THE LABOUR THEORY OF VALUE AS FOUNDATION FOR EMPIRICAL INVESTIGATIONS

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ABSTRACT

This paper outlines some recent approaches to the construction of an accounting structure which relates observable prices to Marxian labour values. The first is that proposed (independently of each other) by Duménil and Foley (DF); the second in some sense is a generalization which focuses on gross value produced rather than net value added; and a third imposes some temporal structure upon the second approach. The second two approaches are based on different definitions of labour value from that in the DF approach, and in the paper it is argued that the DF approach is both more theoretically coherent and more practically useful.

1. INTRODUCTION

The theoretical consequences of the revival of Marxist economics in the 1960s were disappointing. A large literature developed whose outcome by the mid-1970s across a wide political spectrum was agreement (albeit nuanced in a variety of ways) that the research programme was a degenerate one. The formalizations produced by Seton (1957) and then built upon by Morishima (1973) and by Steedman (1977) seemed to show conclusively that the labour theory of value had no operational significance in the explanation of observable phenomena.

In reaction, a number of papers began to appear around the mid-1970s which tried to distinguish Marx from Ricardo, by arguing that the labour theory of value as traditionally conceived was founded on a Ricardian understanding of labour as 'embodied labour', whereas Marx's notion of 'abstract

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labour' as the substance of value was not the same. These arguments took a variety of forms, largely according to how influenced they were by the rediscovery of Rubin (1972) and by how they absorbed the works of Althusser and Balibar (1970) and their followers on the one hand,[1] and those of Colletti (1973) on the other.[2] Although there was little consensus as to the precise difference between the Marxian and the Ricardian labour theories of value, by the early 1980s two broad approaches had emerged in opposition to the consensus view. One approach was based on a view that traditional Marxian arguments concerning the relation between values and prices had foundered through a misunderstanding of the nature of abstraction in Marx's writings. A set of complex mediations underlay the elaboration of the abstract categories of value in their concrete referents in the empirical world, and considerable emphasis was put on an interpretation of the architecture of Marx's *Capital* to support this approach. The basic idea was to focus initially on what phenomena had in common, and to 'abstract' from what differentiated them. So commodities exchanged in ratios given by their qualitatively common abstract labour content, and only subsequently was account taken of how these ratios were modified by the effects of the quantitatively different compositions of capital involved in their production. Similarly, competition was initially treated as intra-sectoral, and only subsequently was intersectoral competition considered. However, a major difficulty remained: how could the criteria be understood whereby incorporation of 'lower' levels of abstraction was deemed merely to modify the conclusions of the analysis at a 'higher' level of abstraction, rather than changing them completely? A sophisticated interpretation of the textual mediations in *Capital* was proposed, but this gave little clue as to how to proceed beyond Marx's own writings.[3]

The second approach was rather different. Instead of arguing that the journey from 'capital in general' to 'many capitals' was a journey from the abstract to the concrete, it took that journey as one from the 'typical' to the 'individual'. If the 'typical' is understood to represent the aggregate, then the argument of the early chapters of *Capital*, Volume I, could be taken as an elaboration of the thesis that money directly represents and measures social labour time. This emphasis on the relation between value and money is conspicuous by its absence in the traditional interpretation and formal-

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[1] For example, Gerstein (1976).

[2] For example, Himmelweit and Mohun's emphasis on abstractions as real processes, in the collection from the period edited by Mohun (1994b).

[3] One example is the influential survey by Fine and Harris (1979); see also the collection edited by Fine (1986).

ization of Marx's economics. And it establishes potentially direct correspondences between Marxian aggregate categories and national income accounts, and between Marxian individual categories and the accounts of capitalist firms, thereby opening the possibility of a progressive research agenda.[4] It is for this reason that this second approach is of interest, and its evaluation is the focus of this paper.

Evaluation requires some agreement on criteria. One obvious criterion concerns logic and internal consistency. But while illogic or inconsistency suffice to indict an approach, their absence does not in itself provide grounds for a positive evaluation. A second possible criterion concerns usefulness for theoretical and empirical investigations into contemporary capitalism. But usefulness is often conflated with a different criterion, that of fidelity to Marx's writings, whether in spirit or in letter. This is problematic, because fidelity is hermeneutically elusive. Partly this is because so much of Marx's economic work remained unpublished in his own lifetime, and was subsequently published by editors (Engels, Kautsky, Bernstein). Partly it is elusive because Marx wrote methodologically within and against a philosophical tradition which is notoriously difficult to recover.[5] Partly it is elusive because Marx's economic arguments arose within a classical tradition (exemplified by Smith and especially Ricardo) that has long been distinctly unfashionable in economics, and matters are not helped by Marx's practice, particularly in his notebooks, of developing his arguments through polemical contrasts with his predecessors and contemporaries. Finally, clarity is muddied by the interaction between the larger political project of Marx's works and the politics of the period in which they are interpreted. All of these considerations combine to suggest that any 'fidelity to the text' is unlikely to command common consent.[6] Since this paper deals with writings that locate themselves within the Marxian tradition, arguments and interpretations within that tradition are important. But they are only considered important here in so far as they potentially contribute to research into contemporary capitalism. From this perspective, assessments of doctrinal veracity are less helpful.

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[4] Correspondences are potential for two reasons. First, money aggregates require adjustment for depreciation, for the imputations in national income accounting practice, and for the state sector employment of workers who produce non-marketed output. Second, aggregates of labour time require some view on whether and how adjustments should be made for different levels of skill, and for the distinction between productive and unproductive labour. These practical problems are not considered further here.

[5] Thus Krause remarks how 'merely unclear formulations are sometimes passed off as enlightening dialectics' (Krause (1982, p. 29)).

[6] The doctrinal history of Marxism since 1883 provides ample testimony to this lack of common understanding.

The approaches considered are 'single-system' approaches. Instead of a 'dualist' system in which there is one determination of labour values and a quite different determination of prices, the approaches freely translate between labour value and money value magnitudes, a single system determining both. The next section recalls for reference the traditional 'dualist' interpretation. The third section outlines an approach due (in English) to Foley (1982). The following section considers an approach, typified perhaps by Moseley (1993), that can be interpreted as an attempt to generalize this, and section 5 assesses further their similarity. The penultimate section considers an attempt by a number of authors, notably Kliman and McGlone (1988, 1999) and the papers in the collection edited by Freeman and Carchedi (1996), to impose a temporal structure on a single-system approach. A final section provides an overall evaluation, and is followed by some concluding remarks.

2. THE TRADITIONAL 'DUALIST' APPROACH

Consider the simplest case of a circulating capital model, with a uniform period of production so that all capital has a common fixed rate of turnover of unity, in which each of *n* industries produces a single output using an unchanging productive technology described by an $n \times n$ matrix of input–output coefficients $A = [a_{ij}]$. The $1 \times n$ vector *l* describes the hours of labour performed which are assumed equal to the hours of labour power purchased, wages are paid in advance, and all labour is assumed to be productive. The equations determining the $1 \times n$ vector of embodied labour λ are

$$\lambda = \lambda A + l \tag{1}$$

which can be solved for λ provided the matrix $[I - A]$ is non-singular. These λ are coefficients of labour directly and indirectly embodied in commodities produced, and are interpreted as Marxian 'values'.

The formalization of equation (1) is problematic for at least two reasons. First, any specification of technology and employment is sufficient to determine values. But much of Marx's work is concerned with showing the opposite: how values determine technology and employment. Second, there is an implicit assumption of homogeneity of labour, both 'living' and 'dead', such that actual hours of embodied labour are identified as 'abstract labour'. Yet Marx lays great emphasis on the importance of the distinction between concrete labour and abstract labour. Any disaggregated account must recognize the heterogeneity of concrete labours, and hence provide an account of the

coefficients whereby embodied heterogeneous concrete labours are 'reduced' to homogeneous abstract labour.[7] However, these important considerations are not pursued further here, because the issues they raise are extraneous to this paper. Consideration of the determination *by* value rather than the determination *of* value raises issues of the dynamics of the accumulation process, which are much broader than the more definitional issues that are the subject of this paper, and issues of the heterogeneity of labour are sidestepped in the aggregate relations considered below.

The input–output equations relating the $1 \times n$ vectors of gross output x and net output y are

$$x = Ax + y \tag{2}$$

Post-multiply equation (1) by x and pre-multiply equation (2) by λ. Then,

$$lx = \lambda y \tag{3}$$

and the total labour performed in the production of gross output is the labour embodied in net output. Thus given the technical conditions (A, l) and some specification of the real wage, the amounts of constant and variable capital invested in each industry are determined. Aggregate constant capital C is interpreted as the total labour embodied in the means of production, λAx, and variable capital the total labour embodied in wage goods. If b is the $n \times 1$ vector of wage goods required per hour of labour expended, then bl is the matrix of wage goods required per unit of gross output produced, blx is the vector of total amounts of wage goods required, and λblx is the labour embodied in them and hence is aggregate variable capital V. Given some account of the determination of the length of the working day, aggregate surplus value S is the value difference between total labour hours and the labour embodied in wage goods, which is $\lambda (I - A - bl) x$, and the rate of exploitation e is the ratio of surplus value to variable capital. Once it is determined how capital produces surplus value, the accumulation process can then be described, to show how surplus value produces capital. In sum, the theory of capitalism is explained in terms of a class-divided system that is propelled by the drive for surplus value via the exploitation of labour.

Given constant and variable capital in labour value terms, and hence a value rate of profit R for the system as a whole, (labour value) prices of production are derived as the sum of (labour value) costs plus a (labour value)

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[7] As for example Krause (1982).

mark-up given by R. However, with this derivation, the 'price' of any commodity as output must be different from the 'price' of that same commodity as input. Since a commodity can only have one price, if the quantities of inputs are given, the value magnitudes of investment in labour power and means of production must change. This entails that, first, the procedure for determining prices of production is incomplete, since these changes should be allowed for; and second, it is inconsistent, because such changes entail that the mark-up based on R is incorrect.

Correcting this procedure involves determining prices of production and the rate of profit simultaneously. The rate of profit r is uniquely determined by, and prices p are determined up to a scalar multiple by,

$$\boldsymbol{p} = (\boldsymbol{p}A + w\boldsymbol{l})(1+r) \tag{4}$$

where w is the wage rate. But the wage is specified in real terms by the bundle of commodities $\boldsymbol{b}$ it purchases, so that $w = \boldsymbol{pb}$ and hence

$$\boldsymbol{p} = \boldsymbol{p}(A + \boldsymbol{bl})(1+r) \tag{5}$$

Since equation (5) is homogeneous in $\boldsymbol{p}$, some normalization condition is needed to fix the price level, and the 'transformation problem' is concerned with how to specify a relation of determination from the 'underlying and fundamental' $\boldsymbol{\lambda}$ to the 'surface appearances' $\boldsymbol{p}$. For there are two systems of accounts, one in terms of embodied labour and the other in terms of prices, and the only connection between the two is the arbitrarily chosen normalization condition.

Much of what follows is concerned with definitions of value aggregates and their interpretation. Within the dualist approach, these aggregates are as follows, with superscripts indicating whether they are denominated in terms of labour time (L) or in terms of money (P), and the TD subscripts indicating the 'traditional dualist' interpretation. The value aggregates are

$$C_{\mathrm{TD}}^{\mathrm{L}} = \boldsymbol{\lambda}A\boldsymbol{x} \tag{6}$$

$$V_{\mathrm{TD}}^{\mathrm{L}} = \boldsymbol{\lambda}\boldsymbol{bl}\boldsymbol{x} \tag{7}$$

$$S_{\mathrm{TD}}^{\mathrm{L}} = \boldsymbol{\lambda}(\boldsymbol{I} - A - \boldsymbol{bl})\boldsymbol{x} \tag{8}$$

$$C_{\mathrm{TD}}^{\mathrm{L}} + V_{\mathrm{TD}}^{\mathrm{L}} + S_{\mathrm{TD}}^{\mathrm{L}} = \boldsymbol{\lambda}\boldsymbol{x} \tag{9}$$

$$V_{\mathrm{TD}}^{\mathrm{L}} + S_{\mathrm{TD}}^{\mathrm{L}} = \boldsymbol{\lambda}\boldsymbol{y} \tag{10}$$

$$e = \frac{S_{TD}^{L}}{V_{TD}^{L}} \tag{11}$$

The aggregates of constant and variable capital and surplus value, denominated in terms of prices of production, are

$$\boldsymbol{C}_{TD}^{P} = \boldsymbol{pAx} \tag{12}$$

$$V_{TD}^{P} = \boldsymbol{pblx} \tag{13}$$

$$S_{TD}^{P} = \boldsymbol{p}(\boldsymbol{I} - \boldsymbol{A} - \boldsymbol{bl})\boldsymbol{x} \tag{14}$$

The challenge for this 'dualist' approach, then, is to specify some relation (other than dogmatic assertion) between the two systems of accounts that enables some purchase on the empirical realities of capitalist development. This is difficult for three reasons. First, except in particular special cases (such as a zero profit rate, or equal ratios of constant to variable capital in price terms), there is no relationship between magnitudes denominated in terms of embodied labour and magnitudes denominated in terms of prices of production. One relationship between particular magnitudes can be asserted by construction, through the normalization condition, but that is all. Second, since equation (1) shows that the proximate determinates of λ are the input–output coefficients A and the labour input coefficients l, and equation (5) shows that those of p are the same input–output and labour input coefficients plus real wage data, the λ are redundant anyway. The relation between 'values' and prices is nugatory, and this 'dualist' approach theoretically leads nowhere. And third, the approach has no place for what is one of the defining features of the capitalist world: it is hard to see how an approach which omits all mention of money can provide a foundation for an account of the pervasiveness of money relations in the modern world.

Specifying the problem in this way involves some care in interpretation. For it might appear to the unwary that the resolution to the difficulties just mentioned entails some solution to the 'transformation problem'. In one limited sense this is true: the issues to be discussed *do* revolve around how one can think about the categories of value and price, embodied labour coefficients and sums of money, direct prices and prices of production. But it is something of a leap to assert further that since the 'transformation problem' concerns the relation between these, so too anything that pertains to their relation must comprise a solution to the 'transformation problem'. If one is locked into this problematic, then much of what follows will seem like sleight

of hand. For no solution to the 'transformation problem' will be proposed; rather, thinking about the issues differently serves to bypass many of the traditional concerns.[8]

3. THE DUMÉNIL AND FOLEY APPROACH

The sense in which money represented social labour time was a central focus in Foley (1982), paralleling independent work (in French) by Duménil (1980). One immediate problem was that Lipietz (1982) published a survey that explicitly linked the related approaches of Duménil and Foley to the existing literature on the transformation problem, calling their approaches the 'new solution'. This has led to considerable confusion, because the approach proposed by Foley in particular has little if anything to do with the transformation problem.[9] While it has been gradually recognized that 'new solution' is misleading, its replacement with the phrase 'new interpretation' is no great improvement. I will more neutrally designate it 'the DF approach' in what follows.

The process which commensurates different types of labour is the process of the sale of the output produced by them, and hence there must be some accounting relation between labour values and prices. The most general formulation is to focus on an aggregate relationship between prices and values, in order not to presuppose any specification of individual relationships.[10] Foley (1982) suggested that the appropriate category was 'value added', because this was the contribution of current labour. Equation (3) shows that the total labour performed in the production of gross output is the labour embodied in net output, and the latter is total labour value added. Foley argued that this total value added should be regarded as the same aggregate, whether measured in terms of hours, as labour value added, or measured in terms of money, as money value added. As an accounting relation, their conceptual equivalence defines the value of money m (measured in hours per unit of money):

$$m_{\text{DF}} = \frac{\lambda y}{py} \tag{15}$$

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[8] These issues are discussed in the exchange between Febrero Panos (2000) and Mohun (2000).
[9] Despite the title of his paper (Foley (1982)).
[10] This also sidesteps the important issue of the heterogeneity of labour mentioned in the previous section.

(where the DF subscript labels the approach), and the inverse of the value of money is the 'monetary equivalent of value' or the 'monetary equivalent of labour time' or MELT (measured in units of money per hour). Equation (15) represents the basic accounting content of the labour theory of value, quite separate from, and prior to, any particular assumption made about how prices are formed. In particular, there is no presumption about whether exchange is exchange of value equivalents or of non-equivalents.

A further rationale for equation (15) could be sought in the evolution of capitalism. The process of exchange commensurates commodities according to their labour contents via a process whereby the value of any commodity i is expressed relatively in the physical form or the use-value of some other commodity j; a social process then singles out one such equivalent to act in place of all, the 'universal equivalent' thereby being established as the money commodity. It is often argued that the twentieth century has seen a gradual 'de-commodification' of money (Foley 1983). If money is not produced as a commodity, then it has no labour content and hence has no value itself. But in an n-commodity world, money continues to have n equivalent forms, and hence the specification of the 'value of money' turns on an appropriate specification of that equivalent form. That is, if money has no intrinsic value itself, then the value of money is the value of something else. Formally, consideration of the 'general form of value' suggests immediately that, for some given stock of money, the value of any commodity will do to measure the value of money. But a normalization that privileges one particular commodity and its production conditions does not seem a satisfactory rendition of a labour theory of value, precisely because any such commodity will do. A more general approach is to use some combination of commodities as equivalent in a way that retains a labour theory of value.

One possibility is to specify all past and present labour embodied in gross output and to use the ratio of that labour value to the money value of gross output as the value of money. The difficulty with this, as Ricardo discovered, is that it is quite possible that the money value of gross output can vary with no variation in the total quantity of labour performed, if the temporal structure of embodied labour changes. As with using any particular commodity as *numéraire*, this does not therefore seem adequately to represent a labour theory of value. A second possibility is to restrict attention to net output and current labour performed. That is, in order to retain the link with total current labour performed, past labour should be ignored. Then the answer to the question of what money can notionally 'command' in exchange (for some given velocity of circulation) is total net output produced. Equation (15) formalizes this in terms of a definition of the relationship between total current labour performed and the total net output produced by that labour

at current prices, i.e. as the ratio of the labour value of total net output to its money value.

The second fundamental innovation suggested by Foley concerns the value of labour power (VLP). Labour power is an aspect or capacity of people, and is not in itself a produced commodity. Neither, except in slave societies, are people themselves produced commodities. In capitalist societies, there is therefore no labour embodied either in people or in their capacities. Hence the VLP cannot be defined in terms of labour embodied because there is none. When labour power is sold for a wage, its value is expressed relatively, like all produced commodities, in the physical form of money. But since labour power is not a produced commodity with any labour embodied in it, what is required theoretically is to identify those *other* social processes which determine the magnitude of the VLP. Functionally, the lower limit of this magnitude must be determined by the requirements of biological subsistence if social reproduction is to occur at all. But this says very little about developed capitalist economies, and the extent to which the imperatives of biological subsistence are exceeded is determined by what Marx called 'a historical and moral element' (Marx (1976, p. 275)) and what today might be called 'social norms'.[11]

Identification of these social norms and their evolution is not pursued here; for this paper what is required is a unit of account for labour power. As with money, although for different reasons, the commodity labour power has no labour content, and again as with money an appropriate equivalent form must be specified. The usual approach specifies labour power's equivalent form of value in terms of the use-values purchased by the wage. The value of these use-values can then be used to fix the VLP. This procedure only makes sense given an assumption of equivalent exchange: the commodity labour power, which has a value, is sold for a wage, which measures that value, and the wage is then used to purchase a bundle of commodities of equivalent value. Under these circumstances the VLP is the same as the value of the wage bundle of commodities. *But in general this cannot be true.* For each commodity in the bundle purchased by the wage is produced in its own production process, with its own technology of production, and will in general sell at a price that is not proportional to its labour value. Hence the VLP cannot be measured by the value of the commodities purchased with the wage, for that exchange is in general a non-equivalent exchange of values.

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[11] Subsistence requirements 'are themselves products of history, and depend therefore to a great extent on the level of civilization attained by a country; in particular they depend on the conditions in which, and consequently on the habits and expectations with which, the class of free workers has been formed' (Marx (1976, p. 275)).

However, because labour power is not a produced commodity, considerations of non-equivalent exchange resulting from different technologies of production do not apply to the purchase and sale of labour power for a money wage. Hence Foley proposed that for accounting purposes the VLP should be understood as being measured by the wage, and left open the issue of the identification of those social processes which determine the VLP. More strictly, assuming some given process which converts hours of labour power sold into hours of labour employed in production, the VLP per hour of labour hired is equal to the average wage rate per hour (w) multiplied by the value of money:

$$\text{VLP}_{\text{DF}} = w m_{\text{DF}} \tag{16}$$

And combining equations (3), (15) and (16) then shows that the VLP is the share of wages in money value added:

$$\text{VLP}_{\text{DF}} = \frac{W}{py} \tag{17}$$

These aggregate accounting relations do not necessarily hold in each individual firm. For since the wage rate w is the average wage rate in the economy, so that

$$w = \sum_i w_i \frac{l_i x_i}{lx}$$

and since the VLP is formed out of a similar averaging process,

$$\text{VLP} = \sum_i \text{VLP}_i \frac{l_i x_i}{lx}$$

then

$$\sum_i l_i x_i (\text{VLP}_i - w_i m_{\text{DF}}) = 0$$

Only in the case of a uniform wage rate will the VLP per hour of labour hired be the same in each firm, in which case variable capital in firm i at unit level is $\text{VLP}_{\text{DF}} l_i$ or $m_{\text{DF}} w l_i$.

The accounting implications are now straightforward to draw out. As in the previous section, total labour value is the sum in value terms of

aggregate constant capital, aggregate variable capital and aggregate surplus value:

$$C_{\mathrm{DF}}^{\mathrm{L}} + V_{\mathrm{DF}}^{\mathrm{L}} + S_{\mathrm{DF}}^{\mathrm{L}} = \lambda x \tag{18}$$

In the DF approach, as in equation (10), the labour value of net output is defined as the sum of aggregate variable capital and aggregate surplus value, both in labour value terms,

$$V_{\mathrm{DF}}^{\mathrm{L}} + S_{\mathrm{DF}}^{\mathrm{L}} = \lambda y \tag{19}$$

and the value of aggregate constant capital is the labour embodied in the means of production (the non-labour inputs):

$$C_{\mathrm{DF}}^{\mathrm{L}} = C_{\mathrm{TD}}^{\mathrm{L}} = \lambda A x \tag{20}$$

Then, since the money value of net output is the sum of aggregate wages (W) and aggregate profits (Π),

$$\boldsymbol{p y} = w \boldsymbol{l x} + \Pi \tag{21}$$

and since the labour value of aggregate variable capital is the VLP per hour of labour hired multiplied by the total number of hours worked, multiplying equation (16) through by $\boldsymbol{lx}$ shows that aggregate variable capital in labour value terms is equal to total wages multiplied by the value of money:

$$V_{\mathrm{DF}}^{\mathrm{L}} = W m_{\mathrm{DF}} \tag{22}$$

Then aggregate surplus value in labour value terms (surplus labour time) is given by the difference between total labour time and the labour time represented by wages (necessary labour time)

$$S_{\mathrm{DF}}^{\mathrm{L}} = L - W m_{\mathrm{DF}} \tag{23}$$

and is equal to aggregate profits multiplied by the value of money, sometimes rather loosely specified as 'total surplus value equals total profit':

$$S_{\mathrm{DF}}^{\mathrm{L}} = \Pi m_{\mathrm{DF}} \tag{24}$$

It immediately follows that if the rate of exploitation (e) is defined as the rate of surplus value, that rate is the aggregate profit–wage rate in the economy:

$$e_{DF} = \frac{S^L_{DF}}{V^L_{DF}} = \frac{\Pi}{W} \tag{25}$$

Finally, from equations (17), (21) and (25), the rate of surplus value and the VLP are related by

$$e_{DF} = \frac{1 - VLP_{DF}}{VLP_{DF}} \tag{26}$$

It should now be clear why it is seriously misleading to term this approach the 'new solution'. The DF approach is not in itself a 'solution' to anything. It is rather an approach to the labour theory of value that provides an *ex post* accounting system that is theoretically coherent, and compatible with accounting practice in capitalist society. As an accounting system, no relations of determination are expressed. In particular, that profits are an exact measure of unpaid labour is *not* a deduction from more primitive assumptions. Rather, the labour theory of value is itself *defined* so that profits are an exact measure of unpaid labour. This means that the DF approach is a very general one, and remains valid whatever prices happen to be. If each individual price were proportional to its labour value, the factor of proportionality being given by m_{DF}, then all of the DF equations would be indistinguishable from the 'dualistic' equations. But this will not in general be the case. In this sense the DF approach generalizes the 'dualistic' approach, and without any requirement for a separate accounting system based on embodied labour coefficients. Indeed, beyond the confines of the unchanging technique circulating capital linear model commonly used for expository purposes, the DF accounting approach remains valid in the presence of fixed capital and joint production. It is worth emphasizing this, for while the foregoing has been couched in terms of the standard linear model of production, it is well known that the latter cannot assign quantities of embodied labour to individual commodities produced under conditions of joint production, and hence under these conditions equation (1) does not work. But equations (15) and (16), and hence (17), (22), (24) and (25), are all specified in terms of aggregates, and hence remain valid in the more realistic conditions of joint production. The DF approach therefore enables the construction and investigation of meaningful empirical measures, both across countries and through time, in terms of readily available national accounts data.[12]

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[12] These data are both much more widely available than input–output data and arguably more reliable, since the input–output data themselves are derivatives of data collected in market prices in the first place.

This is particularly important if it is believed that an approach based on class can describe the historical development of capitalism in ways in which approaches based on methodological individualism cannot. For one obvious problem with the Marxian tradition is that, while certainly characterized by doctrinal controversy, it has traditionally had much less to say in any rigorous sense about the empirical world. Either empirical studies are written which have no underlying theoretical basis (and hence theory is not taken seriously), or there is a concentration on theory alone (an approach that is vulnerable to an indictment of continually constructing immunizing strategems). The DF approach proposes definitions of the value of money and the VLP which enable an accounting framework for the production of aggregate value and its distribution between classes, and hence an examination of the historical path of capitalist development.

Too much should not be claimed. In itself, the DF approach is neither predictive nor explanatory in the absence of specific behavioural hypotheses involving determination. Not only do the theoretical determinations of the value of labour power and the value of money remain to be explored.[13] It is also that as an accounting framework the DF approach focuses on the outcome of that economic process which renders heterogeneous and concrete labours homogeneous and abstract. Within a similar framework to the DF approach and at about the same time, Krause (1980, 1982) focused theoretically on this economic process directly. He explored in joint production models the relation between relative reduction coefficients (which render concrete labours homogeneous and abstract) and relative prices. Just as (in product space) Sraffa's standard commodity enables a focus on distribution independent of relative prices, Krause proposed (in labour space) a standard reduction determining relative labour values measured in abstract labour, and, unlike the case of the standard commodity, proposed some economic meaning in terms of competition for this standard reduction. But absolute magnitudes require independent specifications of the rate of surplus value and the value of money; Krause suggested that the former required a more detailed specification of production and class struggle, and the latter required incorporation of such issues as the circulating quantity of money. So while the DF focus is not itself theoretical, it does not preclude further theoretical development of its underpinnings in a number of directions. Moreover, while empirical investigations require theory to drive observation and measurement, the history of science also suggests that informed measurement is an important way of accumulating knowledge about precisely what it is that

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[13] Although on the value of money see Foley (1998).

theory has to explain. And the DF approach does enable detailed empirical investigation of substantive (rather than definitional) parts of the Marxist approach, such as for example hypotheses about accumulation and technical change. In marked contrast to the dualist approach, all of this constitutes a progressive research agenda.

4. A SINGLE-SYSTEM 'GENERALIZATION'

In the DF approach, the value of money is defined by a postulated equivalence between the labour value and the money value of net output. Given that definition, then the value of money exactly translates the VLP per hour of labour hired into the average hourly wage rate, the labour value of aggregate variable capital into its money form of total wages, and the labour value of surplus value into its money form of total profits. This raises the obvious question of whether a similar relation can be determined between the labour value and the money form of aggregate constant capital. Such a relation would in this sense generalize the DF approach.

But such a relation *cannot* be specified in the DF approach for constant capital, because the different means of production comprising its elements will in general be produced in processes with different compositions of capital, and hence their prices will not be proportional to their labour values. At the prevailing value of money, the labour time equivalent of the money value of the means of production is *not* the aggregate embodied labour value of the means of production. But suppose it were *defined* to be so. It clearly is possible to define the 'value' of aggregate constant capital as its money value multiplied by the value of money, and in a sense this generalizes the DF approach by treating all inputs on the same basis. Moreover, it then enables the argument that this exactly reflects the interpretation that Marx's initial 'typical' magnitudes are all denominated in money terms.

Since a corollary of the proposition that all inputs should be treated symmetrically is that the labour embodied in all of the means of production is different from the value of aggregate constant capital, then the vector of values cannot be defined by equation (1). Further, the definition of value must involve some relation with money, since it is the process of commensuration of commodities in the market that renders the heterogeneous labours that produced them homogeneous. Given the starting point of a labour theory of value, in which by definition only the expenditure of labour adds value, then these considerations together suggest a formulation in which the expenditure of labour adds value to whatever is the current labour time equivalent of the monetary value of the means of production. The monetary

value of the means of production is the sum of the quantity used of each non-labour input at unit level multiplied by its current unit price. Their current labour time equivalent is this monetary figure multiplied by the value of money, where the value of money is defined, not in terms of the ratio of the value to the price of net output, but in terms of the ratio of the value to the price of *gross* output. So if p is the vector of prices and m_{SS} the value of money in this generalized 'single-system' (SS) approach, then the vector of values so defined, λ_{SS}, is determined by

$$\lambda_{SS} = m_{SS}\,pA + l \tag{27}$$

where

$$m_{SS} = \frac{\lambda_{SS}x}{px} \tag{28}$$

Equation (27) was first explicitly proposed (in slightly different form) by Wolff *et al.* ((1982; 1984a); see also Wolff *et al.* (1984b)), although it was there embedded in a framework of anti-essentialist post-modernism (which arguably prejudiced its immediate acceptance). Equation (27) was also proposed by Moseley (1993), who insisted that the initial 'givens' of Marxian theory were monetary magnitudes, and on this basis used it as part of the foundation of a wide-ranging attack on the Seton–Morishima–Steedman framework.[14]

Post-multiplying equation (27) by x and substituting in equation (28) yields

$$m_{SS} = \frac{m_{SS}\,pAx + lx}{px} \tag{29}$$

Solving for the value of money,

$$m_{SS} = \frac{lx}{py} = m_{DF} \tag{30}$$

which is identical to the value of money proposed in the DF interpretation. Thus it is not the apparently different definition of the value of money that is critical; it is rather the definition of value by equation (27). This is impor-

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[14] Moseley's argument is based on a particular interpretation of Marx, which he formulated in the early 1980s and has also used in empirical work (Moseley (1991)).

tant, because equation (27) severs any linkage between (living and dead) labour embodied on the one hand and 'value' on the other save through the value of money.

It is worth noting in passing that this approach *has* to determine the labour embodied in the means of production as their price multiplied by the value of money. For consider what must happen as soon as the circulating capital approach is generalized to allow for fixed capital. Fixed capital is a stock of means of production produced at different times using different prevailing technologies. Hence the labour embodied in the means of production will be a vector of labour times arising from different vintages and different productivities. Hence the value of money as the ratio of the value to the price of gross output is a vector divided by a scalar, rendering the concept incoherent.[15] By determining the labour embodied in the means of production as their price multiplied by the value of money, this incoherence is avoided.

Total value is given by

$$\lambda_{SS} x = C_{SS}^{L} + V_{SS}^{L} + S_{SS}^{L} \tag{31}$$

Just as constant capital in labour value terms is the monetary value of the means of production multiplied by the value of money, so it is logical to define variable capital in labour value terms as necessary labour time, which is the monetary value of total wages multiplied by the value of money, and surplus value in labour value terms as the difference between total labour time and necessary labour time, which is just the monetary value of total profits multiplied by the value of money. Hence equations (22) and (24) are asserted in the SS approach (but without the supporting reasoning of the DF approach underlying equation (16)). Then immediately, just as constant capital in money value terms is pAx, so variable capital in money value terms is total wages, and surplus value in money value terms is total profit. Hence the aggregates are

$$C_{SS}^{L} = mpAx \tag{32}$$

$$V_{SS}^{L} = mW \tag{33}$$

$$S_{SS}^{L} = L - V_{SS}^{L} \tag{34}$$

(where by equation (30) there is no need to subscript the value of money), and it is immediate that $V_{SS}^{L} = V_{DF}^{L}$ and $S_{SS}^{L} = S_{DF}^{L}$, so that aggregate profits are the money form of aggregate surplus labour time.

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[15] This point is made by Foley (2000).

Moseley's interpretation is outlined at an aggregate level, and so, like the DF interpretation, can incorporate joint production without problem. Although he bases his interpretation on a particular reading of Marx, the only analytical difference from the DF interpretation is his assertion of a given money aggregate of constant capital which he multiplies by the value of money to determine its labour value. This implies that if wages are paid in advance, then, for the SS approach, the rate of profit for the economy as a whole (R) is the same whether measured in terms of prices or labour values:

$$R = \frac{\Pi}{pAx + W} = \frac{S_{SS}^{L}}{C_{SS}^{L} + V_{SS}^{L}} \tag{35}$$

(whereas the second equality cannot be asserted in the same sense in the DF approach). Again, while this holds at the aggregate level, it does not hold in general for the individual firm. For consider the ith equation in the system defined by (27), where now the superscript labels the approach:

$$\lambda_i^{SS} = m \sum_j p_j a_{ji} + l_i$$

Suppose that competition enforces a uniform wage rate. Then, since unit prices must cover costs and make a profit,

$$p_i = \sum_j p_j a_{ji} + w l_i + \pi_i$$

Then

$$p_i = \left(\frac{\lambda_i^{SS}}{m} - \frac{l_i}{m} \right) + w l_i + \pi_i$$

Rearranging,

$$p_i - \frac{\lambda_i^{SS}}{m} = \pi_i - \frac{l_i}{m}(1 - wm) \tag{36}$$

so that, for any firm, the difference between its unit price and its unit value in money terms is the same as the difference between its unit profit and its

appropriated surplus labour time in money terms. Hence while the aggregate rate of profit is the same whether measured in terms of prices or labour values, this is only true for individual rates of profit when individual firm profit and surplus value in money terms are the same. And in general this will not be the case.

5. ASSUMPTIONS ABOUT PRICE FORMATION

Given the assumptions, both the DF and the SS accounts are consistent accounting frameworks for the labour theory of value, the various propositions all holding without any particular assumption about how prices are formed. But accounts of price formation are central to accounting for the visible appearances of capitalism, and any account must bear some relation to the labour theory of value if the latter is to have any meaning. Two accounts of price formation have been important in the Marxian tradition, and each will be considered in turn.

5.1 Price assumption 1: prices proportional to labour values

Suppose that there is equivalent or equal exchange throughout the economy so that prices are proportional to values. Then for each i, the SS equation (27) is identical to equation (1) because the distinctive SS equation $C_{SS}^{L} = mpAx$ is identical to the DF equation $C_{DF}^{L} = \lambda Ax$. Hence $\lambda_{SS} = \lambda_{DF} = \lambda_{TD}$ and all approaches are indistinguishable. Since all prices are proportional to their corresponding value magnitudes which are quantities of embodied labour, then, for each firm, surplus value is equal to profit multiplied by the value of money, and it makes no difference whether individual rates of profit are measured in terms of labour values or prices. This is only to be expected, since the point of the assumption of equivalent exchange is precisely to identify the origin of exploitation and profit.

5.2 Price assumption 2: prices of production

In general, because of different conditions of production, prices will not be proportional to values. Marx conceived of long-run equilibrium prices as 'prices of production', formed according to equation (4) out of costs marked up by the general (equalized) rate of profit. An issue for the labour theory of value then is what relation, if any, such prices bear to labour values.

5.2.1   The relation between prices and SS values

In equation (4), the rate of profit is defined as

$$r = \frac{\Pi}{pAx + W} \tag{37}$$

Since in the SS approach each money value aggregate multiplied by m is equal
to its corresponding labour value aggregate, then the Sraffian rate of profit
r in equation (37) is the same as both the 'value rate of profit' and Marx's
general rate of profit R in equation (35). Then for a uniform wage rate, mul-
tiplying the ith equation in (4) by m shows that the ith unit value in money
terms is

$$p_i m = (c_i + v_i)(1 + r) \tag{38}$$

Now define the composition of capital used in the ith production process as

$$k_i = \frac{\sum_j p_j a_{ji} x_i}{w l_i x_i} \tag{39}$$

and the composition of capital for the economy as a whole as

$$k_y = \frac{pAx}{wlx} \tag{40}$$

Proposition 1 (SS): Given no joint production and a uniform rate of
exploitation across the economy, the unit price realized for the ith com-
modity is greater than (equal to, less than) its value in money terms accord-
ing as the composition of capital used in its production is greater than
(respectively equal to, less than) the economy-wide composition of capital,
both compositions being measured in terms of prices:

$$\text{sign}\left(p_i - \frac{\lambda_i^{SS}}{m}\right) = \text{sign}(k_i - k_y) \tag{41}$$

Proof: Multiply equation (36) through by $m/(c_i + v_i)$ and rearrange as

$$\frac{m\pi_i}{c_i + v_i} = \frac{m}{c_i + v_i}\left(p_i - \frac{\lambda_i^{SS}}{m}\right) + \frac{l_i(1 - wm)}{c_i + v_i}$$

Consider each term. The left-hand side is the equalized rate of profit, and dividing through by V_L or equivalently mW and, using equations (25) and (40), can be written as $e/(k_y + 1)$. Similarly the second term on the right-hand side can be written as $e/(k_i + 1)$. Hence dividing the first term on the right-hand side through by v_i,

$$\frac{e}{k_y + 1} = \frac{m/v_i\left(p_i - \lambda_i^{\text{SS}}/m\right)}{k_i + 1} + \frac{e}{k_i + 1}$$

Collecting terms

$$e\left(\frac{1}{k_y + 1} - \frac{1}{k_i + 1}\right) = \frac{m/v_i\left(p_i - \lambda_i^{\text{SS}}/m\right)}{k_i + 1}$$

so that, after simplifying,

$$p_i = \frac{\lambda_i^{\text{SS}}}{m} = wr(k_i - k_y)$$

which establishes the proposition. ∎

Results like these motivate SS claims that Marx's own analysis is correct, and that the analyses of his critics for over a century have been wrong. These claims evidently depend upon the acceptance of the validity of the SS value equation (27).

5.2.2 The relation between prices and DF values

Since DF labour values are given by λ rather than λ_{SS}, an analogous proposition to that just developed within the SS tradition requires a different approach. Let u_i be the ith unit (column) vector. Then subsystem i is defined as a system whose total net output is one unit of commodity i, and hence is u_i. The gross output of subsystem i is ξ_i, determined as

$$\xi_i = A\xi_i + u_i$$

and hence, provided the inverse exists,

$$\xi_i = [I - A]^{-1} u_i \tag{42}$$

$\boldsymbol{\xi}_i$ is the *i*th column of the matrix $[\boldsymbol{I} - \boldsymbol{A}]^{-1}$, representing the quantities of all commodities directly and indirectly required by the *i*th industry in order to produce one unit of its output. Since l_i is the total amount of labour used directly by industry *i* in order to produce one unit of output of *i*, then the total amount of labour directly and indirectly used by subsystem *i* is $\boldsymbol{l\xi}_i = \boldsymbol{I}$ $[\boldsymbol{I} - \boldsymbol{A}]^{-1}\boldsymbol{u}_i$. Since from equation (1) $\boldsymbol{\lambda} = \boldsymbol{l}\,[\boldsymbol{I} - \boldsymbol{A}]^{-1}$, then $\boldsymbol{l\xi}_i = \boldsymbol{\lambda u}_i = \lambda_i$, where λ_i, the labour embodied in commodity *i*, is what Pasinetti calls the 'vertically integrated labour coefficient' for commodity *i* (Pasinetti (1973, p. 6)). This notion of vertical integration can be applied to the price of production equations (4) to provide a precise measure of unequal exchange, similar but not identical to the SS rule in terms of the compositions of capital.[16]

Proposition 2 (DF): In the absence of joint production, the unit price realized for the *i*th commodity is greater than (equal to, less than) its embodied labour value in money terms according as the vertically integrated capital (to paid) labour ratio used in its production is greater than (respectively equal to, less than) the aggregate composition of capital for the economy as a whole:

$$\text{sign}\!\left(p_i - \frac{\lambda_i}{m_{\text{DF}}} \right) = \text{sign}\!\left(\boldsymbol{k}_i^{\varepsilon} - \boldsymbol{k}_y \right)$$

where

$$\boldsymbol{k}_i^{\xi} = \frac{\boldsymbol{pA\xi}_i}{w\lambda_i}$$

the vertically integrated ratio of capital to paid labour for subsystem *i*, and $\boldsymbol{k}_y$ is the vertically integrated capital to paid labour ratio in the production of one unit of the composite commodity *y*, which is just the capital to paid labour ratio for the economy as a whole given by equation (40).

Proof: Write the price of production equations (4) as

$$\boldsymbol{p} = r\boldsymbol{p}\boldsymbol{A}[\boldsymbol{I} - \boldsymbol{A}]^{-1} + w(1+r)\boldsymbol{l}[\boldsymbol{I} - \boldsymbol{A}]^{-1} \tag{43}$$

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[16] The argument draws closely on Parys (1982).

Post-multiply by u_i and rearrange to derive

$$p_i = w\lambda_i\left[r\boldsymbol{k}_i^{\xi} + (1+r)\right] \tag{44}$$

Then post-multiply equation (43) by the composite commodity net output y and rearrange analogously to derive

$$\boldsymbol{py} = w\boldsymbol{\lambda}\boldsymbol{y}\left[r\boldsymbol{k}_y + (1+r)\right] \tag{45}$$

Divide equation (44) by equation (45)

$$\frac{p_i}{\boldsymbol{py}} = \frac{\lambda_i\left[r\boldsymbol{k}_i^{\xi} + (1+r)\right]}{\boldsymbol{\lambda}\boldsymbol{y}\left[r\boldsymbol{k}_y + (1+r)\right]}$$

and hence; using equation (15),

$$m_{\text{DF}}\, p_i = \frac{\lambda_i\left[r\boldsymbol{k}_i^{\xi} + (1+r)\right]}{r\boldsymbol{k}_y + (1+r)}$$

Subtract λ_i from both sides, factorize and rearrange:

$$m_{\text{DF}}\, p_i - \lambda_i = r\lambda_i\left[\frac{\boldsymbol{k}_i^{\xi} - \boldsymbol{k}_y}{r\boldsymbol{k}_y + (1+r)}\right]$$

Substitute for the denominator on the right-hand side from equation (45) and use the definition of m to derive

$$p_i - \frac{\lambda_i}{m_{\text{DF}}} = wr\lambda_i\left(\boldsymbol{k}_i^{\xi} - \boldsymbol{k}_y\right)$$

which establishes the proposition. ∎

While this provides an exact measure of unequal exchange, it is only of interest to the extent that accounting in terms of embodied labour coefficients at the level of the individual firm is of interest. While a similar result obtains for the 'dualist' approach (contingent upon some appropriate normalization condition), within the DF approach this sort of proposition is at best of only doubtful interest.

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6. AN SS APPROACH WITH THE PARTIAL ADDITION OF TIME

A different approach was taken by a group of theorists who argued that temporal aspects of the production process are fundamental: inputs must be used before outputs can be produced, and hence it is conceptually wrong to presume that the input and output price for a commodity must be the same. If production takes time, input prices must be determined prior to output prices. Hence in this 'temporal single-system' (TSS) approach, equation (27) is rewritten as

$$\lambda_{t+1} = m_t (pA)_t + l_t \qquad (46)$$

where the time path of the TSS value of money is defined as the ratio of the value to the price of gross output:

$$m_{t+1} = \frac{(pAx)_t m_t + L_t}{(px)_{t+1}} \qquad (47)$$

Profits are revenues less costs, where revenues are discounted back one period for commensurability

$$\Pi = \frac{(px)_{t+1}}{1 + i_{t+1}} - (pAx)_t - W_t \qquad (48)$$

and the discount factor is defined as

$$\frac{1}{1 + i_{t+1}} = \frac{m_{t+1}}{m_t} \qquad (49)$$

Substituting this in equation (48) and then using equation (47) gives

$$\Pi = \frac{L_t}{m_t} - W_t \qquad (50)$$

and hence the labour time equivalent of profits is equal to the difference between total labour time and the labour time equivalent of wages, or

$$\Pi m_t = S_t \qquad (51)$$

just as the DF equation (24). But whereas the DF approach interprets this as an accounting equation consequent upon the definitions of the value of

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money and the VLP, this partial temporal approach understands equation (51) as a theoretical causal statement of the source of all profit in labour time (the analogue of the 'fundamental Marxian theorem' in the dualist approach).

It is worth noting in passing that the definition of the time path of the TSS value of money as equation (47) is the same as the time path of the DF value of money when rewritten in temporal terms. For, by definition,

$$\frac{(\boldsymbol{py})_{t+1}}{1+i_{t+1}} = \frac{(\boldsymbol{px})_{t+1}}{1+i_{t+1}} - (\boldsymbol{pAx})_t$$

Using the definitions of the TSS value of money and the discount factor, the right-hand side is L_t/m_t, so that

$$(\boldsymbol{py})_{t+1}\frac{m_{t+1}}{m_t} = \frac{L_t}{m_t}$$

and hence

$$m_{t+1} = \frac{L_t}{(\boldsymbol{py})_{t+1}} \tag{52}$$

7. AN EVALUATION

7.1 Temporality

In the dualist and DF approaches, the traditional value equations (1) are predicated upon some specification of the production period and the prevailing technology during this period. In the absence of joint production, each commodity has a single labour embodied value, whether that commodity is an input, an output or both. On a labour definition of value, if the value of a commodity output changes relative to its value one period ago, it can only be because of a change in labour requirements, and hence labour embodied, during the current period. If the commodity is also used as an input in the current period, the new value is *ex post* applied to the commodity as input, and hence there is a quantitative difference between the value of the commodity as an output at the end of last period and its *ex post* value as an input at the beginning of the current period. This does not of course mean that the commodity is sold at one price at the end of last period but purchased at a different price at the start of the current period. Sale price and

purchase price in the same transaction are the same. But the value of the input which counts in the current period depends only on current production conditions. If the capitalist purchases an input whose value is *ex post* changed in this manner, so too, *ex post*, is the capital that was laid out.

The TSS approach denies this accounting convention, and asserts that outputs are produced after inputs are employed, and that input prices and output prices in the same production process are not therefore determined at the same time. Historic costs rather than current reproduction costs are what matter. On one level, this is just a different accounting convention. But it creates some difficulties in a temporal context.

First, as soon as the assumption is relaxed that the production of time t is all sold at time $t + 1$, there are problems with inventory valuation. Inventories are stocks of unused intermediate inputs, work-in-progress, finished commodities awaiting sale, and commodities acquired for resale. Over any defined period, output is defined as sales plus changes in inventories. National accounting practice is based on opportunity cost rather than historic cost, and values additions to inventories at the prices ruling at the time they are produced and withdrawals from inventories at the prices at which they are sold. This 'perpetual inventory method' of valuation in principle requires all such additions and withdrawals to be recorded continuously as they occur. In practice this is impossible, and book values of inventories at both beginning and end of the period are revalued on the basis of replacement cost, in order to separate any 'holding gain', consequent upon inventory price changes during the period, from the operating surplus derived from productive activity during the period. By contrast, historic cost accounting, which values inventories at the same (constant) prices at which they entered the stock of inventory, treats the inventory 'holding gain' due to price increases as additional output, and hence as additional surplus value, even though there is no change in the flow of labour producing that value. This is not obviously compatible with *any* definition of value which attributes value to some flow of productive input services. More broadly, devaluation and devalorization are critical temporal aspects of technical progress, accumulation and crisis, so that any approach must specify precisely how technical progress affects the current valuation of previously produced commodities. The TSS methodology constructs numbers based on historic costs, and determines any revaluation (in labour time terms) solely in respect of changes in the value of money. Since these numbers are neither actual historic costs incurred nor actual current replacement costs, it remains to be demonstrated how the TSS approach bears on what capitalist firms actually do.

Second, the same problems as those involved in inventory valuation must be confronted as soon as fixed capital is allowed for. Just as a methodology

of opportunity cost requires an inventory valuation adjustment, so too it requires a capital consumption adjustment, in order to separate the replacement cost of the 'real' fixed capital used up in any period from its historic costs as prices change over time. And just as with inventories, historic cost valuation of depreciation will produce effects on gross and net output which are not attributable to the expenditure of current labour.

Third, as soon as the assumption is relaxed that the production of time t is all sold at time $t + 1$, the process of the formation of market value as the average of individual values *embodied at different time periods* must be specified. This runs straight into a variant of the problem that Ricardo discovered in the first chapter of his *Principles*: in historic cost accounting the time at which labour is embodied matters as well as its amount.

To move from a timeless equilibrium specification of price to an explicitly temporal approach while maintaining uniform periods of production, no fixed capital and zero circulation time in a point-input point-output approach is not obviously a step in the direction of realism.[17] Indeed, the issue is not so much the temporality of circulating capital single production processes with uniform periods of production, but the complexity of the ways in which a multiplicity of circuits of industrial capital with different periods of production intertwine. Foley (1986, ch. 5) considers the circuit of capital in terms of nodes of financial, productive and commercial capital in which flows between nodes are derivatives of stocks and stocks are the definite integrals of flows. Time lags in financing, production and realization can then be introduced in a framework which mirrors actual accounting practice. The rather different TSS approach misinterprets a simultaneous approach as one in which everything happens at the same time, instead of one which tries to capture issues of mutual interdependence for some specification of technology. This is a significant conceptual disadvantage.

7.2   Constant capital

If temporality is put on one side, then equation (46) becomes equation (27). The SS approach of equation (27) is justified in the following way (Kliman and McGlone (1988, p. 63)). Any value is always expressed as a sum of

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[17] To specify values as depending upon input prices as in equation (46) is to presume that values are dependent upon exchanges during a previous circulation period, a period which is unspecified. Duménil and Lévy (2000) have recently shown how TSS value equations defined by equation (46) can lead to the paradoxical result that increases in labour productivity are not associated with falls in value.

money, through the value of money. When the capitalist purchases means of production, the sum of money used represents a portion of his money-capital. That a portion of his money-capital is now physically fixed in means of production says nothing about the labour embodied in the elements of the latter. Constant capital, as a value, is not the same thing as the sum of the embodied labours of its constituent elements. And exactly the same argument holds for variable capital when 'means of production' is replaced with 'labour power'.

As regards variable capital, this argument is at first sight similar to that of the DF approach, preceding equation (16) above. Yet there is a difference. Because labour power is not a produced commodity, there is no labour embodied in it. So not only does its value (like that of all commodities) have to be expressed in something else; it is also the case that for labour power its value *has to be the value of something else*. The only candidates for this something else are the sum of money for which labour power is sold, and the value of the produced commodities which that sum of money then purchases. To say that the VLP (multiplied by the length of the working period) is the value of the commodities purchased with the wage *requires* an assumption of equivalent exchange, because it is not *their* value which is being measured, but labour power's. Then it is incoherent to use such a definition of the VLP in a procedure which shows that in general there cannot be equivalent exchange. So all that is left for the VLP is the sum of money for which it is sold, and, because labour power is not a produced commodity, such a choice of equivalent is independent of any assumption of equivalent or non-equivalent exchange. Not only does labour power express its value relatively in the money wage; not only is the use-value of the money wage the 'mirror' (Marx (1976, p. 144)) for the VLP; the money wage (per hour, multiplied by the value of money) *is* the VLP (per hour of labour hired).

The situation with respect to the means of production is not symmetrical in this regard. The value of the means of production can meaningfully be expressed in both relative and equivalent forms and, but unlike the VLP, means of production are produced commodities and labour is embodied in them. Hence to propose that the sum of money which purchases means of production, when multiplied by the value of money, is the value of constant capital, regardless of the embodied labour content of those means of production, is vulnerable to the criticism that such a proposition breaks the link between labour and value. For whatever labour value sum the aggregate constant capital represents at the going value of money, it is not the labour time embodied in the means of production. And once fixed capital is considered, it is neither the labour time historically embodied in the means of production nor the labour time required to produce the means of production today

with current technology. Once it is asserted that total value is the value added by living labour to whatever value sum the constant capital represents at the going value of money, it is conceptually not obvious how to relate such a gross value concept to the total expenditure of labour.[18] In particular, values can change for reasons quite other than a change in the expenditure of labour. The whole framework of a labour definition of value thereby becomes problematic.

7.3 Instrumental practicalities

The only point of an accounting framework is to be able to use it. A purely practical reason for preferring the DF approach is that it avoids notorious difficulties with the valuation of the capital stock. The SS and TSS approaches require some agreement on asset lives, depreciation and amortization rates, the valuation of stocks, and a coherent rationale for inflation accounting. All of these issues are controversial, and capital stock data are the least reliable of national accounts data. Since, further, circulating constant capital flows are netted out of national accounts data, there is an obvious instrumental reason for preferring a 'value added' approach to a 'gross value' approach. Indeed it is doubtful that a gross value approach can say anything empirical that is theoretically informed. This is not true of the DF approach.

8. CONCLUSION

This paper has considered some alternative approaches within the Marxist tradition developed during the last quarter of the twentieth century, from the perspective of how well they develop a practical and progressive research agenda. Of the three approaches considered, it is argued that for both theoretical and practical reasons the DF approach is superior to the SS and TSS approaches. In the former, there is no reason ever to consider the aggregate labour value of the means of production. All accounting is in terms of money, at whatever prices happen to be. The rate of surplus value is the aggregate profit–wage ratio, the composition of capital is the ratio of the aggregate money value of the means of production to aggregate wages, and the rate of profit is defined entirely conventionally as a ratio of money aggre-

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[18] Moreover, since what is to count as an intermediate input depends upon the degree of aggregation, there is both arbitrariness and instability in the very definition of gross concepts.

gates. There is no value rate of profit, either ontologically or epistemologically, and there is nothing 'really' happening 'underneath' the price decisions of capitalists. In these terms, the DF approach provides a theoretical basis for a coherent empirical description of capitalist economic development on the basis of the labour theory of value. Such a description is a necessary preliminary to the testing of specifically Marxian hypotheses concerning for example the nature and direction of technical change. And the empirical measurement over time of the value of money and the VLP shows what must be explained in any theory of the determination of the value of money and the VLP, thereby providing some pointers to the development of such theory.

REFERENCES

Althusser L., Balibar E. (1970): *Reading Capital*, New Left Books, London.

Colletti L. (1973): *From Rousseau to Lenin*, New Left Books, London.

Duménil G. (1980): *De la Valeur aux Prix de Production*, Economica, Paris.

Duménil G. (1983–84): 'Beyond the transformation riddle: a labor theory of value', *Science and Society*, XLVII (4), pp. 427–50.

Duménil G. (1984): 'The so-called "transformation problem" revisited: a brief comment', *Journal of Economic Theory*, 33, pp. 340–8.

Duménil G., Lévy D. (2000): 'The conservation of value: a rejoinder to Alan Freeman', *Review of Radical Political Economics*, 32 (1), pp. 119–46.

Febrero Panos E. (2000): 'A re(in)statement of the labour theory of value: a comment', *Cambridge Journal of Economics*, 24 (1), pp. 107–11.

Fine B. (ed.) (1986): *The Value Dimension. Marx versus Ricardo versus Sraffa*, Routledge & Kegan Paul, London.

Fine B., Harris L. (1979): *Rereading Capital*, Macmillan, Basingstoke, and Columbia University Press, New York.

Foley D. K. (1982): 'The value of money, the value of labor power, and the Marxian transformation problem', *Review of Radical Political Economics*, 14 (2), pp. 37–47.

Foley D. K. (1983): 'On Marx's theory of money', *Social Concept*, 1 (1), pp. 5–19.

Foley D. K. (1986): *Understanding Capital*, Harvard University Press, Cambridge, MA.

Foley D. K. (1998): 'Asset speculation in Marx's theory of money', In Bellofiore R. (ed.): *Marxian Economics: A Reappraisal*, Vol. 1, Macmillan, Basingstoke, and St Martin's Press, New York.

Foley D. K. (2000): 'Recent developments in the labor theory of value', *Review of Radical Political Economics*, 32 (1), pp. 1–39.

Freeman A., Carchedi G. (eds) (1996): *Marx and Non-Equilibrium Economics*, Edward Elgar, Cheltenham.

Gerstein I. (1976): 'Production, circulation and value: the significance of the "transformation problem" in Marx's critique of political economy', *Economy and Society*, 5, pp. 243–91.

Kliman A., McGlone T. (1988): 'The transformation non-problem and the non-transformation problem', *Capital and Class*, 35, pp. 56–83.

Kliman A., McGlone T. (1999): 'A temporal single-system interpretation of Marx's value theory', *Review of Political Economy*, 11 (1), pp. 33–59.

Krause U. (1980): 'Abstract labour in general joint systems', *Metroeconomica*, XXXII, pp. 115–35.

Krause U. (1982): *Money and Abstract Labour*, Verso, London.

Lipietz A. (1982): 'The so-called "transformation problem" revisited', *Journal of Economic Theory*, 26, pp. 59–88.

Lipietz A. (1984): 'The so-called "transformation problem" revisited: a brief reply to brief comments', *Journal of Economic Theory*, 33, pp. 352–5.

Marx K. (1976): *Capital*, Vol. I, Penguin, Harmondsworth.

Marx K. (1981): *Capital*, Vol. III, Penguin, Harmondsworth.

Mohun S. (1994a): 'A re(in)statement of the labour theory of value', *Cambridge Journal of Economics*, 18, pp. 391–412.

Mohun S. (ed.) (1994b): *Debates in Value Theory*, Macmillan, Basingstoke.

Mohun S. (2000): 'New solution or re(in)statement? A Reply', *Cambridge Journal of Economics*, 24 (1), pp. 113–17.

Mongiovi G. (2002): 'Vulgar economy in Marxian garb: a critique of temporal single system Marxism', *Review of Radical Political Economics*, 34, pp. 393–416.

Morishima M. (1973): *Marx's Economics: A Dual Theory of Value and Growth*, Cambridge University Press, Cambridge.

Moseley F. (1991): *The Falling Rate of Profit in the Postwar United States Economy*, Macmillan, Basingstoke.

Moseley F. (1993): 'Marx's logical method and the transformation problem', in Moseley F. (ed.): *Marx's Method in 'Capital': A Reexamination*, Humanities Press, Atlantic Highlands, NJ.

Parys W. (1982): 'The deviation of prices from labour values', *American Economic Review*, 72 (5), pp. 1208–12.

Pasinetti L. L. (1973): 'The notion of vertical integration in economic analysis', *Metroeconomica*, XXV, pp. 1–29.

Pasinetti L. L. (1977): *Lectures on the Theory of Production*, Macmillan, Basingstoke.

Rubin I. I. (1972): *Essays on Marx's Theory of Value*, Black and Red Books, Detroit, MI.

Seton F. (1957): 'The transformation problem', *Review of Economic Studies*, 24, pp. 149–60.

Steedman I. (1977): *Marx After Sraffa*, New Left Books, London.

Wolff R. D., Roberts B., Callari A. (1982): 'Marx's (not Ricardo's) transformation problem: a radical reconceptualization', *History of Political Economy*, 14 (4), pp. 564–82.

Wolff R. D., Roberts B., Callari A. (1984a): 'Weaving a tangled web, the transformation of values into prices: a rejoinder', *History of Political Economy*, 16 (3), pp. 431–6.

Wolff R. D., Callari A., Roberts B. (1984b): 'A Marxian alternative to the traditional transformation problem', *Review of Radical Political Economics*, 16 (2/3), pp. 115–35.

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