (a concept already glimpsed in Adam Smith) records its wage payments and its profit payments; summed, these industry value-addeds define the NNP, which has no logical existence other than as the macroeconomic sum of the microeconomic items, all simultaneously defined. To digress, in a corrected Baumol parable, each industry "puts into" the pot in value-added what it takes out.

Only simpletons think that accounting labels cause the world to move. The apple falls the same whether Newton watches or enunciates its constant acceleration. Profit or surplus is no less ugly or reprehensible or correctable when it is proportional to each industry's *total* investment outlay on raw materials and on direct-labor wage payments; and, if we want to understand real-world competitive exploitation, and to predict how distribution will change when invention, consumption-demand, or subsistence-requirements change, we preserve insight by concentrating on the reality of avaricious competitive arbitrage rather than on irrelevant Platonic abstractions or dual accounting systems.

None of this soft pedals for a moment the basic fact that, if you take away all living labor, you take away *all* product. Nor does it distract attention from Marx's basic reality: The worker does not own the raw materials and machinery that is needed if his labor is to produce product (use values). That is why the worker must sell or rent out his labor power rather than be sole producer and appropriator of *all* the product he sets his hand and brain to.

Living labor, yes. But it is a bad pun to confuse this with "live labor" in the sense of *direct* labor, to the neglect of labor "previously" performed and embodied in raw materials and in equipment—*i.e.,* "dead" or indirect labor.

That there is no cogent sense in which at each stage surplus or profit springs out of the direct labor alone and not out of the needed raw materials can be shown by any simple example.[5] Let 1 coal now be producible by 1 mine-labor a short period ago. And let 1 coal now with 1 farm-labor now produce 1 corn a period from now. Suppose corn is the "end-all" of economic activity. Then, eschewing any neoclassical variability of production methods, we have in terms of production causation:

$$\text{Corn}_t = \text{Min}[\text{mine–labor}_{t-2}, \text{farm–labor}_{t-1}]$$

[4] This does not assert that a "macroeconomic" theory of profits, like Kalecki's widow's cruse model, is self-contradictory or illogical. It does point out that there is no semblance of such a theory in any of the three Volumes of Marx. Incidentally, a Kalecki-Kaldor-Pasinetti macro theory finds the uniform rate of profit more useful than a detour through a uniform rate of surplus value.

[5] A more complicated example can do better justice to Marx's non-Austrian circular-flow models. Let $\frac{1}{2}$ coal and $\frac{1}{2}$ mine labor now produce 1 coal a brief period from now. And let $\frac{1}{2}$ coal and $\frac{1}{2}$ farm labor produce 1 corn a period from now. Then

$$\text{Corn}_t = \text{Min}\ [\tfrac{1}{2}\ \text{farm–labor}_{t-1}, \tfrac{1}{4}\ \text{coal–labor}_{t-2}, \tfrac{1}{8}\ \text{coal–labor}_{t-3}, \ldots + \tfrac{1}{2k}\ \text{coal–labor}_{t-k}, \ldots]$$

an infinite-sequence that converges for steady-state corn production producible out of steady-state total labor $L_t = \bar{L}$ to

$$\overline{\text{Corn}} = 1\ \bar{L} = (\tfrac{1}{2} + \tfrac{1}{4} + \tfrac{1}{8} + \ldots + \tfrac{1}{2k} + \ldots)\ \bar{L}$$

with half society's steady state labor on the farm and half in the mines. This NNP of producible corn will go to wage earners in a share of a anywhere from 1 to 0 depending upon where the profit rate per period, R, falls in the range $0 \leqslant R \leqslant 1$, where $a = 2(1 + R)^{-1} - 1$.

and in the steady state with a given labor supply of $L_t \equiv \bar{L}$, we have

$$\overline{\text{Corn}} = \text{Min}\left[\frac{\bar{L}}{2}, \frac{\bar{L}}{2}\right] = \tfrac{1}{2}\bar{L}$$

In terms of physical causation, and any ethical consequences inferrable from that, no more can be said.

Nothing in these technocratic facts or in the brute facts of competitive arbitrage is illuminated by the 1867–85 innovations that postulate dual accounting identities $s_1/v_1 = s_2/v_2$. As Veblen said, not unsympathetically, Marx never even deigns to prove his contention. As I say, neither Baumol nor Morishima nor anyone else has provided a shred of the lacking proof needed to show why $s_i/v_i = s_j/v_j$ is a useful concept to anyone who understands the self-standing $C_j + V_j + R(C_j + V_j)$ conventional tableau.

Beyond Baumol's parable and aside from his evidence bearing on Marx's *intention*, there is only one other part of his paper that addresses itself to whether or not Marx's intention misfired. In the first paragraph of his section on transformed profits as a mere surface manifestation, Baumol criticizes himself and other bourgeois economists like me for "treating Volume I as an unnecessary detour." He does so by turning from the issue of relative shares (which both sides deem *non*-trivial) to the issue of relative industry prices only. He says, "What is all that important, . . . from the point of view of the objectives of Marx's analysis . . . about an explanation of the determination of competitive prices."

But Baumol has not reckoned with my contention that, all microeconomic price details aside, when we properly transform from rate-of-surplus-value accounting regime to actual rate-of-competitive-profit regime, we take an eraser and replace the $a_0[I\text{-}a]^{-1}(1+r^*)m = 1$ relation that defines "the rate of surplus value, r^*" by the *alternative* relation $a_0(1+R^*)\ [I\text{-}a(1+R^*)]^{-1}m = 1$ that defines the "competitive rate of profit, R^*;" and literally nothing in the way of understanding of the latter's actual distribution relation is "revealed," is "uncovered" or is "laid bare" by the pre-eraser detouring. All that Baumol need do to end disagreement between us is to admit that what he calls Marx's intention actually misfires—in that, *from Marx's own standpoint of explaining actual wage-profits distribution*, the Volume I analysis is indeed a detour. Or Baumol should provide cogent argument for the first time that demonstrates why such a conclusion is wrong.

* * *

Morishima's testimony. This book is of great interest for its own sake [8, 1973]. What light does it throw on the contention that analysis of

$$c_j + v_j + s_j = c_j + v_j + rv_j$$

where r is the uniform rate of surplus value, is an uninteresting and redundant detour for the economist interested in the statics and dynamics of the distribution of income?

After careful reading of the book, I find no cogent argumentation that compels, predisposes, or even tempts one to withdraw the view that the pre-Volume III model with $s_j/v_j = s_i/v_i = r$ (= e in Morishima's notation) is essentially only a diversionary detour. To appraise this thesis of mine, I divided the book's many interesting theorems into three classes:

A. Those theorems that are stated, or can be restated, to apply to the model of mainstream economics in which $S_j/(C_j + V_j) = S_i/(C_i + V_i) = R$ [π in Morishima's notation] including the case where $R = 0 = \pi$, the "classical labor theory of value."

B. Those theorems that relate the $s_j/v_j = s_i/v_i$ *dual* accounting system to the pre-Marxian *primal* accounting system of $S_j/(C_j + V_j) = S_i/(C_i + V_i)$ much in the way that a bi-lingual dictionary relates, say, my children's private nursery language to standard English.[6]

[6] "Duality" is an O.K. word these days, because of its insights into linear programming and game theory, direct-and-indirect utility analysis of demand, price-quantity symmetries in planning and growth models, Legendre transformations in Hamilton-Pontryagin control theory, classical thermodynamics, and in analysis of rationing, point-line symmetries of projective geometry and convex set theory, "and-or-not" symmetries of Schröder-Peirce symbolic logic; node-branch symmetries of network theory, etc. It represents at best a poor pun in English, at worst a source of confusion, to employ the Morishima usage of "*dual* accounting regimes" to denote competitive pricing and Marxian Volume I regimes. In this sense, obsolete phlogiston-caloric and living Cornot-Clausius-Gibbs energy-entropy thermodynamics are "dual accounting regimes," related by eraser transformation algorithms! If only Marxian surplus values added the insights to competitive profits that Maxwell-Boltzmann-Gibbs kinetic theories of statistical mechanics added to phenomenological thermodynamics—but, alas, not even the great skills of a Morishima can accomplish this.

C. Those theorems that apply exclusively to the dual system of values, and which yet do have an independent interest to an economist who has no penchant for antiquarian study in the history of doctrines and ideas.

My finding: Class C was a null set. The few interesting theorems in the book framed exclusively for the dual "values" regime could, upon straightforward reformulation, be expressed *solely* in terms of empirically-observable regimes of competitive-arbitrage pricing, and hence could be put into Class A. Class C's emptiness recognized, Class B dwindles in its interest.

Let me give some illustrations:

1. There is a beautiful modern theorem about non-negative matrices, a, a_0, $(I-a)^{-1}$, $a_0(I-a)^{-1}$, and the same matrices when all (a_0,a) coefficients are multiplied by $(1 + R)$ and R is not so large as to make $det[I - a(1 + R)]$ change its positive sign. In Hicks, *Value and capital*, the theorem states that the percentage change in an own good's price is, under certain assumptions about gross substitutes and defined changes in tastes, greater than for any cross-good's price change. In Leontief input-output analysis, the theorem states that a unit increase in hats will cause a greater percentage change in gross hat production than in gross shoe or belt production. In Keynes-Metzler n-country multiplier analysis, the theorem says that an increase in United States net investment will raise American income more than it will raise the United Kingdom's income. Connoisseurs know how neatly Morishima has enunciated and generalized this nice result in his non-Marxian writings.

Now, in his book on Marx, Morishima points out a version of the same theorem: an increase in an input requirement in industry j, say an increase in a_{ij} or a_{0j} (*i.e.*, of raw material or labor requirements), will increase the pure-labor cost of good j by a greater percentage than it will increase the pure-labor cost of another good k. It is a nice result. But what power, in the Neyman-Pearson sense, does such a result have for interesting any economist in rate-of-surplus versus rate-of-profit analysis? None! The theorem holds as well for "prices" as for "values"; as well for the primal bourgeois accounting regime as for the dual Volume I regime; it holds at every admissible positive profit rate.

I could give many other examples of Class A theorems.

2. Let's look at a typical Class B theorem of antiquarian interest only. The rate of surplus value, e or r^*, will be numerically greater than the rate of profit, R^* or π, in any system where some subsistence-wage good requires directly or indirectly some non-labor input. It can be specified for such a system that $I \neq [I - a]^{-1} \geqslant 0$, $a_0[I - a]^{-1} > 0$, and $a_0[I - a]^{-1}m < 1$, for m the non-negative, non-zero column vector of subsistence for worker. Then we see from the algebra that $f(R_1, R_2) = a_0 (1 + R_1) [I - a(1 + R_2)]m$ is positive for admissible positive R's and is strongly monotone in each and both of its arguments. Consequently Morishima neatly demonstrates that the respective roots, R^* and r^*, of

$$f(R, R) = 1 \text{ and } f(r, 0) = 1$$

must satisfy $0 < R^* < r^*$ since $f(r^* + k^2, r^* + k^2) > f(r^*, 0)$. But if my contention is correct that the $f(r, 0) = 1$ dual regime of Volume I is an uninsightful detour, who but an antiquarian will be interested in this simple algebraic result?

As C. C. von Weizsäcker discussed in "Morishima on Marx," [21, 1973], the harmless algebra theorem that $a_0(1 + R^*)[I - a(1 + R^*)^{-1} m = 1$ has a positive root iff $a_0[I - a]^{-1} (1 + e^*) m = 1$ has a positive e^* root, should *not* be construed to mean that a positive interest rate is solely possible under "exploitation" of poor laborers by rich capitalists. We can have a positive profit rate when all people are alike. Algebra should never *obscure* sociology and power relations! All that is valuable is conveyed by the Volume III non-Marxian theorem: *If and only if* $a_0[I - a]m < 1$ *will there be possible a positive profit rate and feasible positive non-subsistence consumption.* No $s_j/v_j = e > 0$ relations are involved.

3. Under Class C is a Marx-Sraffa theorem such as (a) the ratio of values in the dual accounting regime are never affected by the increase in the rate of surplus value, even though (b) the ratio of prices will be generally affected by changes in the rate of profit, in any system where the ratios of direct-wage to other costs are not uniform between industries. What is interesting about this theorem is the part which already belongs in Class A—namely the alegebra of how any $\text{price}_j/\text{price}_k$ is affected by a change in R from zero to larger values. Morishima's beautiful generalization of this Marx-Sraffa theorem, which can be stated as giving sufficient conditions for a subset of the goods to keep invariant relative *prices* [!] as the profit rate changes, belongs

to my Class A rather than to Class B or Class C.

4. Again, for antiquarians (I include myself in this harmless avocation), Morishima provides as a Class B theorem his useful generalization of my equal-internal-composition sufficiency condition to a wider "linear dependence" sufficiency condition. I applaud this. Morishima's e coefficient is computable from technocratic data alone, without our ever detouring to a dual accounting regime of $s_j/v_j = s_i/v_i = e$, and without ever going beyond the *pre*-Marx classical labor theory of value. But, of course, the ratio "surplus labour"/"necessary labor" $= e$ does not equal the observable Profit Share/Wage Share; nor will e equal observable aggregate *competitive* $\Sigma S_j/\Sigma V_j$, or any one industry competitive S_j/V_j, even though it is bounded by the maximum and minimum of observable $[S_j/V_j]$. A change in capitalists' tastes toward goods of greater wage intensity will, even at unchanged profit and real wage, result in a lowering of observable α even though e has the defect of being invariant under such taste changes.

5. One could go on listing how Morishima's findings could be, from the present viewpoint, more usefully reformulated. Even his rare mistakes can be made to be independent of any detours. Thus, on p. 142, he says "the following treatment based on the [Morishima] true formula (12) may be claimed as the first rigorous proof of the law [of the Marxian falling rate of profit]" [8, 1973]. What Morishima purports to show is this: Consider a "neutral" invention that enables us to replace an industry's labor and raw material requirements [a_{0j} and a_{ij}, for fixed j] by a new set of requirements in which total labor costs [A_{0j} in $a_0(I-a)^{-1}$ remains the same but which the direct labor requirements [a_{0j}] are reduced at the expense of an increase in raw material requirements [one or more a_{ij}]. Such an alleged increase in the organic composition of capital will, at the same real wage and r^* level, necessarily depress the rate of profit. So goes the assertion.

Heaven defend Marx from his defenders! The trap I warned against in my 1972 JEL ecumenical reply to Lerner [15, 1972, p. 56] has sprung here. The invention Morishima prescribes, which he calls by the harmless word "neutral," is a "*dis*improvement" at every positive profit rate, not an "improvement." It will be *avoided* in ruthless competition like the plague. It will never come into effect under the new equilibrium. His rigorous proof is no proof at all, and no proof of a false proposition is ever possible. Indeed, once the system has a choice of technique—pre- and post-invention—concentrating on zero-profit embodied-labor magnitudes becomes highly dangerous (and irrelevant!) for aggregation or any other purpose. Volume I's dual regime gives outsights, not insights.

7. Morishima's claim, even if it were true, as it is not—that zero-profit embodied-labor contents give better weights for aggregation purposes than do prices calculated at positive interest rates that are in a nearer neighborhood of actual observed systems—is better formulated and criticized by avoiding any detour to $s_j/v_j = s_i/v_i = e > 0$ analysis. No need to belabor these points further.[7]

I conclude that Baumol's writing a check on Morishima to reinforce his thesis leaves him overdrawn at the bank.

Synthesis

Let me state for dogmatic clarity what I believe to be the position to which, at some future date, Marxian and non-Marxian economists will both agree. (My pen also has a sense of humor.)

1. *No* new analytical insight is given, statically or dynamically, by Marx's own novelties of theoretical analysis that involve—*macro*economically or microeconomically—the concept of the "rate of surplus-value," either in the form of s_j/v_j or of S_j/V_j, $\Sigma s_j/\Sigma v_j$ or $\Sigma S_j/\Sigma V_j$,

(a) into the explanation of the distribution of income between labor wages and property capital return, or

(b) into the determination of society's general profit rate (or total of profit return), or

[7] A reader who has mastered the present considerations will be in a position to judge whether, in his occasional stricture against my writings on Marx, Morishima has scored valid points that should cause me to recast my wordings. There is no point in discussing Morishima's p. 6 mention that his "discussion of the transformation problem . . . is very different from his [Samuelson's] in its conclusions, in spite of the surprising similarity in the mathematics used . . . I [Morishima] am very much more sympathetic than he [Samuelson] is" [8, 1973]. If you overhear two persons, saying respectively, "2 + 2 = 4 and Marx was a genius" and "2 + 2 = 4 and Marx fathered an illegitimate son," you must not think that they are necessarily disagreeing or that you can cogently infer which one is more sympathetic to Karl Marx! In the cited Metzler *Festschrift*, I have replied more specifically, albeit briefly, to points raised by Morishima about my Marxian writings [7, 1974].

(c) into the microeconomic empirical configuration of goods and prices in a system of perfect or imperfect competition (or of imperfect knowledge, or of stochastic exogenous disturbance) or

(d) into the realities of the class struggle or the understanding of power relations between groups and governments, internationally or nationally, or

(e) into the ethical nature of "exploitation" and inequality of income.

2. More concretely, I assert:

There is no cogent argument, in Baumol, or, for that matter in Morishima's 200 pages of mathematics, or in the vast literature already surveyed on the transformation problem, that would

(a) make one want to qualify the verdict that the Volumes I and II excursion into the realms of $s_j/v_j = s_i/v_i$ was anything but a detour, anything but at best a wasteful redundancy and at worst a digression that fails to "penetrate" and "lay bare," and "reveal" the "deceptive character" of "capitalist accounting."

All this is claimed *within* the paradigm of Marxian rejection of the legitimacy of positive property income at the expense of labor wages gettng 100 per cent of the Net National Product.

3. What I am arguing is this. If Baumol wishes to regard the transformation problem as, not a transition from "values" to "prices," but as a transition "from surplus values into . . . profits," then to understand competitive distribution of income I claim it to be equally true that what is involved *is use of the eraser to rub out the irrelevant detour's uninsightful accounting system, and then the replacing of that system by the empirically-relevant equalized-rate-of-profit behavior equations* that the economists use who preceded Marx, who were contemporary with him, and who have succeeded him. Marx's own investigation into the trends of distribution, the cycles of activity, and the modes of steady reproduction and exponential growth, I am arguing here, were hampered, not helped, by his novel rate-of-surplus-value analysis.

★ ★ ★

Qualifications: Are there no qualifications to this rather sweeping indictment? Yes, the following:

1. The algebra of the surplus-value regime is easier to handle. So, for purposes of elementary exposition and layman persuasion, there is merit in the Volume I models. Just as one does not criticize Walras for not using in 1874 the topological methods von Neumann was to use in 1931 to prove existence of a general equilibrium system, I do not fault Marx—but rather praise him—for coming so close in the 1860's to a correct tableau of steady-state and exponential-growth-equilibrium. But no one would dream today of maintaining that Walras' 1874 counting of equations and unknowns is as good or is better than use of fixed-point theorems; likewise, I argue it is absurd, after praising Marx for his early efforts, to extoll his surplus-value model over the model that dominates it in every virtue.

2. To the degree that differences in direct-labor intensities are deemed minor or that their effects are macroeconomically ignorable, the "values" or surplus-value regime may be a useful first-approximation to the "prices" or profit regime.

3. In the history of thought, we realize that detours may serve useful purposes. An error of Newton is rightly dismissed as such by a modern student of live physics. But to the antiquarian of dead physics, to the historian interested in the psychology of discovery and innovation, errors are often as interesting as truths. Many seminal contributions have grown out of misunderstandings. I doubt that many important contributions of Marx, such as circular-flow balanced growth models, would have been developed by him if he had not, for extraneous reasons, been preoccupied with his detour paradigms. But just as we do not burn down our houses to broil our daily chops, there is no reason why the admirer of Marx should go through his historic circuitous detours and redundancies.

Summary. Karl Marx did pioneering work that foreshadowed a number of modern analytical models of economics. He also has an important position in the history of ideas and in non-analytical aspects of political economy, the social sciences, and philosophy.

Nonetheless, a careful rereading of his claims and those made on his behalf does not disclose cogent arguments that should impel a Marxian or non-Marxian to agree that his novel analytical innovations concerning positive equalized rates of surplus value are other than a detour to one who would understand 19th-century or earlier-century distribution of income and to one who would understand the laws of motion of any economic system.

If I am wrong in my answer to this question—which has been *the* number one question among pro- and anti-Marx analysts from 1867 to the present day—presentation of some new and cogent argumentation controverting my contention can dispose of it.

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The Fundamental Marxian Theorem: A Reply to Samuelson

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I AM happy to find that Samuelson has no objection to my Fundamental Marxian Theorem if it is put in the following neutral form: [3, 1974,].[1]

Theorem: *The competitive rate of profit R^* determined by*

$$a_o\,(1 + R^*)\,[I - a(1 + R^*)]^{-1}\,m = 1 \quad (1)$$

is positive if and only if

$$a_o[I - a]^{-1}\,m < 1. \quad (2)$$

The notation is Samuelson's.[2] The theorem assumes *inter alia* that wages are fixed at the subsistence level; evidently the subsistence-consumption vector per man-hour m equals the subsistence-consumption vector per day (B in my notation) divided by the working hours per day, my T. Then (1) and (2) can be rewritten, respectively, as

$$a_o\,(1 + R^*)\,[I - a(1 + R^*)]^{-1}\,B/T = 1, \quad (1')$$

$$T^* < T, \quad (2')$$

where

$$T^* = a_o[I - a]^{-1}B. \quad (3)$$

Marx regards a_0 and a as technologically given and B as biologically given; hence, T^* can be calculated easily. The theorem then states that R^* which satisfies (1′) is positive if and only if T is larger than T^*. No "mysterious" concepts such as "value" or "exploitation" or anything else appear in this form of the theorem. It gives an economically meaningful relationship between T and R^*.

[1] For the Fundamental Marxian Theorem see Morishima [2, 1973, pp. 53–71].

[2] a_0 is the vector of labor-input coefficients that is my $L = (L_I, L_{II})$, a the matrix of physical-input coefficients (my $A = \begin{bmatrix} A_I & A_{II} \\ 0 & 0 \end{bmatrix}$), R^* the equilibrium rate of profit (my π) and m the subsistence-consumption vector per man-hour (my B/T).

I.

However, what does the critical value T^* stand for? This question is important, especially to Marx because his contemporaries cannot swallow down the Leontief inverse, $[I - a]^{-1}$. Probably the only way to make them understand T^* is to appeal to the labor theory of value, as Marx does. In fact, $a_0\,[I - a]^{-1}$ is nothing else but the solution to the value-determination equation,

$$\Lambda = \Lambda\,a + a_o, \quad (4)$$

and, therefore, T^* equals the value of the subsistence commodity-bundle, ΛB, that is the labor-time socially necessary for producing B by the techniques (a, a_0) actually prevailing in the economy. It is important to emphasize that there is no element of competitive arbitrage in (4). It is no more than the equation for calculation of the quantities of labor socially necessary for producing goods.

II.

In Marx, competitive arbitrage is exclusively made in terms of prices, the wage rates and the profits rates, not in terms of values and the rates of surplus value at all.[3] If the economy is competitive

[3] In Marx's economics, value calculation plays a role that is entirely different from the one which price calculation does. Decision of individuals and firms are all made in terms of price calculation, while value calculation gives a technocratic assessment of labor requirement for production. Marx's theory of value should not be considered as a primitive or obsolete price theory. There is no point in comparing translation of the price accounting in the value accounting or *vice versa* with translation of a children's private nursery language into ordinary English. Samuelson's footnote [3, 1974, p. 66, f. 6] is not understandable if this fact is clearly recognized.

Also, in contrast with Samuelson's grouping my theorems into classes A, B, and C, Marx would probably propose to group them into the following A′, B′, and C′. Class A′ includes the theorems concerning competitive arbitrage in the capitalist economy; B′ those that relate the and the subsistence wages prevail, the following two equations must be fulfilled in the state of equilibrium:

$$p = (1 + R^*)(pa + wa_o) \qquad (5)$$

$$wT = pB. \qquad (6)$$

Equation (5) implies that the rate of profit should be equalized throughout the economy by competitive arbitrage among capitalists, while (6) implies that the hourly wage-rate, w, or the length of the working day, T, should be equalized throughout the economy, by competitive arbitrage among workers, because the wages per day are set at the subsistence level.

Once the length of the working day is equalized among jobs, then a uniform rate of surplus value is established throughout the industries. This is seen in the following way. Let l_i be the labor-input coefficient of industry i, *i.e.*, the i-th element of a_0, and T_i the working hours per day in industry i. Then by definition

$$v_i = l_i \ \Lambda \ B/T_i, \qquad (7)$$

$$s_i = l_i - v_i, \qquad (8)$$

for each i. Hence,

$$\frac{s_i}{v_i} = \frac{1 - \Lambda \ B/T_i}{\Lambda \ B/T_i} \quad \text{for each } i. \qquad (9)$$

Therefore the rates of surplus value are equalized if and only if T_i's are equalized.[4]

price-profit accounting system to the value-surplus-value accounting system; and C' those concerning technocratic calculation of values of commodities. Class A' does not include the theorems of the classical labor theory of value (as a primitive competitive price theory) because they are valid only in the society of "simple commodity production" but not in the capitalist society; on the other hand, class C' is not a null set.

[4] Marx writes: "This [equalization of the rate of surplus value] would assume competition among labourers and equalization through their continual migration from one sphere of production to another" [1, 1966, p. 175].

In his footnote 2, Samuelson asks whether one can reconcile equal $S_j/V_j = S_i/V_i$ with $V_j/C_j \neq V_i/C_i$ and equal $S_j/(V_j + C_j) = S_i/(V_i + C_i)$ or not [3, 1974, p. 63]. But it is obvious that the two inequalities are incompatible if both are in either the price accounting or in the value accounting. Although Marx is confused sometimes, his problem is not such a trivial one. It is to show that equal positive $s_j/v_j = s_i/v_i$ with $v_j/c_j \neq v_i/c_i$ in the value regime is compatible with equal $S_j/(V_j + C_j) = S_i/(V_i + C_i)$ in the price regime.

III.

Let us now assume that all T_i's are equalized. Then (9) is written as

$$\frac{s_i}{v_i} = \frac{T - \Lambda \ B}{\Lambda \ B} \equiv r^*. \qquad (10)$$

In view of $T^* = \Lambda B$, we can say that $T > T^*$ if and only if $r^* > 0$. Hence by the theorem above, the equilibrium rate of profit R^* is positive if and only if the uniform rate of surplus value r^* is positive. Thus r^* is a mirror-image of T, and the latter is considered by Marx to be determined by the relative powerfulness of capitalists and workers. Marx finds that the rate of profit is increased by lengthening the working day—a view that is very consistent with his experience in the Victorian era.

IV.

One of the purposes of Marx's *Capital* is to show the productiveness of the capitalist system or the positiveness of the von Neumann balanced-growth rate. To show this we have to find the necessary and sufficient condition for the augmented input-coefficient matrix $a + a_0m$ to satisfy the Hawkins-Simon condition. We must, however, remember that when Marx was tackling this problem, Frobenius, Perron and Markov had either not been born or were merely babies so that he could not use their theorems; Marx had to find his own way. For this purpose he assumes that A_I (the submatrix of a concerning the capital-goods sectors) is "productive" (this is Marx's basic and harmless assumption concerning technology); and he finds that $a + a_0m$ is "productive" if and only if (2') is satisfied. Therefore, the von Neumann equilibrium rate of growth is positive if and only if (2') holds; in fact, it is seen that the growth rate is equal to the positive equilibrium rate of profit.

I take this as a first-rate contribution. To examine whether the crucially important condition (2') is fulfilled or not, we calculate labor values (or $a_0 \ [I - a]^{-1}$ if one does not like to call it the value vector) and evaluate the commodity-bundle m in terms of values. But this does not mean at all that Marx accepts the theory of value as a theory of prices. In Marx, prices which are determined in the competitive way are distinct from values which are technocratically calculated on the basis of the prevailing production coefficients; on the contrary he insists that the value equations may be taken as the equations for determining prices only in the simple-commodity-production society but not in the capitalist economy. I am against Samuelson's view: "The algebra of the surplus-value regime is easier to handle. So for purposes of elementary exposition and layman persuasion, there is merit in the Volume I models." It is true that Marx often confuses value and price. But in reinterpreting Marx so that no confusion remains (as we, non-antiquarians, do for Walras) we must distinguish, again as non-antiquarians, value of commodity i (*i.e.*, the quantity of labor congealed in one unit of i) from its exchange value (or price). The former regulates the latter; but they differ from each other in the long-run as well as in the short-run, except in some special cases. According to my interpretation, Marx is concerned with the exceptional cases in Volume I first, because he may begin with macroeconomic analysis of a one-department model by doing so, and then he generalizes it into two-or-three-departmental analysis in Volumes II and III. That is to say, I understand that throughout Volume I it is implicitly assumed as the condition for aggregating sectors into one department that all industries have the same value composition of capital, so that values are strictly proportional to prices and hence surplus values to profits. Then it is very natural for Marx to attack these proportionalities in the transformation problem as soon as he denies the aggregation condition and starts the work of disaggregation in Volumes II and III.

V.

So far so good. However, in the above discussion, as well as in the first thirteen chapters of my book, a number of assumptions (all about technology) are made so as to enable us to calculate values unambiguously and to assure their positiveness. But some of these assumptions turn out to be inappropriate if durable capital goods are allowed for. Therefore, in Chapter 14 of my book I reexamine the theory of value (*i.e.*, the program for technocratic calculation of quantities of labor congealed in commodities) and find that unambiguous and meaningful calculation of values is not necessarily possible once joint production and choice of techniques are admitted. As capital good i of age $t + 1$ appears as a joint output at the end of the process which uses capital good i of age t and capitalists can choose among processes which uses capital goods of age 0, 1, 2, . . ., the existence of durable capital goods is intrinsically connected with the problems of joint production and choice of techniques. I finally decide to discard the value theory, but I find, at the end of the book, that the concept of "exploitation" may survive.

This conclusion has stronger effects than Samuelson's "erase and replace" conclusion; it should be a serious attack on Marx. I did not know, when I finished the book, whether the Fundamental Marxian Theorem is valid or not in the general model with durable capital goods. But I now know that it does hold true: The long-run equilibrium rate of profit R^* is positive if and only if the rate of "exploitation" is positive. This proposition is completely independent of the concept of value, and the rate of exploitation is defined as I define it at the end of the book. I have not proven this new general theorem here because it was discussed in my Walras Lecture at the 1973 North American meeting of the Econometric Society in New York. Anyway, we may conceive of Marx without the theory of value, as long as we agree that the Fundamental Marxian Theorem is the core of his economic theory.

VI.

There remain a few more points on which I want to reply to Samuelson. First, I accept his criticism about my interpretation of Marx's law of the falling rate of profit. I have made a similar mistake which has been pointed out by Okishio, one of the very best theorists of Marxian economics. It is interesting to see that a mistake which is favorable to Marx has been pointed out by Samuelson and missed by Okishio and a mistake which is unfavorable to Marx has been pointed out by Okishio and missed by Samuelson. However, I do not accept Samuelson's criticism concerning my treatment of the aggregation problem. He says that I claim "that zero-profit embodied-labor contents give better weights for aggregation purposes than do prices calculated at positive interest rates." But I never made such a proposition in my book.[5] Finally, in relation to Samuelson's footnote 7 [3, 1974, p. 68], I point out that the theorem that prices of commodities are proportional to their values in the simple-commodity-production economy is a proposition concerning the long-run equilibrium. Like the Fundamental

[5] C. C. von Weizsäcker has made the same misunderstanding. A full detail of my reply on this point is given in my "Marx's Economics: A Comment on C. C. von Weizsäcker," *Econ. J.*, forthcoming.

Marxian Theorem, it should not be applied to profits (or monopoly profits) "which a buyer or seller acquires through an accidental state of supply and demand," [1, Marx, 1966, pp. 175–178, especially p. 178], so that von Weizsäcker's corn-wine parable for showing a possibility of existence of a positive profit rate in the classless society is a swing missing the ball. Its existence is transitory when all people are alike.[6]

[6] Also see my comment on von Weizsäcker.

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Comment

I am enormously puzzled by Professor Samuelson's reply. It is, of course, the brilliant sort of comment one expects of him—but it seems to be a reply to an article which I never wrote. Perhaps it does help to explain the source of the *one* fault I have found with Samuelson's earlier article—my belief that there he deals with a model that Marx never used or intended to use.

Let me add several specific points to try to make the purpose of my paper quite clear:

1. I have never accused Professor Samuelson of "mathematical-economic misconceptions" or any other error in logic, as the reader can readily judge for himself. I may add parenthetically that my piece was not even particularly directed at Samuelson's discussion.

2. I am surprised that "On the question of whether [Marx's] purpose was successful in some sense or another [Samuelson] can find only a few relevant paragraphs in Baumol's text." I am surprised because, so far as I know, there is *no* such paragraph.[1] The only objective of my paper was to determine what Marx had set out to accomplish and how *Marx* believed he had accomplished his objectives, because I don't think it is appropriate to criticize anyone until we are sure we are criticizing what he actually said, not what we suspect he might have said, or should have said, or someone else says he might have said.

3. Hence, whether or not I have grasped any particular Matrix equation is totally beside the point. Indeed, my position is immune to *any* algebra that may be hurled at it. It can only be undermined by suitable quotations from Marx showing that he says the things I have denied he said.

4. Professor Samuelson proposes his peace terms, which require me to admit that for an explanation of "actual wage-profits distribution," presumably as for an explanation of actual pricing of commodities, "the Volume I analysis is indeed a detour." So much I admit readily and without reservations, and I contend Marx would readily have admitted it too, for in fact he *did* so repeatedly.[2] Actual prices and actual wages, profits, rents and interest payments clearly were to him explainable by the classical mechanism,[3] which is what he admittedly took over in Volume III. Marx never claimed, in fact he specifically denied, that one gets better numbers for any of these magnitudes from a Volume I than from a Volume III analysis.

Thus, for his part, all that Professor Samuelson

[1] The one citation Samuelson seems to have found to support his belief that my purpose is to judge the virtues of the Marxian argument is my comment that he and I are interested more in Volume III than in Volume I because we are both bourgeois economists. How this observation imputes virtue or vice to the Marxian analysis escapes me.

[2] For example, he wrote ". . . as for Duhring's modest objections to the definition of value, he will be astonished when he sees in Volume [III] how little the determination of value 'directly' counts for in bourgeois society." (letter from Marx to Engels, January 8, 1868, quoted in Sowell [3, 1967, p. 68].

[3] Of course, with one exception—the Malthusian mechanism for the imposition of subsistence wages, which Marx rejected vehemently.

has to do to end the disagreement between us is to admit that Marx himself was not particularly interested in the determination of these magnitudes, which he considered a surface manifestation and were important to him only because he believed them to conceal the underlying social production relationships.

5. I must take the occasion to apologize for a major omission from my article, my failure to give credit to Professor Thomas Sowell for two excellent discussions on Marxian economics which I have only recently come across. While he does not deal explicitly with the transformation problem, his discussion of Marxian value theory, which is documented with exquisite care, comes to conclusions very similar to my own on the tautological nature of the value theory and on the nature of Marx' interests in the subject. Though he does sometimes speak of value theory as a first approximation [3, 1967, p. 66] he makes it clear that Marx *always* considered the deviations between prices and values to be systematic [3, 1967, pp. 65–6]. I recommend these pieces unhesitatingly as models of Marxian scholarship.[4]

One final comment. Obviously, Ricardo is not easy reading,[5] and our predecessors did often hold a multiplicity of views among which they themselves were not always able to distinguish, and such problems are brushed aside far too often in writings on history of thought. But there are some cases, albeit rare, where an author has said clearly and repeatedly, "I do mean A, I do not mean B," yet many people have refused to listen. Ricardo did repeatedly say that his was a cost of production model. He did say, at length, in *every* edition of the *Principles* that quantity and durability of capital make a difference to value. I suggest to any interested reader that he treat himself to a reexamination of pages 30–43 (from the third edition) and 52–66 (from the first edition) of Volume I of Piero Sraffa [5, 1951] to see whether he can come away disagreeing with Jacob Viner's (humorous?) conclusion that "Ricardo's actual words show that from the first he held that the relative values of commodities are *always* partly dependent on the relative amounts of fixed capital employed in their production" (Viner's italics) [6, 1930].

WILLIAM J. BAUMOL

[4] Since the completion of my paper, the English translation of Marx' *Grundrisse* has become available and readers can confirm for themselves (p. 435 ff.) Engel's report that Marx had arrived at his transformation solution nearly a decade before the publication of Volume I of *Capital*. The manuscript that includes the pages in question is dated mid-December 1857–22 January 1858 [1, 1973].

[5] But then, Malthus is surely even more obscure, yet we do not have protracted arguments about Malthus's value theory. Clarity is not the only explanation of the absence of disputes over what (to use Samuelson's example) Wicksell really meant.

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Rejoinder: Merlin Unclothed, A Final Word

Happily our dialectic registers didactic progress. Like the truth-seeking child in Hans Christian Andersen's tale of the Emperor's Clothes, I ventured a riskily strong statement in the hope of provoking from two formidable scholars a cogent defense of Marx as having *succeeded* in his avowed purpose of revealing the secrets of profit and income determination from his Volume I paradigm, in which the rate of surplus value is equalized industry by industry.

The issue is a momentous one. For, proper as it is to cast Karl Marx in the role of Prometheus, so too did he aspire to the role of a Merlin, who reveals the mysteries below the surface of things that cannot yield to conventional political economy.

There is a school in the history of science whose practitioners are concerned primarily with how earlier scientists perceived their own problems. In caricature, we can say it is all one to them whether Newton wrote on gravitation, alchemy, or the Secret of the Number of the Beast in Deuteronomy. They would never dream of grading earlier writers for error or fruitfulness. To look back so on earlier writers is, I believe, to *look down* on them as hopelessly handicapped Neanderthals who lacked our advantages.

I begrudge no one his pastime. But, in the realm of cumulative knowledge, I believe there is a place for what might be called Whig History of Science. In it we pay past scholars the compliment of judging how their works contributed (algebraic) value-added to the collective house of knowledge. Economics, I know, is not a hard natural science. Still I have thought it valuable to treat Marx not as an historic deity or oddity, but rather to appraise his arguments on the transformation problem in the way a journal referee would treat any serious contributor. If it had been the case that Professors Baumol and Morishima had been able to supply the demonstration I puzzled over—that the *prices tableau* of the observed world can be understood only (or, even better) *after* the novel *values tableau* of Marx has been mastered—I would have regarded that as an important finding for modern-day political economy. But, alas, apparently the challenge must still stand.[1]

* * *

Political biases of the economist can contaminate the search for truth in this imperfect world. Hence, as a check on the degree to which my biases may have infected and contaminated my analysis's objectivity, I think it will be of interest that, just as Baumol by serendipity found fascinating letters of Marx and Engels in a lower-Manhattan ashcan, by similar happy chance I came upon the following answer to what I have called the Number One Problem by America's leading Leftist, Thorstein Veblen. Joseph Dorfman recently unearthed this 1895 item,[2] written, it is interesting to note, before Böhm-Bawerk's critique and while Thorstein Veblen was serving as the underpaid sub-editor of the *Journal of Political Economy:*

[1] Reading recent works by two other authors worthy of respect and just evaluation, I must record no reason to modify my thesis. Cf. M. Dobb, *Theories of value and distribution since Adam Smith,* Ch. 6 on Marx [1, 1973]. To illustrate for Dobb's readers the crucial analytic point, suppose (as is possible) that equal organic composition of capital does happen to obtain in the real world. Then the transformation problem is agreed by all to be trivially simple, and indeed hardly necessary. In that case my need to object to a values tableau as a digression from understanding of the actual prices plateau evaporates. But one is still left, even in this case, with no new insights, statically or dynamically, in the distribution of income or the share of wages by Marx's innovations concerning rates of surplus value, commodity fetishism, modes of production involving productive labor in a collective or social division of labor. A Sraffian, Clarkian, neo-Walrasian, would merely be *reposing* the problem of how inventions, thrift, composition of demand, and relative factor supplies alter (1) the R^* profit rate, by asking how these factors alter (2) the now-trivially-related rate of surplus value r^*.

Cf. also the excellent E. Wolfstetter "Surplus Labour, Synchronized Labour Costs and Marx's Labour Theory of Value" [3, 1973]. This affirms the truth that, for normative purposes under socialist planning or Pareto-optimal market exchanges, it is prices tableaux not values tableaux that are relevant when they differ. On p. 799 this also makes the point of Morishima's (10) in his *Reply* that, within the values tableau there is a common s_j/v_j that can be interpreted as the fraction of labor not worked for the subsistence wage itself. But one is left with no interest in this once he has grasped the "neutral" technocratic theorem: $a_0\,[I - a]^{-1}m < 1$ implies and is implied by R^* positive in $a_0\,(1 + R^*)\,[I - a\,(1 + R^*)]^{-1}m = 1$. Similarly, with von Weizsäcker, let labor grow like $L_0\,(1 + g)^t$, workers' consumptions like $L_0m\,(1 + g)^t$. Then this will be feasible only if the following "neutral" theorem applies: $a_0\,(1 + g)\,[I - a\,(1 + g)]^{-1}m < 1$, if and only if $R^* > g$ provides a root for $a_0\,(1 + R^*)\,[I - a\,(1 + R^*)]^{-1}m = 1$.

I accept Morishima's correction that in his book he did say that actual price weights might serve for aggregation as well as value weights. I reproach myself for not having made this clear. But of course this only reinforces my point about the dispensability of $c_j + v_j + r^*v_j$ tableaux in comparison with $C_j + V_j + R^*\,(C_j + V_j)$ tableaux.

[2] That this was not a momentary aberration from Veblen's view will appear from a close reading of his famous 1906 essays in the *Quart. J. Econ.,* "The Socialist Economics of Karl Marx, I, II." Cf. relevant Veblen passages of 1893, 1895, 1897, and 1922 in Dorfman's *Thorstein Veblen: Essays, reviews and reports—Previously uncollected writings* at pp. 419, 263–4 and 444–5, 462, 241 [2, 1973].

Among the surprises of economic literature is the fate that has overtaken Karl Marx's theory of surplus-value in the third volume of his *Kapital,* lately published. Advocates, expositors and critics of the Marxian economics have exercised their ingenuity in futile attempts to reconcile that theory with obvious facts, while its author has put them off with the assurance that the whole mystery would be explained and made right in the Third Book of his work. In the mean time the Marxian dogma of surplus-value has served the present generation of "scientific" socialists as their fundamental "scientific" principle and the keynote of their criticism of existing industrial relations, and its acceptance (on faith) by the body of socialists, avowed and unavowed, has contributed not a little to the viciousness of their attack on the existing order of things. And now, after the theory, accepted literally and with full naiveté, has done service for a generation as the most redoubted engine of socialist propaganda, the "Third Book" comes along and explains with great elaboration, in the course of some 200 pages, that the whole of that jaunty structure is to be understood in a Pickwickian sense. It appears now that the need which has been felt for some reconciliation of this theory of the rate of surplus-value with the everyday facts of the rate of profits is due simply to a crude and gratuitous misapplication of the Marxian doctrine of surplus-value to a question with which it has nothing to do. That theory has none but the most remote and intangible relation to any concrete facts. The full extent of the relation between "surplus-value" and "profits" is this (and even this suffers material qualification in the course of the discussion), that the aggregate profits in any industrial community at any given time may also be styled "aggregate surplus-value." The rate of surplus-value bears no tangible relation to the rate of profits. The two vary quite independently of one another. Nor does the aggregate profits in any concrete case, in any given industry or enterprise, depend on or coincide in magnitude with the aggregate surplus-value produced in that industry or enterprise. For all useful purposes the entire surplus-value theory is virtually avowed to be meaningless lumber [2, Dorfman, 1973, pp. 263–264].

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