

RECENT DEVELOPMENTS IN THE LABOR THEORY OF VALUE

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1 Introduction

The labor theory of value presents one of the most puzzling and intriguing phenomena in the history of thought. Its emergence in the late 18th and early 19th centuries as a coherent basis for economic analysis grounded the penetrating and fertile development of Classical political economy which found its peaks in the work of Adam Smith and David Ricardo, and the equally fertile critique of Karl Marx. From this perspective the labor theory of value parallels the philosophical and theoretical innovations of Galileo and Newton in the physical sciences as the founding idea of a science.

But economics, apparently not comfortable with so powerful and deep an analytical foundation, curiously insisted on attempting to refound itself on the shallow and superficial framework of supply and demand concepts. This turn of events is all the more curious and puzzling when we consider that the Classical political economists and Marx were perfectly aware of supply and demand reasoning and methods¹ give powerful and persuasive arguments for the need for a deeper foundation for economic theory, and convincingly subsume supply and demand reasoning into the framework of the labor theory of value. The current theoretical sterility and scholasticism of "mainstream" economic theory based on supply and demand concepts, which at the present time calls into question the integrity of economics as a theoretically based discipline, stems, in my opinion, from this strange moment in the history of the development of economics

That we are here to discuss the labor theory of value at all in the face of powerful hegemonic attempts over at least a century to suppress its serious development is a testimony to the theory's vigor and intuitive appeal. But the intuitive strength of the labor theory of value has also turned out to be its Achilles heel; different facets of the theory have gripped the imagination of different scholars; and it has proved to be difficult to stabilize a coherent, broadly conceived research programme stemming from the core insights of the theory and building constructively on them.

The task of articulating and implementing such a research program has been complicated to some degree by the parallel, and in many ways more successful, effort by historians of economic thought to reconstruct the methods, arguments and conclusions of Smith, Ricardo and Marx. The complication takes the form of a dual dialogue (in extreme cases, unfortunately, a dialogue of the deaf) in which some participants are primarily concerned with an accurate rendering of the positions of these towering figures, and others are primarily concerned with finding a viable path for a progressive contemporary research program in economics. The tensions between these two aims is particularly acute in the Marxist literature, which has been strongly influenced by scholars' emotional identification with Marx and desire to appropriate his prestige for their particular contemporary political purposes. Thus the Marxist literature seems to set itself the formidable problem of finding an interpretation and reconstruction of the labor theory of value

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which is simultaneously an unimpeachable representation of Marx's own views and a foundation for a progressive economic research program.

In this paper I will attempt a brief and necessarily idiosyncratic account of the development of the labor theory of value and the recent developments in this tradition of which I am aware. I will strive to separate clearly the issue of the history of thought reconstruction of past opinions from the issue of recovering the energy and power of the labor theory of value for contemporary economic analysis. My own interest is primarily in the latter project, and the reader should take my remarks on history of thought issues with an appropriate recognition of my amateur standing in this field. The key question for me in considering any theory, amid the labor theory of value and its numerous interpretations in particular, is to understand what questions the theory is intended to answer. A great deal of the confusion and lack of consensus in the discussion of the labor theory of value seems to me to be traceable to the failure of participants to make explicit their often divergent positions on this question.

2. Smith and Ricardo

Smith, Ricardo and Marx each used the labor theory of value in his own way and to his own purposes. Each emphasizes, therefore, the facet of the theory most relevant to his own vision. As a result we have recognizably different, but not inconsistent, "labor theories of value" in these three authors.

Adam Smith's (1776) great theme was that the prosperity and wealth of nations arise from the energy, cleverness amid pragmatism of their people. The two foils Smith chose so effectively to make this point were the physiocrats and the mercantilists. Thus for Smith the primary function of the labor theory of value was to locate the source of wealth in the productive activity of the population rather than in the god-given fertility of land or its hoards of treasure. Masterful pedagogue that he was, Smith bolstered this vision with parables like the exchange of beaver for deer in the primeval forest in which the link between labor time and the production of wealth is transparent. He also appealed to his largely idle upper-class students' distaste for useful employment by asserting (echoing Genesis) that the discomfort and tedium of productive effort was the fundamental price humanity had to pay for meeting its imperious bodily needs. For Smith the labor theory of value is a return to fundamental realities of human existence, a way of redirecting the attention of his audience from ways to take already produced wealth away from others through interest or rent, toward projects for creating wealth through the organization of productive labor.

For Smith the aim of economics was to provide his audience with a psychologically convincing understanding of their economic experience and a satisfying account of the relation of their efforts to the system of social economy. The labor theory of value served him admirably in this respect, assuring his audience that its historical economic fate was indeed in its own hands, and not predetermined by the fate of national resource endowments or control over gold and silver deposits. Smith's pursuit of a framework for a quantitative scientific measurement of economic phenomena like price and output was secondary to this goal, and as a result he was less interested, and less successful, in developing the quantitative side of the labor theory of value. Smith clearly understood that when the introduction of property rights created a scarcity of land and the development of technology a scarcity of means of production, rent and profit would prevent commodities from exchanging at prices proportional to the labor expended in their

production. This observation, however, had no relevance to the main theme of Smith's labor theory of value, that human activity rather than natural endowment of resources or treasure is the spring of prosperity and wealth.

Ricardo begins his book on Political Economy (1817) with a whole-hearted endorsement of Smith's work. He raises one criticism, that Smith's account of natural price as the adding up of natural levels of wages, profits, and rents is inconsistent with the labor theory of value itself. This observation leads Ricardo to the elaboration of the labor theory of value as a logically consistent framework for the analysis of the distribution of the value of the product between wages, profit and rent. The logical power and analytical persistence which Ricardo deployed in this argument have understandably impressed his readers, including Marx, to the point of astonishment.

For Ricardo the labor theory of value provides the crucial image of the determinate totality of economic value production, which then allows for the rigorous deductive analysis of its division into functionally relevant parts. Ricardo's labor theory of value provides him with an analytical equivalent to a "general equilibrium" perspective that enforces a consistent accounting of flows of value and immediately focuses analytical attention on issues of opportunity cost and trade-offs between income shares. The labor deployed in an economy in a given period can be allocated among various employments, but puts a determinate limit on output and the value claims to output in wages, rent and profit. In particular, a rise in one of the income categories must, holding the labor force deployed constant, come at the expense of the other two, a point that was of central importance to Marx. It is worth noting that the history of economic thought to the present offers no alternative to Ricardo's method except its generalisation in Walrasian equilibrium theory to the postulate of fixed supplies of an arbitrary list of productive inputs.

Ricardo, like Smith, was aware that remit amid profit could force long-run equilibrium prices of commodities away from proportionality to the labor embodied in them. It was greatly to his expository advantage to work out cases where these disproportionalities were absent or negligible, since in this case the logic of the determination of the distribution of the value of the product between wages, rent and profit is transparent and immediate. In some places Ricardo adopts the position that in reality the divergence of natural prices from embodied labor coefficients is small and of secondary analytical importance, so that results obtained by reasoning in the special case of proportionality are approximately correct in reality. This maneuver, reasonable as it undoubtedly is, did not entirely satisfy Ricardo's passion for logic, and he tried to supplement it with a more general analytical method based on an invariable standard of value", either a real commodity or a weighted basket of real commodities for which distributional implications of the labor theory of value would hold exactly.

What Ricardo got right is much more important than what he got wrong, both analytically and in terms of his future influence on the development of economics. The concept of the determinate whole, misleading as it may be for many economic questions, has remained the key to the analytical tractability of rigorous economic theory. This essential point in Ricardo's labor theory of value, which was its defining characteristic at its inception, provides the foundation for modern general equilibrium and growth theories. A subsidiary feature of Ricardo's theory, the analysis of cases in which commodities exchange at natural price ratios proportional to the labor embodied in them, only came to define it in contrast to its own generalization in retrospect.

3 Marx's Labor Theory of Value and Historical Materialism

The intellectual world of Karl Marx's youth was dominated by the "problem" of linking the apparently arbitrary turmoil of human history to the orderly abstractions of religion and philosophy. The great intellectual figures of this period, especially Hegel, formulated their ideas in terms of proposed solutions to this puzzle. The young radical group of which Marx and Engels were a part all found their way to a rejection of traditional religious answers to these questions. Marx and Engels made a further leap to the vision of "historical materialism", which located the driving forces of history in the real activities and relations of human beings rather than the revelation of divine will or the unfolding of the absolute idea.

Marx had considerably developed his ideas about history before he began the serious, almost obsessive, study of economics that consumed that latter years of his life. The idea that societies organized themselves into classes based on control of surplus production played the central role in his thinking. Marx saw, in Western history at any rate, a repeated pattern in which political and social power, and their associated cultural manifestations in religion, literature, and art, rested on the appropriation of the share of output in excess of the basic reproductive requirements of the society by a minority. Marx proposed that the key to understanding basic evolution and change in human societies lay in uncovering the exact mechanisms through which ruling classes secured the control of surplus production, and the "contradictions", or instabilities making for change, that these mechanisms implied.

Marx had also early on concluded that the capitalism spreading over Europe in his life was an instance of this general pattern of class organization of society, in which capitalists were able to use their advantage as owners of the means of production to appropriate the surplus product. The main differences between the capitalist mode of production and earlier class societies stemmed from the structural incentive to restless innovation imposed on capitalist society by its competitive market structure. Marx saw this innovation leading to gigantic increases in the volume of the surplus production over the reproductive requirements of the society, and hence to a qualitative change in the situation of the human race on the planet. It also institutionalized the instabilities that produced revolutionary contradictions in past societies, and thus ushered in a historical period of unprecedentedly rapid and fundamental social and political change.

Some of these beliefs, particularly those concerning the class organization of European capitalist society in the first half of the 19th century, were widely shared by informed members of all classes, even by many fierce defenders of property, privilege, and inequality. This ideological situation changed sharply in the last half of the 19th century, when the problem of managing the social stresses of capitalist economic development took center stage in the politics of Europe, and the rhetorical maneuver of denying or minimizing the class divisions of society began to have wide appeal.

Marx encountered Classical political economy and the labor theory of value in the works of Smith and Ricardo with the theory of historical materialism already well-developed as the basis for his historical and political analysis of his own time. What he saw in Ricardo's version of the labor theory of value fit the perspective of historical materialism perfectly. The classes of landowners and capitalists control the surplus product of capitalist society by appropriating rent and profit from the stream of value produced by labor. The wages paid to workers compensate them for only a part of their entire labor effort, their paid labor time, while the surplus value appropriated by the capitalists (and perhaps then extorted from them by landlords) represents

unpaid labor time, or exploitation. The appropriation of surplus product, so immediate, transparent and personal in slave- and serf-based societies, is translated to the level of the social whole and mediated by the money form of value and competition. Smith and Ricardo's value theories join the theory of historical materialism like two large parts of an unfinished jigsaw puzzle that one suddenly recognises as the completion of each others ragged edges. Historical materialism provides the rational foundation for the study of capitalist political economy. Classical political economy in turn fills in many gaps in the historical materialist account, offering a clear theory of the mechanisms of surplus appropriation in capitalist society, the key to understanding the emancipation of labor from serfdom and slavery, the technologically progressive bias of capitalist competition, and adumbrating a host of other specific problems.

Thus, in my view, (see Baumol, 1974, for a discussion supporting this interpretation) the important issue to keep in mind in considering Marx's labor theory of value is its role as a particular instantiation of the general principles of class society revealed by the theory of historical materialism. Marx deployed his critical intelligence to sharpen and disambiguate Ricardo's account of the labor theory of value. For example, Ricardo never consistently articulated his theory of money with the labor theory of value, but adopted a quantity of money theory of prices that is inconsistent with the production cost theory of the value of a commodity money like gold implied by the labor theory of value. Marx followed Ricardo's quantity theory ideas uncritically in early works like the German Ideology, but, with the help of critics like Thomas Tooke, formulated a consistent theory of money in the Critique of Political Economy (1859) and Capital (1867). Furthermore, Marx propounded a unified theory of labor, value and money, in which labor is the substance of value and money its expression, and in the notoriously difficult first 3 chapters of Volume I of Capital (1867) managed to derive this unified theory from the dual nature of the commodity as use-value and exchange-value we find already in Adam Smith.

Marx also took the trouble to correct explicitly some of the casual language in Ricardo's discussion of the labor theory of value. He made explicit the point that wasted labor expended in backward conditions of production did not add value proportionately to the commodity (as I am sure Ricardo knew, and took implicitly for granted), thus introducing the category of "socially necessary" labor into the analysis. He elaborated slightly Ricardo's remarks on the need to reduce labor of different qualities to a common measure, which Marx called "simple" labor. He was able to link his own historical interests with the foundations of the theory by pointing out, in implicit contrast to Smith, that private labor expended out of contact with the market could produce only use-value, and not exchange-value, so that value producing labor must be "social" rather than "private."

The full implications of Marx's synthesis of the labor theory of value with the theory of money are far-reaching and to this day only dimly and partially grasped even by the ideologically beleaguered community of Marxist economists. For the purposes of the further discussion in this paper, the most important consequence is the firm establishment of an equivalence between money value measures such as the dollar, pound, yen or mark, and social labor time. This equivalence is prior to and consistent with particular monetary systems, such as commodity-money systems like the gold standard, or the state-credit money systems widespread in the late 20th Century. Whatever the particular monetary system, Marx's theory implies the existence of a quantitative equivalence in any particular period between the monetary unit and social labor time.

I will call this the "monetary expression of labor" (abbreviated MEL), which has the dimensions of \$ (or other currency units) per hour (or other time unit) of labor. Marx constantly uses this conception to move back and forth between money and labor accounts. A particularly telling example is the first chapter of Volume III of Capital (1894), where Marx uses this concept freely in the context of a discussion of economies with unequal organic compositions of capital, and hence where prices of production of particular commodities (Marx's reconstruction of Smith's "natural prices") need not be proportional to the labor embodied in them.²

In Volume I of Capital Marx clearly states that actual market prices as well as natural prices or prices of production may not be proportional to embodied labor coefficients in general, and equally clearly, in my opinion, continues to use an MEL coefficient to translate back and forth between labor time and money price accounting. From this I conclude that Marx saw no possible difficulty arising for his monetary elaboration of the labor theory of value from disproportionalities between money prices and embodied labor. The overarching main point in Marx's vision is that the system of commodity exchange based on money is simultaneously a system of distribution of social labor time.

These considerations lead to the conclusion that the labor theory of value for Marx was a theory of exploitation and of money, not, in the first instance at least, a theory of relative prices. That Marx was aware of the problem of reconciling the labor theory of value with the phenomenon of prices disproportional to embodied labor coefficients, as the first section of Volume III of Capital testifies.

4 Prices of Production

Smith explains the working of competition in capitalism as a process in which capital flows from sectors experiencing (or, presumably, anticipating) a low rate of profit relative to the average for the economy as a whole to sectors experiencing a relatively high rate of profit. This movement of capital then acts through the mechanism of supply and demand to raise prices (and consequently profit rates) in the originally low profit rate sectors and depress prices and profit rates in the originally high profit rate sectors. Smith also recognized that the implicit equilibrium or rest point of this dynamic process, a configuration of prices consistent with equal rates of profit in all sectors, which he called "natural prices" would never in reality be achieved because of ceaseless disturbances to technology and demand. Thus in Classical political economy natural prices regulate the actual fluctuation of market prices as a long-run average (or, in more Classical language, as a "center of gravity"). It is not hard to see that a system of prices that will equalize profit rates in all sectors at a positive level will be proportional to the labor embodied in the sectoral outputs only if all sectors have the same invested capital per labor input. Ricardo had already tried to reconcile the insights of the labor theory of value with the Classical theory of competition through the analytical device of the "invariable standard of value." Ricardo seems to have regarded this issue as one of approximation: he saw his strict labor theory of value as a good first approximation to the description of a real economy, and its fundamental insights into the dynamics of distribution as generalizable to more realistic models.

² The monetary expression of labor is the inverse of what I called (Foley 1982b, 1986a) the "value of money". Although the phrase "value of money" is used by Marx in exactly the same sense, it has been criticised by a number of scholars for its imprecision and ambiguity, so I will move to the innovative and less graceful, "monetary expression of labor" in the interests of clarity

Marx addressed the problem of the disproportionality between profit rate-equalizing prices and embodied labor coefficients in notes written before the publication of the Volume I of Capital which Engels later published as sections 1 and 2 of Volume III of Capital. These notes make Marx's general idea of how to deal with the problem quite clear, but leave a number of methodological details obscure. The general idea is that competition among capitals redistributes value produced from one sector of capitalist production to another and indeed from one producer to another, without, however, altering the aggregate value produced nor the rate of exploitation measured as the ratio of surplus value in all forms appropriated by the capitalists to the variable capital they advance as wages to workers. If this step in the argument is valid, Marx can rigorously "abstract" competition from the analysis to reason purely in terms of value flows proportional to embodied labor, and then "turn on" competition or, indeed, any other price formation process, including supply and demand, without changing any of the relations between aggregate value flows determined in the first stage of the analysis. One way to put this is that Marx was looking for a principle of conservation of produced value in exchange. Since these aggregate value flows are the point at which political economy touches historical materialism, this method of abstraction preserves the integrity of Marx's initial vision.

When Marx turned to the drafting of Volume I of Capital, he reduced the discussion of the problem of competition and price formation to a few rather cryptic remarks about the possibility of disproportionalities between money market prices and embodied labor coefficients. The most explicit of these reads as follows:

...although price, being the exponent of the magnitude of a commodity's value, is the exponent of its exchange-ratio with money, it does not follow that the exponent of this exchange-ratio is necessarily the exponent of the magnitude of the commodity's value....

Magnitude of value expresses a relation of social production, it expresses the connexion that necessarily exists between a certain article and the portion of the total labour-time of society required to produce it. As soon as the magnitude of value is converted into price, the above necessary relation takes the shape of a more or less accidental exchange-ratio between a single commodity and another, the money-commodity. But this exchange-ratio may express either the real magnitude of that commodity's value, or the quantity of gold deviating from that value, for which, according to the circumstances, it may be parted with. The possibility, therefore, of quantitative in-congruity between price and magnitude of value, or the deviation of the former from the latter, is inherent in the price-form itself. This is no defect, but, on the contrary, admirably adapts the price-form to a mode of production whose inherent laws impose themselves only as the mean of apparently lawless irregularities that compensate one another. (Marx, 1867, 101-102.)

An alternative translation (due to Jens Christiansen) of the first part of this passage, which is unusually obscure, is "When price expresses the value of the commodity it does so by expressing the commodity's exchange ratio with money; but it does not follow that the exchange-ratio with money always expresses the commodity's value."

At least four different readings of the first three chapters of Volume I of Capital are possible, contributing to a disproportionality between the volume of writing on these passages and the level of consensus on their meaning we have achieved.

The first three chapters of Volume I of Capital can be read as analyzing a precapitalist system of "simple commodity production" which abstracts altogether from the social and class relations of capitalism, so that commodities exchange in proportion to their embodied labor because of the competition of the direct, labor-expending producers. This view sees these chapters as Marx's

equivalent of Smith's primeval forest in which beaver and deer exchange in proportion to the labor required to find and kill them. This reading then raises the question, which Marx does not explicitly address, of the degree to which its conclusions generalize once capitalist social relations and capitalist competition are acknowledged.

Or, the first three chapters of Volume I of Capital can be read as analyzing completely developed real capitalist social relations including the tendency for competitively equalized profit rates under the special assumption that the capital invested per unit of labor is uniform across sectors, so that profit-rate equalizing prices will be proportional to embodied labor inputs. This reading also raises the question of which of the conclusions can be generalized to once the structure of capital is allowed to vary across sectors. Unfortunately Marx himself never makes the assumption of equal ratios of invested capital to labor (or equal organic compositions of capital as he refers to this ratio later) explicit.

Or, the first three chapters of Volume I of Capital can be read as analyzing the aggregate flows of value in an economy with fully developed capitalist social relations, competition, and arbitrary ratios of invested capital to labor across sectors, taking as proved the conservation of value in exchange. This reading, which underlies Foley (1986a), for example, requires us to interpret Marx's reference to individual commodities in the initial chapters of Capital as referring to "average" commodities representing the aggregate value flows in the economy as a whole. This reading has the advantage over the first two of avoiding the need to establish the general validity of the results; if the conservation of value in exchange holds, the generalisation is immediate, no matter what forces may affect money prices of commodities.

Or, the first three chapters of Volume I of Capital can be read as analyzing flows of value in an economy with fully developed capitalist social relations, and allowing for arbitrary ratios of invested capital per unit of labor across sectors, but abstracting from the tendency for competition to equalize rates of profit (indeed, abstracting from all phenomena that might lead to a disproportionality between money market prices and embodied labor coefficients.) This reading runs afoul of Marx's observations about the possible quantitative incongruity of prices from labor embodied, but in other respects has many strengths. Like the reading described in the last paragraph it dispenses with the need for generalization to introduce either capitalist social relations or arbitrary organic compositions of capital. But it does leave open the question of the degree to which the conclusions generalize once competition and other forces are allowed to influence market prices. In this case the general validity of the analysis of value flows in capitalist economies as rigorously representing a distribution of labor and thus of surplus product is not addressed in Volume I of Capital at all, but is contingent on the success of the analysis published as Part I of Volume III of Capital. This reading is consistent with other aspects of Marx's method (for example his treatment of rent, in which he first analyses the operation of a completely developed competitive capitalist system abstracting from private appropriation of land and then introduces private ownership of land and the consequent emergence of rents.) But it leaves the historical materialist conclusions of Volume I of Capital hostage to the validity of arguments eventually published in Volume III. Would Marx, with his instinct for polemic and logical completeness of argument, have rested easy with this major loose end?

Our knowledge that Marx wrote the notes published as Volume III of Capital before preparing Volume I for publication only heightens the puzzlement over his failure to find a graceful way to introduce his considerations on these issues into the exposition of Volume I.

When we turn to Volume III of capital we find Marx firmly in control of the capitalist accounting categories underlying profit and profit rate measures. He clearly distinguishes stocks and flows (through the category of turnover, which is developed at great length in the notes published as Volume II of Capital, 1893) and the definitions of accounting cost. The overall structure of his argument is also unambiguous: he intends to reconcile the phenomenon of prices disproportionate to embodied labor coefficients with the labor theory of value by viewing prices as simply redistributing a mass of value created in production among different sectors and firms, thus establishing the conservation principle necessary to link real capitalist accounts quantitatively to measures of labor time.

Marx confines himself to the methodologically weak procedure of giving numerical examples to illustrate his idea, rather than general arguments tending to establish the principles in general. The difficulty with numerical examples is twofold; first, they tend to express only a part of the whole situation the theories has in mind (so that Marx is not explicit about the actual flows of use-values that underpin his tableaux); and second, it is difficult to see immediately when features of a particular example reflect general principles, and which are peculiar to the numbers chosen. Marx's treatment of these tableaux is excruciatingly well-known: he presents systems specifying the constant capital, variable capital and surplus value in each of several sectors, first with the surplus value uniformly proportional to the variable capital, and then redistributing the surplus value so as to be uniformly proportional to the sum of constant and variable capital (on the hypothesis that capital turns over exactly once per period), without changing the total surplus value. These examples surely illustrate the idea that a redistribution of surplus value without any change in the total value added ($s + v$), or total value ($c + V + s$) can equalize sectoral profit rates (and, in the examples, conserve the social profit rate as well.) But they raise a number of methodological questions as well.

Marx himself raises methodological issues in chapter 9 of Volume III of Capital, which he fails to resolve and resorts to evasion to bring closure to. For example:

...Aside from the fact that the price of a particular product ... differs from its value because the surplus-value realised ... may be greater or smaller than the profit ..., the same circumstance applies also to those commodities which form the constant part of capital ..., and indirectly also its variable part, as the labourers' necessities of life. So far as the constant portion is concerned, it is itself equal to the cost-price plus the surplus-value, here therefore equal to cost-price plus profit, and this profit may again be greater or smaller than the surplus-value for which it stands. As for the variable capital, the average daily wage is indeed always equal to the value produced in the number of hours the labourer must work to produce the necessities of life. But his number of hours is in its turn obscured by the deviation of the prices of production of necessities of life from their values. However, this always resolves itself to one commodity receiving too little of the surplus-value while another receives too much, so that the deviations from the value which are embodied in the prices of production compensate one another. Under capitalist production, the general law acts as the prevailing tendency only in a very complicated and approximate manner, as a never ascertainable average of ceaseless fluctuations. (Marx, 1894, 161.)

The last sentence appears almost to retreat to a position that there is no general rigorous quantitative relation between surplus value and unpaid labor time.

A few pages later we read:

The foregoing statements have at any rate modified the original assumption concerning the determination of the cost-price of commodities. We had originally assumed that the cost-price of a commodity equalled the value of the commodities consumed in its production. But for the buyer the price of production of a

specific commodity is its cost-price, and may thus pass as cost-price into the prices of other commodities. Since the price of production may differ from the value of a commodity, it follows that the cost-price of a commodity containing this price of production of another commodity may also stand above or below that portion of its total value derived from the value of the means of production consumed by it. It is necessary to remember that this modified significance of the cost-price and to bear in mind that there is always the possibility of an error if the cost-price of a commodity in any particular sphere is identified with the value of the means of production consumed by it. Our present analysis does not necessitate a closer examination of this point (1894, 164-65)

But the defense of the conservation of the value of the gross product in its price seems to require precisely a closer examination of this point.

Now it may have been the case that Marx, who was a brilliant person and saw many connections and unities that other people have difficulty in comprehending, had a clear, transparent understanding of the relation between prices and values that could rigorously resolve the sharp differences in language between the published Volume I and the unpublished notes that are the substance of Volume III of *Capital*, and that he could have satisfactorily answered all of the numerous questions later writers have raised about these matters. But it may also have been the case that Marx never completely resolved these issues satisfactorily in his own thinking, but, viewing them as essentially secondary to what he regarded as the indubitably correct and vitally important relation between the labor theory of value and historical materialism, published Volume I of *Capital* anyway. Even if Marx felt "subjectively" that he had resolved these issues (perhaps with the feeling that a few essentially technical issues still had to be resolved, but that he had established the correct method) it is not at all certain that he could have given satisfactory answers to the much sharper questions posed by later scholars possessed of a more general mathematical framework and better developed statistical and accounting methods. Since there is no sure way of settling these questions, I prefer to remain agnostic on them, and to pursue a critique of the labor theory of value that does not require one to take a position on them.

5 The Dual system

In his Preface to Volume II of *Capital* Engels announced that in Volume III he would reveal Marx's method of reconciling profit rate-equalizing competitive prices with the labor theory of value and issued a general challenge to the world's economist to discover or improve upon Marx's treatment in the intervening years. Since at least some of the world's economists (perhaps incautiously) took up this challenge, Engels' challenge ensured that the adequacy of Marx's analysis on this point would be the subject of intense critical scrutiny.

The first wave of critical attention to what became known as the "transformation problem" began with the assumption that Volume III of *Capital* was indeed a sequel to Volume I, written after Volume I and developing its thesis. (We now know that this assumption was wrong.) Thus the first commentators on Marx's analysis began with what they perceived to be an unambiguous identification in Volume I of *Capital* of the term "value" with the labor embodied in particular commodities (Marx, at least in English translation, does seem to me to use the word "value" in this sense consistently in Volume I.) This line of critical analysis, beginning with Tugan-Baranowsky (1905) and continuing through Bortkiewicz (1952), Sweezy (1970), Seton (1957), Morishima (1973), Samuelson (1971), Steedman (1977) and Roemer (1981), among others, attempts to reconstruct the notion of the labor embodied in a commodity from Volume I of *Capital* on a rigorous basis and to use the resulting analytical concept to test the generality of Marx's analysis of prices of production in Volume III mathematically.

The aim of these writers was to demonstrate what they believed to be an inconsistency in Marx's argument. It is clear from Marx's writing that he believed that his method of reconciling prices with the labor theory of value was completely general, in that it could apply to any real capitalist economy, without special assumptions as to turnover rates, the organic composition of capital, the mechanisms of competition, stationarity of prices, the rate of technical change, the existence of joint production, and so on. A completely satisfactory understanding of these issues ought to have this level of generality. In order to demonstrate a logical inconsistency in Marx's method, however, it is necessary only to show its inadequacy in some particular setting, even if that setting is extremely stylized, abstract, and unrealistic. Thus these critics of Marx's interpretation of the labor theory of value can make their case without taking the responsibility of putting forward a positive and general theory of price formation in capitalist societies.

In the interests of expositional economy and to prepare the way for some of the discussion in the later sections of this paper, let me introduce a particular model and some algebraic notation at this point. Let time pass in discrete periods $t=0, 1, \dots$. Suppose we are dealing with a capitalist economy in which n commodities, distinguished by subscripts i or j are produced with an unchanging technology described by an $n \times n$ matrix A whose element A_{ij} represents the amount of commodity i required at the beginning of a period to produce 1 unit of commodity j at the end of the period, and a $1 \times n$ vector l where l_j represents the amount of labor required during the period to produce 1 unit of commodity j . We will write the j th column of the matrix A as A_j . This technology has a fixed rate of turnover of capital equal to 1. Then if the matrix $I-A$ is nonsingular, it is possible to calculate a $1 \times n$ vector of embodied labor coefficients, λ , which represent the direct and indirect labor embodied in each commodity:

$$\lambda = \lambda A + l$$

$$\lambda = l(I - A)^{-1}$$

If the $n \times 1$ vector x represents the gross output of the economy, then lx is the total living labor input, and Ax is the labor embodied in the gross output. The net output of the economy, allowing for the productive consumption of the inputs Ax , is $y = (I - A)x$, and $ly = lx$ is the labor embodied in the net output. Let us assume that each worker expending a unit of labor consumes a bundle of commodities represented by the $n \times 1$ vector b . Marx's constant capital in these embodied labor coefficient accounts is $c_\lambda = A\lambda x$, variable capital, assuming that workers are paid just the equivalent of their subsistence, is $v_\lambda = \lambda b l x$, and surplus value is $s_\lambda = \lambda(I - A - b l)x$. The sum $v_\lambda + s_\lambda = \lambda(I - A)x = lx$, which is just the living labor expended, so that we can regard v_λ and s_λ as the paid and unpaid portions of the living labor time.

This line of critique takes the embodied labor coefficients λ defined above to represent what Marx in Volume I calls the labor directly and indirectly embodied in the commodities under the stringent assumptions of the model. These embodied labor coefficients are unambiguously determined in their absolute magnitude by the technology, A, l , so that no normalization of them is necessary.

It is worth noting, however, that this method of imputing labor to particular commodities will not work for joint products, since there is no unambiguous way to impute the labor input to the joint production process over its outputs. But the demonstration of inconsistency in Marx's method does not, as we have seen, require the analysis of general cases.

Suppose now that in a capitalist economy, workers expend the labor required in production as a result of having sold their labor-power to the capitalists for a money wage w paid at the beginning of the period of production, that a unit of labor-power sold yields the capitalist on average a unit of labor expended in production. Capitalists purchase inputs and sell outputs at stationary money prices represented by the $1 \times n$ vector p .

At arbitrary prices p we can calculate the money price of gross output, px , the money price of net output, $p(I - A)x$, which is the same as the accounting value added measured in the net domestic product in national income accounting terms, the aggregate wage bill wlx , and the money price of the non-labor inputs, pAx .

A capitalist producing a unit of commodity j has to lay out capital pA in order to purchase means of production (Marx's constant capital, c), and wl_j in order to purchase labor-power (Marx's variable capital v). She sells the output at price p_j , so that her profit (Marx's surplus value, s), π_j , is:

$$\pi_j = p_j - p_j A_j - wl_j$$

Since the rate of turnover of capital is unity, the capital she ties up is equal to her cost of production, $p_j + p_j A_j$ and her profit rate, r_j , is:

$$\frac{p_j(I - A_j) - wl_j}{p_j A_j + wl_j}$$

A system of prices of production and wages, p , w that equalizes profit rates across sectors must satisfy the matrix equation:

$$p = (1 + r)(pA + wl)$$

If we assume that the money wage, w is determined by the condition that it just allows the workers to purchase their subsistence wage b , we have $w = pb$, and we can eliminate w from the expression altogether:

$$p = (1 + r) p(A + bl)$$

This expression for the prices of production is homogeneous in the prices, so that if some vector p satisfies it, any positive multiple of p will also satisfy it, and thus requires some normalization. Using prices of production we can recalculate Marx's constant capital, $c_\lambda = pAx$, variable capital, $v_\lambda = pblx$, and surplus value, $s_\lambda = p(I - A - bl)x$. This critique thus involves two systems of accounts, embodied labor coefficients and prices, and has as a result been called a "dual system" interpretation of the labor theory of value.

How closely can we connect these two systems of accounts, one, c_p , v_p and s_p based on prices of production and the other, c_λ , v_λ and s_λ , on embodied labor coefficients? Except in the "degenerate" case in which the sectoral ratios pA_j/pbl_j are all equal (Marx's case of "equal organic compositions of capital" in this interpretation) the vector (c_p, v_p, s_p) is not proportional to the vector $(c_\lambda, v_\lambda, s_\lambda)$. Thus there is no monetary expression of labor, it, such that:

$$(\mu c_\lambda, \mu v_\lambda, \mu s_\lambda) = (c_p, v_p, s_p)$$

The adherents of this line of critique of Marx's method take this analysis, the mathematical correctness of which is unquestioned, to show that there is no rigorous quantitative connection between the labor time account arising from embodied labor coefficients and the phenomenal

world of money price accounts. Thus for them the labor theory of value is valid only in the special case of equal organic compositions of capital. Marx's argument in Volume III of Capital, they conclude, fails to fill the logical gap adequately so as to generalize the labor theory of value to account for the complexity of real capitalist economies.

From this conclusion the various proponents of the critique draw quite different lessons. Some, like Michio Morishima, attempt to retail a kind of shadowy underworld after-life for the labor theory of value by showing that the embodied labor accounting system reflects some aspects of capitalist reality, even though it distorts the picture qualitatively. Thus Morishima puts forward a "fundamental Marxian theorem" that the rate of profit in the price accounting system is positive if and only if the rate of exploitation in the embodied labor accounting system is positive. These interesting mathematical discoveries, however, fail to motivate the analysis of the embodied labor coefficients system by showing what explanatory power it has over observable phenomena.

Others, like Ian Steedman and John Roemer, retain a commitment to the historical materialist perspective. Find the logical case against the relevance of the labor theory of value unanswerable. This leads them to the positive research program of finding an alternative analytical structure in which to situate the theory of exploitation in more modern conceptions of price theory, either Walrasian general equilibrium theory or Sraffa's theory of pricing.

Still others, like Paul Samuelson, prefer to see what they take to be the logical inconsistency of Marx's labor theory of value as a fatal flaw in the historical materialist theory of exploitation as a whole.

For my own part, I would remark on two points. First, this critical line of inquiry appears to establish that an interpretation of the labor theory of value based on imputed embodied labor coefficients does not lead at the purely theoretical level to a progressive research program. Second, this line of thinking somehow manages to ignore completely the monetary aspect of Marx's labor theory of value.

6 The Empirical Approach to Embodied Labor

The last 25 years have seen fertile and interesting empirical work stimulated by the embodied labor coefficients interpretation of the labor theory of value. This work, pioneered by Ed Wolff (for example, 1975 and 1987) and Anwar Shaikh, has been developed by Shaikh and E. Ahmet Tonak (1994) and other associates, among them Ed Ochoa (1988), and more recently extended by Paul Cockshott and Allin Cottrell and their collaborators (for example, Cockshott, Cottrell and Michaelson, 1995).

This line of empirical work uses Leontief's input-output tables to calculate imputed embodied labor coefficients and prices of production for real-world economies. The focus of analysis is to study how much empirical deviation there is between the embodied labor coefficients system of accounts and either price of production or market price systems.

In calculating prices of production from input-output tables care must be taken over the fact that the Leontief's A table records the flows of commodities between sectors, not the stocks of commodities tied up in production, which give rise to the denominator in the rate of profit. In order to calculate the prices that would equalize rates of profit on invested capital, these must be weighted, as Marx points out, by the appropriate rates of turnover for different classes of

commodity. Some of the studies in this literature have failed to take account of this methodological point.

Considerations of space prevent me from reviewing the richness of empirical detail revealed by this literature, but its main finding is that by a number of statistical measures embodied labor coefficients are closely correlated with both prices of production and market prices across sectors in real capitalist economies. The main methodological question these studies raise is the appropriate statistical measure of correlation to use in this comparison.

Since replicable empirical regularities are rather rare in economics, the strong evidence these studies offer for a widespread coherence between embodied labor coefficients, prices of production and market prices is of indubitable scientific interest. Its exact theoretical significance and explanation, however, remains obscure. Some of the key figures in this tradition, for example, Shaikh, have not yet to my knowledge publicly discussed their views of the theoretical significance of this work in detail in relation to the issues addressed in this paper.

Other workers in this tradition, Cockshott and Cottrell, for example, argue that this empirical regularity provides the foundation for the scientific role of the labor theory of value. In this view, the empirical correlation between market prices and embodied labor coefficients supports the idea that embodied labor coefficients determine market prices, and motivates economic interest in the embodied labor coefficients and their evolution over time. This position raises some troubling questions from the perspective of Marx's own work. Suppose, for example, that the correlations between embodied labor coefficients and market prices had turned out to be much lower, or to fall over time, or to be low in certain capitalist economies. Are we to conclude that the labor theory of value does not hold, or is weakening over time, or holds only in some capitalist economies?

The empirical approach to reconciling embodied labor coefficients with real prices echoes to a considerable degree Ricardo's position that embodied labor is a good first approximation to 'in understanding of value and labor flows in real economies.

7 The "New Interpretation"

In the late 1970s Gerard Duménil and I independently from each other suggested a reconstruction of Marx's labor theory of value emphasizing the relation between money and labor time that preserves the rigorous quantitative relation between paid and unpaid labor on the one hand and the aggregate wage bill and aggregate gross profit (including interest, rent, and business taxes) on the other.³ This approach was rather uninformatively described as "The New Solution" to the transformation problem, and, after Duménil's observation that it actually abolished the "transformation problem" as such, and thus wasn't really a solution to anything, equally uninformatively as "The New Interpretation".

Our intervention centered on the monetary expression of labor. We argued that the important issue for Marx was the idea that money represents social labor time, and that he can therefore use a measure of the monetary expression of labor appropriately defined at the level of the aggregate system of commodity production to translate flows of money in real-world capitalist accounts

³ See Duménil (1980, 1983), and Foley, (1982b, elaborated in 1986a and 1986b.) Duménil's work was brought to my attention and to the English-language literature through the article of Alain Lipietz (1982).

into flows of labor-time and vice versa. This way of looking at the labor theory of value dispenses with the need for a separate accounting system based on embodied labor coefficients.

We argued that the core content of Marx's labor theory of value was that the expenditure of living labor in production adds money value to the inputs to production. (Marx reiterates the point that the money value of inputs to production is merely preserved by living labor in the production process, and reappears unchanged in the price of the commodity.) The value added in production in an economy over any time period is a familiarly measured statistic, the net domestic (or national) product. Thus we concluded that the appropriate definition of the monetary expression of labor was the ratio of the net domestic product at current prices to the living productive labor expended in an economy over a period of time.

There are further important issues involved in applying this definition in practice. The measurement of net domestic product depends on deducting unreliable estimates of depreciation of fixed capital from the more precisely measured gross domestic product. (In practice the use of the GDP in place of the NDP in estimating the monetary expression of labor leads to an overestimate of the MEL, since GDP exceeds NDP by the amount of depreciation, but will not distort the time profile of the measurement very much as long as the share of depreciation in GDP is changing slowly.) Accepted national income accounting practice includes imputations of non-market transactions (such as the rental value of owner-occupied housing) that should in principle be removed from measures of NDP for the purpose of calculating the MEL. There are also issues of measurement of the denominator of the MEL, the living labor expended. In principle it is necessary to adjust total hours worked for the skill levels of workers. A variety of methods, some based on relative wage weights, and others on more direct measures of skill, have been proposed to make this adjustment. Not all employed labor in capitalist economies is productive in Marx's sense, so that in principle an adjustment should be made to deduct unproductive labor from the total living labor expended.⁴ In the rest of this paper I will assume (contrary to reality) that some agreement has been made on these measurement issues, so as to focus on the conceptual, definitional and interpretational problems of the monetary expression of labor.

It is important to notice that this definition of the monetary expression of labor, though it clearly links money and labor time, does not depend on any assumption about the particular monetary system operating in the economy. In particular, it works equally well for a commodity-money system like the gold standard, or for state-credit based monetary systems like those common in the late 20th century. This point underlines the fact that the definition of the monetary expression of labor in this way does not commit us to any particular theory about the definition of the MEL. In a gold standard economy the MEL could be determined by the price of newly produced gold relative to that of other commodities, for example, and in a state credit money system by speculation on the prospective solvency of the state. These determining mechanisms are quite different, but in each case money can be viewed as functioning (in part) to express social labor time quantitatively.

The monetary expression of labor permits us to resolve a wide range of other issues in the labor theory of value. Dumenil and Lévy, for example, proposed that in general the "value of labor-power" should be measured as the ratio of the money wage to the monetary expression of labor, not as

⁴ See Edward Wol® (1987), Fred Moseley (1990) for a further discussion of this issue.

the labor embodied in the commodities workers consume. With this definition the problem of the identification of surplus value in the capitalist system as a whole with the unpaid labor of productive workers simply vanishes, since the paid and unpaid portions of the total expended labor are definitionally equal to the wage and gross profit share in the net domestic product. As a result, the rate of exploitation measured as the ratio of the gross profit share in national income to the wage share in national income coincides with the corresponding ratio expressed in labor-time equivalents. A moment's thought shows, in fact, that this definition of the monetary expression of labor and of the value of labor-power are the only definitions that will generally preserve the quantitative relation between surplus value in the form of the aggregate gross profit and unpaid labor.

To put the matter in a slightly different light, the New Interpretation proposes to define the relevant categories of the labor theory of value so that what we regarded as the key Marxian insight, the quantitative equivalence between capitalist gross profit and unpaid labor, holds. The "dual" approach to the labor theory of value outlined in the last section, in contrast, considers whether it is possible to deduce Marx's equivalence from other assumptions (such as the identification of the value of labor-power with the labor embodied in the workers' consumption). It is in this sense that the New Interpretation is an "interpretation", not a "solution", since it proposes a particular definitional ordering of the key abstractions of the labor theory of value.

The New Interpretation definition" has some significant methodological advantages. It is completely general, in that it is consistent with any theory of price formation (including, but not restricted to theories of profit-rate equalizing prices of production.) It opens the way to an interpretation of the substantive parts of Marx's theory (his discussions of relative surplus value, induced technical change in capitalism, and the long-term tendencies of capital accumulation, or his theory of the circuit of capital, for example) as testable empirical hypotheses that can be confronted with widely available statistical data. It opens up new avenues of empirical-theoretical work in the Marxist tradition, such as an examination of the relation of national exchange rates to relative monetary expressions of labor. (See Mark Glick and Hans Ehrbar, 1987, and Simon Mohun, 1994 for further discussions of these points.)

In our initial attempts to explain the New Interpretation, Duménil and I both spent quite a bit of effort showing how it would work in the context of special models of production such as the pure circulating capital model of the last section. These expositional efforts unfortunately have misled some of our readers into thinking that these examples are all an inherent part of the New Interpretation itself, which they are not. The point of the New Interpretation is that it proposes an operational and (pace the measurement problems mentioned above) unambiguous method of measuring the monetary expression of labor in any real economy, no matter how complex its production system in terms of times of turnover or joint production activities. Since the New Interpretation only proposes definitions of a restricted set of labor theory of value theoretical concepts (the monetary expression of labor and the value of labor-power) it can consistently be combined with a wide range of other definitions or hypotheses constituting particular theories of capitalist production (for example, theories about class struggle, induced technical change, international trade and imperialism, and the like.)

The New Interpretation has, I believe, had some effect in opening up Marxist economics to a more vigorous and fertile empirical/theoretical development in the last 15 years. A promising beginning has been made in measuring the monetary expression of labor, the rate of exploitation,

and other parameters of the circuit of capital in the work of Senchak (1983), Azari (1996), Matthews (1995), Alemi (1997) and Dumenil and Levy (1994)

In anticipation of later sections of the paper, let me point out that it is possible (as Fred Moseley particularly has emphasized) to extend the use of the monetary expression of labor defined by the New Interpretation to the translation of money measures of constant capital and stocks of invested capital into labor-time equivalents. We could, for example, take the money flow of purchases of intermediate inputs (which is netted out from firm accounts to create the national income accounts, but is preserved in census-based statistics like the U.S. Census of Manufactures) and divide it by the MEL to arrive at a number, denominated in labor time units, representing the labor time equivalent of the flow of constant capital. If we did this for an economy with a unit rate of turnover, then these labor time equivalents of constant capital would satisfy Marx's claimed quantitative equivalence between total price and value of output, and also between the average price and value rates of profit.⁵ At the time, however, there seemed to be no plausible interpretation of the labor time equivalent of the constant capital or invested capital (since these measures will in general be equal neither to the historical labor embodied in the means of production, nor to the labor that would be required to reproduce them with contemporary technology). In order to clarify the relation of the proposed New Interpretation to the "dual" system that had preceded it, Duménil and I both pointed out the quantitative incongruity between the embodied labor coefficient accounts rate of profit and the rate of profit at market prices arising from the difference between the labor embodied in the means of production and the labor-time equivalent of the money spent on the means of production using the monetary expression of labor. Fred Moseley has argued that this lacuna represents an inconsistency in the New Interpretation, which "transforms" variable capital, but does not "transform" constant capital in the same way. I personally see no objection to using the New Interpretation definition of the monetary expression of labor to derive labor-time equivalents of constant capital. In effect, Marxist empirical and theoretical studies based on the circuit of capital do this by looking at the dynamics of the money values in the circuit.

8 Criticisms of the New Interpretation

The New Interpretation has been criticized on various grounds.

Anwar Shaikh and E. Ahmet Tonak criticize the relevance and originality of the New Interpretation in the following terms:

As just defined, the value of money... is the living labor commanded in exchange by the net product. This means that the value of labor power ... is the living labor commanded by the money wage bill of productive workers, and that surplus value ... is simply the living labor commanded by the existing mass of profit. Marx argued that price and profits were monetary forms of value and surplus value. The new approach abandons this altogether by defining surplus value to be a form of profit! The whole relation between

⁵ To see this in the circulating capital model of the last section, consider that the monetary expression of labor, μ , will in this context be defined as: $\mu = p(I + A)x/lx$. If we now define the labor-time equivalents of constant capital, $c\mu = pAx/\mu$, variable capital, $v\mu = wlx/\mu$ and surplus value $s\mu = (p(I - A) - wl)x/\mu$, then we have:

$$c\mu + v\mu + s\mu = (pA + p(I - A) - wl + wl)x/\mu = px/\mu$$

$$r\mu = s\mu/(c\mu + v\mu) = (p(I - A) - wl)x/(pA + wl)x = r:$$

Note that:

$$c\mu = pAx/\mu \neq \lambda Ax = c\lambda$$

surplus value and profit is turned on its head. Moreover, this approach does not even have the virtue of being new, since it is really nothing more than Adam Smith's second definition of labor value as living labor commanded by price. Ricardo and Marx decisively rejected this approach, with good reason. (1994, p. 179)

Shaikh and Tonak here reveal a misunderstanding of either the New Interpretation or of Smith's conception of value as labor commanded. Smith's definition identifies the amount of what he called "labor" and what Marx called "labor-power" the price of the commodity could command on the market, in algebraic terms p/W where p is the money price of the commodity and w the money wage. Ricardo's and Marx's reasons for rejecting Smith's conception are good, and rest on the point that Smith's definition confuses the effects of technology and distribution on the value of commodities. Ricardo and Marx correct this by regarding value as being produced by the expenditure of labor in the production process, and therefore determined logically before the distribution of the value of net product between wages and profit. The New Interpretation is completely consistent with Ricardo and Marx's argument on this point, since the definition of the monetary expression of labor as the ratio of the value of the net product at market prices to the living labor expended in a period does not involve the level of money wages (and this is not Smith's conception)

One of the virtues of the New Interpretation is that it finally links the value of the net product at market prices to the expenditure of living labor and profit to unpaid labor time. It is true that the New Interpretation identifies the phenomenal forms of price to the categories of the labor theory of value, but it is hard to see why this turns the relation on its head. The New Interpretation locates the source of new value in the expenditure of living labor in production, not in market exchange, the relation Marx insists on.

As to the originality of the New Interpretation, there are surely suggestions along the line of the New Interpretation in the previous literature (starting with Marx, but not with Smith, in my opinion), including passages from Shane Mage (1963), Joan Robinson (1965), Bertram Schefold (1973), and perhaps others with whose work I am not familiar. The only claim I would make for Dumenil and myself in this regard is that we were the first (excepting perhaps Marx himself, if you accept the New Interpretation as a faithful representation of Marx's ideas) to pursue the idea and develop it into a complete and coherent interpretation of the labor theory of value.

Adherents of the dual-system interpretation of the labor theory of value tend to view the New Interpretation as a contentless "trick", which evades rather than confronting the problem of the relation between embodied labor coefficient accounts and market price accounts. The dual system framework poses the problem as proving mathematically the proportionality of profit and the wage bill measured in market prices to surplus and necessary labor the measured in embodied labor coefficients, and argues that the New Interpretation makes no contribution to this project. If one accepts the mathematical correctness of the dual-system demonstrations, as I do, then within that framework the question is completely settled: it is impossible in general to maintain the required proportionality, and neither the New Interpretation nor anything else is ever going to come to a different conclusion without committing a mathematical error. Accepting the mathematical validity of the analysis within the dual-system framework, however, does not require one to accept that this is the only, or the most relevant, way of posing the issue.

Recent unpublished work by Robert F. Brinkman (1997), for example, argues that the New Interpretation essentially complements and completes the dual-system interpretation. Brinkman points out that the original dual system analysis (rehearsed above) leaves the rate of profit

calculated in terms of embodied labor coefficients, as well as the absolute level of the profit rate-equalizing money prices and wages, undetermined. He shows that taking into account the allocation of social labor time among sectors (or, what amounts to the same thing, the composition of net output) completes both systems, by determining the rate of profit in embodied labor coefficients and determining the prices of the commodities and the money wage up to a constant of proportionality which is, in fact, the monetary expression of labor is defined by the New Interpretation. Brinkman proposes to distinguish 'essential prices' (money prices divided by the monetary expression of labor) and 'labor values', that is, embodied labor labor coefficients. He argues that embodied labor coefficients are the appropriate accounting system to distinguish in general between necessary and surplus labor time, but that essential prices are the appropriate accounting system to distinguish between paid and unpaid labor time. Profit and the wage bill are always equal to paid and unpaid labor time, but paid and unpaid labor time are equal to necessary and surplus labor time only under special assumptions that guarantee the proportionality of embodied labor coefficients to prices of production.

I agree with the dual-system advocates that the New Interpretation is a set of definitions rather than an empirical Hypothesis, but I disagree with their claim that as a result the New Interpretation has no theoretical or scientific content. This disagreement arises, perhaps, from different philosophies of science. In my view the labor theory of value under the New Interpretation plays a role in political economy analogous to the role played by Newton's Laws in mechanics. The definition of the monetary expression of labor is analogous to the stipulation in Newtonian mechanics that force is equal to mass multiplied by acceleration. Taken by itself $f = ma$ is just a definitional relation between three theoretical terms (just as the monetary expression of labor is just a definitional relation between the money magnitudes and living labor time), but in the context of a determinate mechanical system this definition decisively disciplines and directs scientific in contentful and fruitful ways. Thus while the New Interpretation does not itself propose any operational hypotheses about the evolution of the monetary expression of labor or the rate of exploitation, its definitional framework allows us to measure the evolution of the monetary expression of labor and the rate of exploitation in real capitalist economies and to link these magnitudes to other aspects of capital accumulation, such as the bias of technical change, or the class relations of particular societies. The dualsystem advocates, on the other hand, seem to be saying that only empirical hypotheses about the real world count as "theories", so that the labor theory of value has to be understood as a specific contingent hypothesis which might or might not hold in specific situations (such as the hypothesis of a 'ugh correlation between market prices and embodied labor coefficients.)

Another way to make this point is that the New Interpretation definitions are *ex post* accounting identities, which must hold definitionally in all economies in all periods. The critics of the New Interpretation, seeking *ex ante* hypotheses with explanatory and predictive content, find the New Interpretation wanting in this regard. I am myself extremely interested in the development of *ex ante* hypotheses, and certainly support their investigation. The history of science, however, suggests that the discovery of successful *ex ante* Hypotheses is much aided by the establishment of appropriate heuristic *ex post* definitional frameworks, like Newton's mechanical laws.

Some scholars find the connection between money and labor time asserted by the New Interpretation to be arbitrary and unsupported. For example John Roemer (1990) criticizes the lack of economic motivation in the identification of social labor time with money.

This criticism seems to me to be closely connected with that of the dual-system advocates. As I have explained earlier in this paper, I think the main motivation for Marx's labor theory of value was the relation he perceived between it and the theory of historical materialism and class society. In Roemer '5 terms this motivation is not "economic", that is, directly connected to the analysis of commodity market relations. Roemer's failure to find much resonance in the New Interpretation may also be connected with his commitment to the Walrasian model of market equilibrium as a vehicle for the analysis of commodity relations. The Walrasian approach is in striking contrast to Marx's in its inability to integrate money, which is precisely the point on which the New Interpretation definitions rest.

Alfredo Saad-Filho (1996) in a well-informed and balanced appraisal of the New Interpretation (which he calls the "New Approach"), makes two critical points, one more persuasive than the other.

The less persuasive concerns the role of the net product in the analysis. Saad-Filho appreciates the issue of double-counting if the value of gross output at market prices rather than the value of net output at market prices is used to define the monetary expression of labor (p. 126). The full complexity of this problem is obscured by our thinking in terms of period models, in which the accounting period and the production period coincide. In real capitalist economies, we account in periods such as years that may span more than one turnover of some elements of constant capital in some production processes. The value of the gross product in market prices over a year, for example, may count some parts of constant capital more than twice. This point emphasizes the ambiguity of the concept of gross output in real capitalist economies as opposed to period models.

Saad-Filho sums this discussion up, however, by saying: "...the New Approach argues that only the value of net product should be the subject of the transformation...." As we have seen above, one can use the value of the net output at market prices to define the monetary expression of labor, and still use the resulting monetary expression of labor to "transform", that is, convert into abstract social labor equivalents, the flow of constant capital.

Saad-Filho persuades me more by his criticism of the New Interpretation for being excessively reductionist:

This conception of price is methodologically questionable. Its main drawback is that this is simply a circulation-based view of price. It is correct as far as it goes, but it fails to give analytically priority to conceptually more fundamental processes such as the performance of labor in production, *vis-a-vis* more superficial phenomena such as the relations between supply and demand for each commodity or monopoly power. The internal structure of the New Approach leads it to address the appearance from the start..., but this apparent advantage exacts a heavy toll: it becomes very difficult to develop the theory further without making use of arbitrariness in the choice of phenomena to be explained, the judgement of their importance and their relation with other features of reality (1996, p 128)

I think this criticism has some merit. For example, there may be a real role for a concept of the value of labor-power independent of the *ex post* realized wage share In a fully developed Marxist theory. The approach of Brinkman outlined above, which retains a separate role for the concepts of necessary and surplus labor and paid and unpaid labor may suggest a way to address this issue.

9 The Temporal Single-System Approach

At the same time that Dumenil and I were publishing the New Interpretation (and in some cases in the same issues of the same journals), a number of scholars, including Richard Wolff, Antonino Callari and Bruce Roberts (1982), and John Ernst (1982), began a critical re-examination of Marx's labor theory of value which has developed into an embryonic school (see for example, Alan Freeman and Guglielmo Carchedi, eds., 1996.)

Wolff, Callari and Roberts emphasize, as I have here, class and exploitation as the context of Marx's interest in the labor theory of value. They go on to propose that Marx used the word "value" in a different technical sense in his discussions in Volume III of Capital from Volume I. In Volume I, according to their reading, Marx used the word "value" to mean "abstract social labor directly and indirectly expended in producing the commodity", and therefore consistently with the mathematical definition of the vector A above. But in Volume III, Marx changed the meaning of the word "value" to mean the sum of the direct labor expended in producing the commodity with the abstract social labor-time equivalent of the means of production use (I up calculated by dividing the money price paid for the means of production by a monetary expression of labor. In a stationary economy with no technical change, they define these "values" as the vector V in terms of the prices of production p (determined in the same manner as in the dual-system approach described above) by the relations:

$$p=(1+r)p(A+bl)$$

$$py=lx$$

$$v=pA+l$$

This amounts to the extension of the New Interpretation outlined above, in which the monetary expression of labor is taken to be titlity, as is evident from the second equation above. As I have already shown, if we regard the abstract social labor time equivalents of the constant capital as their money prices divided by the monetary expression of labor rather than the labor directly and indirectly embodied in them, as this approach proposes, then in addition to the proportionality of the money value of the net product to living labor expended, of surplus value to unpaid labor time, and of the wage bill to paid labor time, the price of the gross product will be equal to the value of the gross product and the price and value rates of profit will be equal. Wolff, Callari and Roberts argue exegetically that this interpretation seems to correspond to Marx's conception as expressed in Volume III, but offer no economic motivation or interpretation of the "value" coefficients, V . Fred Moseley, as I have remarked, has emphasized the desirability of making this extension of the New Interpretation.

Alan Freeman (1996a), Ted McGlone and Andrew Kliman (1996), and Alejandro Ramos-Martinez and Adolfo Rodriguez-Herrera (1996) call this a "single-system" interpretation of the labor theory of value, since in it the embodied labor coefficients A of the dual-system analysis disappear altogether. Ramos Martinez and Rodriguez-Herrera marshal considerable textual evidence supporting the claim that this interpretation is consistent with Marx's method of analyzing the relation of prices and values in Volume III of capital

I do not see any inconsistency between the New Interpretation and a single system interpretation of the labor theory of value, as long as the single-system interpretation consistently (either explicitly or implicitly as in Wolff, Callari and Roberts) defines the monetary expression of labor

as the ratio of the money price of the net product to the living labor expended, as it must do in order to conserve value added, surplus value and variable capital in the analysis.

John Ernst's paper (1982) raises a further issue, the generalization of the labor theory of value to realistic situations where technology is changing over time. Ernst, working in a single-commodity model in which there can be no disproportionality of money prices and embodied labor coefficients, calculates two profit rates, a "visible" profit rate calculated as the ratio of surplus value to the sum of variable capital and constant capital reckoned in terms of the commodity as numeraire (or, in this case, equivalently in terms of money), and a "value" profit rate in which the constant capital is valued in terms of the labor historically expended to produce it. (In Ernst's paper lie examines a one-period circulating capital model so that only one older "vintage" of labor, last period's, is involved.) Since there is technical change, the labor embodied in each vintage of the commodity diverges from that contained in the constant capital used up to produce it, so that the "value" rate of profit is generally lower than the "visible" rate of profit.

Alan Freeman (1996b) argues vigorously for an interpretation of the labor theory of value general enough to embrace situations in which there is ongoing technical change, 50 that technology is not stationary, as it is assumed to be in many of the examples and models in the literature. Since ongoing technical change is a key feature of capitalist economic reality, it is hard to quarrel with this goal.

As I showed in (Foley, 1982a) and elaborated in (Foley, 1986b), the New Interpretation can provide such a framework. The key analytical simplification is once again the definition of the monetary expression of labor as the ratio of the value of the net product at market prices to the living labor expended in each period, an unambiguously defined magnitude. With this definition, it is possible to analyze capitalist economies undergoing any complex patten of technical change in the average money prices of commodities into a part representing changes in the productivity of labor.

If, on the other hand, we were to try to define the monetary expression of labor as the ratio of the price of the gross product to the total labor expended in producing the gross product in the context of ongoing technical change, we would confront the problem that the gross product contains means of production of various vintages, produced under different technical conditions, and embodying labor of different vintages and different productivities. This the labor embodied in the gross product is under these circumstances a vector of labor of different vintages. The definition of the monetary expression of labor as the ratio of a scalar (the contemporary value of the gross product at market prices) to a vector (the labor embodied in the gross product) is incoherent mathematically.

The attempts to develop a 'temporal single-system' interpretation of the labor theory of value in the Freeman-Carchedi volume fail to put forward a single, consistent definition of the monetary expression of labor, which is necessary to carry out their purpose. It appears to me that this definition should coincide with the New Interpretation definition, as in the Wollf, Callari and Roberts paper: otherwise the temporal single-system interpretation that results will not preserve the proportionality of wage bill and gross profit with paid and unpaid labor.

The language that surrounds this issue in these papers is somewhat obscure, so that I may be misunderstanding what is being said. But it appears to me that the temporal single-system program needs to distinguish clearly between the change in the value imputed to stocks of commodities from one period to the next and the value of the net product in the period. In a

model economy with stationary technology, so that prices of production (and embodied labor coefficients) remain constant over time, the net product in a period equals the change in stocks plus consumption in use-value terms, and as a result the value of the net product (in either a market price, prices of production, or embodied labor coefficient accounting system) is equal to the change in the value of stocks plus the value of consumption. But in an economy undergoing technical change, market prices, prices of production, and embodied labor coefficients will all be changing from period to period. As a result, the value of the net product in any accounting system will not necessarily equal the change in the values of stocks plus the value of consumption. In fact, in national income accounting language, the value of the net product is equal to the change in the values of stocks plus consumption reduced by an "inventory valuation adjustment" representing the change in the value of inventories due to price changes through the period and a "capital consumption adjustment" representing the change in the value of fixed capital (Due to price changes through the period).

This problem arises, for example, in the examples that Andrew Kliman (1996) puts forward as "refutation" of the Okishio theorem. He makes the explicit assumption that the monetary expression of labor is constant on the paths they examine (often in the form of a stipulation that \$1 remains equivalent to 1 unit of labor on the paths studied). Then in order to calculate a path of prices (in order to derive the path of profit rates), Kliman equates the change in the value of stocks plus the value of consumption to the living labor expended in the period. But from the point of view of the New Interpretation definition, this equation does not hold the monetary expression of labor constant, since under the assumed conditions of changing technology and prices the value of the net product deviates from the sum of the value of consumption and the change in the value of stocks through the period. Kliman's equation attributes the changes in the value of inventories and fixed capital due to price change to the living labor expended, which seems counter to the Marxist interpretation of the labor theory of value. On the resulting price paths in the example, the monetary expression of labor in the New Interpretation sense is not constant, and the falling monetary rate of profit in the examples reflects this changing monetary expression of labor. When this aspect of the examples is corrected, the resulting price and profit rate paths do not contradict the Okishio theorem.

10 Conclusion

I would like to conclude by emphasizing what I see as a large degree of practical and operational agreement on the labor theory of value emerging despite the doctrinal disagreements we have reviewed. All the interpretations lead to the practical use of market price data in empirical studies based on the categories Marx's labor theory of value such as the rate of profit, the composition of capital, and the rate of exploitation, and hypotheses concerning these categories. Single system interpretations, including the New Interpretation (extended to use the monetary expression of labor to impute abstract labor time to constant capital), all link the labor-value categories directly to money and thus establish observed monetary accounts as the appropriate operational equivalents of the theoretical concepts.

It is interesting that the empirical work of Shaikh, Tonak, Ochoa and their students and collaborators and Cockshott and Cottrell showing a high degree of correlation between embodied labor coefficients and market prices, leads to a similar practice within the dual-system

interpretation.⁶ The point is that these results suggest that the choice of an embodied labor coefficients or a market price accounting system doesn't make much practical difference to estimates of Marxian categories like the rate of exploitation, or the ratio of unproductive to productive labor in real economies. Given the much wider availability of market price accounting data in financial and government sources, and the expense, difficulty and possible error involved in reconstructing embodied labor coefficients for many periods and economies from input/output tables, most empirical work, even by people who hew to the dual-system interpretation, will use market price data as a first approximation to an embodied labor-coefficient system of accounts. Thus single and dual-system theorists will find themselves pursuing similar and comparable empirical investigations.

I think this is a hopeful development, since my own interest is more in what Marx's interpretation of the labor theory of value can tell us heuristically about the structure and evolution of real capitalist economies than in what close reading and ingenious speculation can tell us about the consistency of Marx's unwritten thoughts. I also think this convergence of empirical method carries with it some hope for Marxist economic pedagogy. It should be possible for adherents of these different positions to teach their own and the alternative interpretations of Marx's labor theory of value honestly and clearly as alternative theoretical foundations for a unified empirical practice that can yield important insights into capitalist reality. The release of scholarly energy into the empirical investigation of the development of world capitalism need not wait on the resolution of every knotty interpretative and theoretical issue in the labor theory of value.

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⁶ I do not mean to attribute a dual-system interpretation of the labor theory of value to these scholars, only to point out an implication of the empirical results for dual-system practice.