TRYING TO HELP RESCUE VALUE FOR EVERYONE.

Nick.Potts@Solent.ac.uk

Abstract/Introduction.

Marginalisation of heterodox economic ideas in economics departments ensures that for these ideas to endure, develop, and hopefully have influence, they must be taken up, and understood, by a wide range of academics in the larger field of social science. We hope to bring the debate on value theory to a wider audience by attempting to summarise, at least some of the main points of the debate, in less demanding language and through use of a less demanding mathematical technique than is conventionally employed. We shall attempt to simply, but accurately, present the Simultaneous and Dualistic Interpretation of Marx, the New Interpretation of Marx, the Temporal Single System Interpretation of Marx and the Value Form position. Our purpose is not to suggest that these theories of value are either valid or invalid, but to stress how they imply very different views of how the economy works and, by implication, what issues we should focus on. Furthermore, and more controversially, we shall attempt to show how such different views fit with Marx's theory of the determination of value by labour-time and his comments on other theorists' conceptions of value. To enable the interpretations to be clearly contrasted, we shall employ a simple numerical example focusing on the question of accumulation and profitability.

What Is The Controversy?

In January 2006 in an article warning the UK academic community of the dangers of Marxism in *The Times Higher* Leszek Kolakowski asserted, without any further justification or recognition of possibility of error, (Kolakowski, 2006),

> 'Marx also predicted the collapse of capitalism as a result of a consistent fall in the profit rate. But this has not happened. This prediction was unlikely even in Marxist terms (technical developments that lower the part of variable capital in production costs lower the value of constant capital, so the profit rate can remain stable or increase even if the amount of work required to produce a given product declines). … Moreover, the labour theory of value has no explanatory power as there is no link between value and price and we cannot measure the value of any product in terms of the amount of labour needed to create it. This theory has no economic meaning: it can not predict or explain anything.'[1]

Kolakowski is in good company, in Brenner (1998), arguably the best known piece of political economy of recent times, Brenner rejects Marx's prediction of a tendency for the rate of profit to fall, 'scientifically' referring to Okishio's (1961) and Roemer's (1981) proofs of Marx's error. More encouragingly Desai (2002) suggests Marx may help us understand the process of globalisation, however in the small print we find the same acceptance that Marx's theory of value is subject to error/need for correction. Kliman (2007) records how, for a hundred years, starting with Bortkiewicz in 1906-07 (Bortkiewicz, 1952 and 1984), Marx's critics have asserted that Marx's theory of value is internally inconsistent. Furthermore Marxist economists, rather than challenging the accusation of internal inconsistency, have accepted it and corrected Marx's theory of value for its 'errors' in order to proceed as 'normal', as if Marx would have taken this 'sensible' direction if he had the mathematical ability to do so.

The 'problem' Bortkiewicz identified concerned Marx's 'Transformation of Commodity Values into Prices of Production' in Chapter 9 of Marx (1981). Marx assumes a set of input data, including implicit input prices, for five capitals/firms with different value compositions of capital (ratios of wages/variable capital to all other inputs, raw materials, machinery etc, collectively termed constant capital). From this data Marx works out the value produced by each capital. Marx now works out a set of prices of production, the value received/appropriated by each capital, which would equalise the rate of profit across the five capitals: no problem! Bortkiewicz, an admirer of Walras (Freeman, 1996), thought Marx's sequential calculation of the problem flew in the face of the 'superior' new tradition of simultaneous calculation (dominant in 'mainstream' economics) so 'corrected' it. Firstly Bortkiewicz reset the problem in the stationary environment of simple reproduction i.e. in an identically repeating model of the economy with no growth. Secondly, to maintain simple reproduction, the unit value of a commodity as an input (in terms of value produced and value received as expressed by price) must equal that commodity's unit value as output i.e. values must be calculated simultaneously. Thirdly produced values and received values/prices are considered as separate systems/concepts to reconcile together. Physical data/technical coefficients are used to calculate commodities' produced values in labour-time, and then a separate system of prices/value received in terms of money is calculated to equalise the five capitals' profit rates. After correction 'Marx's transformation problem' fails to add up! Depending on our choice of numéraire/relation between units of money and labour-time the dual systems can only be simultaneously tied together, in terms of either –

Total profit equalling total surplus value (Bortkiewicz's solution).
Total wages equalling the value of wage goods (Seton, 1957).
Total value equalling the price of total capital (Winternitz, 1948).

The point is either as opposed to Marx's claim to satisfy all three equalities, so Marx's theory of value must be internally inconsistent. Sweezy (1942) publicised Bortkiewicz's 'correction' as the best approach to adopt, rather than rejecting it, and simultaneous and dualistic (SAD) Marxism became 'mainstream' Marxism (see Desai, 1979 and 1990). Armed with simultaneous tools Okishio (1961) asserted the theorem that viable technological change (cost reducing at current prices) can never cause the 'uniform' profit rate to fall, in direct opposition to Marx's prediction of a tendency for the rate of profit to fall in times of accumulation/growth. Some SAD Marxists attempted to counter Okishio's theorem (Shaikh, 1978, Alberro and Persky, 1981, and Lipietz, 1986), with their simultaneous method leading them to counter it by trying to explain why the rate of profit in physical terms may fall in response to accumulation rather than rising. SAD Marxists' reliance on physicality was made clear by Steedman (1977), who argued their method amounted to prioritising a physical notion of value, just like Sraffa (1960), with value being a redundant concept through being perfectly proxied by physical terms. 'Corrected' Marx turns out to be physical Marx with a redundant concept of value. SAD Marxists, unable to satisfy all three of Marx's equalities in the transformation problem, sought to prioritise Marx's notion that surplus labour is the sole source of profit (Okishio, 1993). Holding to this central result, as Morishima (1973) termed it, the fundamental Marxist theorem (FMT), seemed to confirm their link to/logical 'improvement' of Marx's work. However, as Roemer (1981) made clear, employing Marx's theory of value is unnecessary to explain the FMT.[2]

In reaction to SAD Marxism a number of alternative approaches to/interpretations of Marx emerged in the 1980's. We shall focus on three, the New Interpretation (NI), the Value-Form position and the Temporal Single System Interpretation (TSSI) of

Marx. Foley (1982 and 1986) and Dumenil (1980 and 1983) separately developed the NI. The focus of attention is the net product i.e. total living labour input and the physical surplus over constant capital input (with constant capital cancelling out). To establish the monetary expression of an hour of living labour input the NI divides the nominal money expression of the net product by total living labour input. Within the net product produced values and received values/prices are no longer imagined as separate systems in terms of labour-time and money respectively. Net product variables can be measured in labour-time or money terms, with the NI's net product monetary expression of labour time making labour-time and money magnitudes commensurate within the net product. The money wages paid to labour determines the value in terms of labour-time of variable capital; as opposed to by SAD calculation where the value in terms of labour-time of variable capital depends on the labour-time objectified in the wage goods they consume and not on their money prices. The NI transformation problem preserves three equalities –

Total profit equals total surplus value.
Total wages equals the value of variable capital.
The price of the net product equals the total value added.

At the level of the net product value is back in business i.e. the NI's concept of value within the net product is internally consistent. For this to mean Marx's concept of value is internally consistent we must imagine that Marx was only concerned with the net product. But this would contradict Marx's (1981) illustration of the 'transformation problem', where he assumes the total price of capital must equal the total value of capital, not total value added equals the price of the net product.

The social-paradigm/abstract-labour approach/the Value-Form paradigm (Krause, 1982, Reuten, 1993, Arthur, 2001) focuses on value as a market/exchange phenomenon. Workers' individual 'concrete' labours are only seen to become abstract labour when the commodities they produce are actually sold in the market. Essentially focus is switched from prioritising the production of value/surplus value in production to the determination of value/surplus value through realisation/exchange in circulation (McGlone and Kliman, 2004). Value-Form theorists do not necessarily suggest their approach is in line with Marx's (Krause, 1982, Reuten, 1993), or, if they do claim to follow Marx, look to a novel interpretation of Marx (Arthur, 2001). The question of the internal consistency of 'Marx's' theory of value is thus 'out-flanked' by the Value-Form's different approach to value. We should note that prioritising value as a market phenomenon neither rules-in nor rules-out adoption of simultaneous or sequential calculation. The question is rather whether focus on value as a market phenomenon is an improvement on Marx's own notion that value is produced in production, and only potentially redistributed, not brought into existence, by price formation and subsequent exchange.[3] Marx (1976), pages 261-262,

> 'Hence we see that behind all attempts to represent the circulation of commodities as a source of surplus-value, there lurks an inadvertent substitution, a confusion of use-value and exchange-value. In Condillac, for instance: … Still, Condillac's argument is frequently repeated by modern economists, especially when the point is to show that the exchange of commodities in its developed form, commerce, is productive of surplus-value. … We might therefore just as well say that the buyer performs what is 'strictly' an 'act of production' by converting stockings, for example, into money.'

The TSSI of Marx neither claims to improve or modify Marx, it simply claims Marx actually employed a sequential approach and imagined prices and values within the same single system i.e. prices being sequentially dependent on values and values being sequentially dependent on prices (Freeman, 1996). Both values produced in production and prices/the value received or appropriated upon price formation at the end of production can be expressed in labour-time or money. Labour-time and money magnitudes are made commensurate through the TSSI's concept of the monetary expression of labour time (MELT) calculated at the level of total capital (not just the net product as in the NI). Centrally the TSSI claims that when Marx is 'properly' identified as having a sequential and non-dualistic method the apparent internal inconsistency identified by Bortkiewicz, through adjustment to SAD calculation, disappears, or rather were never there in the first place (Kliman, 2007). The 'transformation problem' is no longer a 'problem', all three of Marx's aggregate equalities hold (Kliman and McGlone, 1988) –

Total profit equals total surplus value.
Total wages equals the value of variable capital.
The total price of capital equals the total value of capital.

Marx's concept of value is internally consistent. Furthermore Marx's prediction of a tendency for the profit rate to fall in times of accumulation is confirmed by sequential and non-dualistic calculation, rejecting the 'physicalist' Okishio theorem (Freeman, 1999, Kliman, 1999a, Freeman and Kliman, 2000a and 2000b). Surplus labour is confirmed as the sole source of profit (Kliman, 2001, contested by Mohun, 2003, confirmed by Kliman and Freeman, 2006). The TSSI do not claim Marx's theory of the determination of value by labour time and the tendencies he reveals within capitalism through employing it are necessarily correct, they simple claim that they are not internally inconsistent i.e. they can not be simply ruled out as mere 'errors'.

The TSSI's claim to have re-awoken, from a century of misinterpretation, a consistent all-long Marx is thus a very strong and contentious claim. Kliman (2004 and 2007) justifies the TSSI's claim by employing the hermeneutic principle that a successful interpretation of a text's meaning is one, which, if possible, makes that text make sense. He explains by the criterion of coherence (Hirsch, 1967) how a genuine understanding of a text as a whole must reconcile the individual parts of that text together coherently as aspects of the whole. Kliman records how Stigler (1965) developed the principle of scientific exegesis, the application of the criterion of coherence to an analytical work, in debate with Barkai (1965 and 1967) over how the price of corn relates to its demand in Ricardo's theory. Stigler's principle of scientific exegesis states that an interpretation of an author which fails to deduce the author's main analytical conclusions from their definitions and premises, must be rejected as an invalid interpretation. If no interpretation can reconcile an author's premises and conclusions that author is likely to be internally inconsistent. However if an interpretation can deduce an authors conclusions from their premises it must be accepted as a valid interpretation of that author. The TSSI, in contrast to other 'interpretations' of Marx, precisely contend that their interpretation of Marx allows his conclusions to follow from his premises. Kliman (2004) explicitly identifies 13 of Marx's key conclusions and explains how the TSSI can deduce them all from their interpretation of his method, whereas alternative interpretations of Marx fail to do so. Kliman thus concludes, by hermeneutic criterion/Stigler's principle of scientific exegesis, that the TSSI of Marx best claims to represent Marx.

Accumulation and Profitability – A Common Base.

Space does not permit us to fully explore all the aspects of the theories of value we wish to consider. We shall employ a simple numerical example of the productive economy as a whole to focus on how the SAD approach, the NI and the TSSI consider accumulation effects the rate of profit. Our 'macro' analysis abstractly assumes only one type of commodity is produced by identical capitals (while labour-power, strictly speaking our second commodity, is reproduced). Employing a one-commodity model allows us to avoid the complexities of the SAD transformation problem i.e. simultaneously calculating the values and prices of a number of commodities and deciding upon which numeraire to tie our dual systems together with. Also for simplicity we assume all capital circulates each period i.e. we have no fixed capital. In our pure circulating capital model all constant capital input is entirely consumed each period, so assuming no stocks, total capital at the end of each period simply equals that period's total output.[4] With only one commodity monetary exchange need not occur, identical capitalists could use their own output as constant capital input and for their own personal consumption, while advancing wages in kind. To impose the realism of monetary exchange let us simply assume that all output must be sold at the end of each period; our capitalists can not use their own output as constant capital input or for consumption and must pay wages in money. We also abstract from the question of crisis and the existence of stocks by assuming at the end of each period our capitalists clear the market (directly by purchasing output for personal consumption and to apply as constant capital next period and indirectly by advancing wages to workers, who we assume entirely spend/do not save). Rather than modelling behaviour we shall simply exogenously set our initial period and following periods. In summary, we keep our abstract model as simple as possible so as to focus on how the theories of value we consider fundamentally differ in respect to how they predict accumulation effects profitability.

Each period our identical capitals combine constant capital input with living labour/labour power to produce an output of our single-commodity. We can either imagine that workers are paid (variable capital is advanced) at the start of the period (as we will for the TSSI) or at the end of the period (as we will for the SAD approach and the NI). We assume each period of production is followed by an instantaneous period of circulation, in which total output either changes hands between capitalists or is sold to workers by capitalists. Once instantaneous circulation is complete we begin the next production period. Table 1 records our common scenario, note £ represents nominal units of money, h represents hours of labour-time while ph represents physical quantities.

Table 1 – A Common Base.

Period	Constant Capital C			Labour Power L	Variable Capital V			Surplus Value S			Exploitation e
	£ = $C^{£}$	h = C^{h}	ph= C^{ph}	h = L^{h}	£ = $V^{£}$	h = V^{h}	ph= V^{ph}	£ = $S^{£}$	h = S^{h}	ph= S^{ph}	h = e^{h}
0	120		**20**	**60**	30		**5**			5	
1	120		**20**	**60**	30		**5**			5	
2	150		**25**	**60**	30		**5**			8	
3	198		**33**	**60**	30		**5**			11	
4	264		**44**	**60**	30		**5**			15	

Period	Total Capital = Total Output			Profit Rate *r*			Unit Value *v*	Nominal Unit Price P	End Period MELT Φ
	£ = $M'^{£}$	h = Y^{h}	ph= Q^{ph}	£ = $r^{£}$	h = r^{h}	ph = r^{ph}	h = v^{h}	£ = $P^{£}$	£/h = Φ
0	180		**30**	20.00%		20.00%		**6**	
1	180		**30**	20.00%		20.00%		**6**	
2	228		**38**	26.67%		26.67%		**6**	
3	294		**49**	28.95%		28.95%		**6**	
4	384		**64**	30.61%		30.61%		**6**	

There are many blank spaces in Table 1 as we only define our common scenario in physical and nominal money terms. The fact we assume labour power input, L^{h}_{t}, stays constant at 60 hours of labour-time each period, although relevant to our future calculation of labour-time magnitudes, is irrelevant to the physical and nominal money scenario we assume.[5] Table 1 thus expresses how we would view our simple economy if we had only a physical and a nominal money concept of value, as mainstream economics does. We initially assume simple reproduction in physical terms in Table 1. In simple reproduction capitalists consume the entire surplus physical product and apply unchanging levels of constant and variable capital input in physical terms each period. At the end of period 0 our capitalists consume the 5 units of physical surplus product and apply in period 1 20 physical units of constant capital and 5 physical units of variable capital for 60 hours of labour-time, just as they did in period 0. Assuming no technological change accompanies this stationary environment, period 1 output is identical to period 0 output in physical terms. Period 0 identically physically repeats itself in period 1. We thus start our scenario through employing the 'well-behaved' initial condition of simple reproduction.[6] Through assuming nominal money price remains constant at £6, as we shall assume throughout our scenario, period 1 is identical to period 0 in nominal money terms as well as physical terms.

Let us assume at the end of period 1 capitalists do not consume the 5 physical units of surplus product and alternatively increase their application of constant capital for period 2 to 25 physical units. We assume variable capital input stays constant at 5 physical units in return for 60 hours of labour-time from period 2 to period 4. Period 2 is now a period of maximum extended reproduction (MER); the economy is growing at its fastest potential rate in physical terms. MER continues in periods 3 and 4 as the preceding period's physical surplus product is entirely applied as additional constant capital input each period. We highlight in bold all the variables we exogenously set in our scenario, while figures not in bold simply follow from the variables we exogenously set. Physical surplus product (S^{ph}_t, with t simply representing a time-script i.e. relating to period t) and the rate of profit in physical terms (r^{ph}_t) are determined by exogenously setting constant capital, variable capital and total output in physical terms (C^{ph}_t, V^{ph}_t and Q^{ph}_t). Nominal money magnitudes simply follow from setting nominal money price. Note $C^{£}_t$ depends on the nominal money price at the end of the previous period ($P^{£}_{t-1}$) when constant capital is advanced (for the TSSI this also holds for $V^{£}_t$, as we assume wages are paid prior to the start of production) so we must also exogenously set a nominal money price for period 0-1, which we set at £6. Physical and nominal money profit rates are given by:

(1) $r^{£}_t = M'^{£}_t / M^{£}_t = P^{£}_t Q^{ph}_t / (C^{£}_t + V^{£}_t)$

(2) $r^{ph}_t = S^{ph}_t / (C^{ph}_t + V^{ph}_t) = (Q^{ph}_t - C^{ph}_t - V^{ph}_t) / (C^{ph}_t + V^{ph}_t)$

We have set physical quantities in Table 1 such as to ensure rising profitability in physical terms accompanies MER from period 2 to period 4. If we see the value of money as being defined by the prices of commodities that money can buy, keeping nominal money price constant at £6 throughout our scenario ensures nominal money magnitudes represent conventional ‘real-terms’. A mainstream economist concerned only with physical/‘real-terms’ would consider our simple economy in Table 1 to be highly successful, but will such a picture of health be confirmed when we consider our scenario in terms of labour-time? Before we calculate labour-time magnitudes by the alternative approaches we wish to consider we must recognise for all three approaches that total value produced must equal total value received/appropriated through our assumption of one-commodity/analysis at an aggregate level. With only one-commodity we have no transformation problem. Our single commodity cannot deviate in value produced and value appropriated as there is no other commodity available to match, thus facilitating, this deviation. We are purely focussing on the question of accumulation and profitability; will the three approaches confirm the Okishio theorem or not?

Simultaneous And Dualistic Marxism.

To calculate labour-time magnitudes by the SAD approach we must recognise its central assumption that a unit of physical input must have the same value in terms of labour-time and price in terms of money (the numéraire) as a unit of physical output. By keeping nominal money price constant at £6 we ensure input prices are equal to output prices in nominal money terms. To ensure the value in terms of labour-time of a unit of physical input equals the value of a unit of physical output:

$$v^h_t C^{ph}_t + L^h_t = v^h_t Q^{ph}_t$$

$$L^h_t = v^h_t(Q^{ph}_t - C^{ph}_t) = v^h_t(V^{ph}_t + S^{ph}_t) \qquad \text{as } Q^{ph}_t = C^{ph}_t + V^{ph}_t + S^{ph}_t,$$

(3) $$v^h_t = L^h_t / (Q^{ph}_t - C^{ph}_t) = L^h_t / (V^{ph}_t + S^{ph}_t)$$

(4) $$C^h_t = v^h_t C^{ph}_t$$

(5) $$V^h_t = v^h_t V^{ph}_t$$

(6) $$e^h_t = (L^h_t - V^h_t) / V^h_t = S^h_t / V^h_t$$

(7) $$r^h_t = S^h_t / (C^h_t + V^h_t)$$

With our commodity's unit value in terms of labour-time established simultaneously we now 'retrospectively' calculate each period's constant and variable capital input in labour-time terms, revealing the rate of exploitation of labour and the profit rate in terms of labour-time. We only need to know L^h_t, C^{ph}_t, V^{ph}_t and Q^{ph}_t, which we exogenously set in our scenario, to determine all labour-time magnitudes. With labour-time magnitudes established we can fill in the blanks in Table 1, producing Table 2 showing how the SAD approach views our simple scenario.

Table 2 – Simultaneous And Dualistic Marxism.

Period	Constant Capital C			Labour Power L	Variable Capital V			Surplus Value S			Exploitation e
	£ = $C^£$	h = C^h	ph= C^{ph}	h = L^h	£ = $V^£$	h = V^h	ph= V^{ph}	£ = $S^£$	h = S^h	ph= S^{ph}	h = e^h
0	120	120.0	**20**	**60**	30	30.00	**5**	30	30.00	5	100%
1	120	120.00	**20**	**60**	30	30.00	**5**	30	30.00	5	100%
2	150	115.38	**25**	**60**	30	23.08	**5**	48	36.92	8	160%
3	198	123.75	**33**	**60**	30	18.75	**5**	266	41.75	11	220%
4	264	132.00	**44**	**60**	30	15.00	**5**	90	45.00	15	300%

Period	Total Capital = Total Output			Profit Rate r			Unit Value v	Nominal Unit Price P	End Period MELT Φ
	£ = $M'^£$	h = Y^h	ph= Q^{ph}	£ = $r^£$	h = r^h	ph = r^{ph}	h = v^h	£ = $P^£$	£/h = Φ
0	180	180.00	**30**	20.00%	20.00%	20.00%	6.00	**6**	1.0
1	180	180.00	**30**	20.00%	20.00%	20.00%	6.00	**6**	1.0
2	228	175.38	**38**	26.67%	26.67%	26.67%	4.62	**6**	1.3
3	294	183.75	**49**	28.95%	28.95%	28.95%	3.75	**6**	1.6
4	384	192.00	**64**	30.61%	30.61%	30.61%	3.00	**6**	2.0

(8) $\Phi_t = M'^£_t / Y^h_t = P^£_t Q^{ph}_t / (C^h_t + V^h_t + S^h_t)$

Equation (8) determines the monetary expression of labour time (MELT, Φ_t) at the end of each period for our SAD system. The MELT is the number of units of money represented by one hour of labour-time. In simple reproduction in period 0 and period 1 we have constructed our scenario such that one unit of money equals one hour of labour-time. Increased productivity from period 2 to 4 (combined with our assumption of constant nominal money price) ensures MELT rises, the value of money in terms of labour-time falls. As such our SAD system is providing us with one piece of information that would be invisible to a conventional economist simply concerned with the value of money in 'real-terms' (which is constant throughout our scenario). Our SAD system apparently reveals the rate of exploitation of labour by revealing V^h_t and S^h_t, but simply dividing S^{ph}_t by V^{ph}_t would reveal the same rate of exploitation. Our scenario satisfies the Okishio theorem (Okishio, 1961); viable technological change (cost reducing at current prices) can never cause the 'uniform' profit rate to fall. With a constant physical variable capital input ('real-wage') unit cost reducing technological change increases the profit rate in labour-time terms, which is equal to the physical and the nominal money profit rate, from period 2 to 4. The rate of profit in labour-time terms, r^h_t, is perfectly proxied by the physical rate of profit, r^{ph}_t:

(7) $\quad r^h_t = S^h_t / (C^h_t + V^h_t)$ $\qquad$ But given by the SAD approach,

(4) $\quad C^h_t = v^h_t C^{ph}_t$

(5) $\quad V^h_t = v^h_t V^{ph}_t$

$$r^h_t = v^h_t S^{ph}_t / (v^h_t C^{ph}_t + v^h_t V^{ph}_t) = S^{ph}_t / (C^{ph}_t + V^{ph}_t) = r^{ph}_t$$

We should note the fact/special case that as we are analysing the economy at a aggregate level, through assuming a single-commodity, our SAD system satisfies all three aggregate equalities each period ($S^{£}_t/\Phi_t = S^h_t$, $V^{£}_t/\Phi_t = v^h_t V^{ph}_t$ and $M'^{£}_t/\Phi_t = Y^h_t$). As soon as we assume different types of commodities we enter the transformation problem, with SAD analysis being hampered by only being able to fulfil one of the aggregate equalities.[7] Although our SAD system fulfils all three aggregate equalities each period, from period 2 labour-time is lost between periods! In period 2 $C^h_2 = v^h_2 C^{ph}_2 = 4.62 \% 25 = 115.38$ and $V^h_2 = v^h_2 V^{ph}_2 = 4.62 \% 5 = 23.08$, a total of 138.46 hours of labour-time. However at the end of period 1 these same 30 units of physical output Q^{ph}_1, the physical representation of total capital through our assumption of no fixed capital, which becomes $C^{ph}_2 + V^{ph}_2$ by assuming MER, had a total value of 180 hours of labour-time. A simultaneous concept of value thus causes 41.54 hours of labour-time to disappear between the end of period 1 and the start of period 2. Value in terms of labour-time disappears between periods as soon as growth and increased productivity replace simple reproduction. Conversely, if productivity fell, value in terms of labour-time would mysteriously appear. C^h_t and V^h_t simply adjust each period to ensure value in terms of labour-time is perfectly proxied/made redundant by physical terms. Our SAD system is clearly dominated by physicality, as Steedman (1977) predicts. Our SAD system's concept of simultaneous valuation ensures each self-contained period has no memory of/connection to the previous period, other than a certain amount of physical objects must have existed at the end of the previous period so-as to exist at the start of the current period. All other past information is irrelevant.

To sum up, SAD concepts of value prioritise physicality; behind their concept of value lies an essentially physical view of the world. Such a view is accepted conventionally in mainstream economics, and in the heterodox world is well served by the Sraffian tradition. However we would suggest that it was not the view of Marx, who as early as Chapter One of Capital Volume 1 warns us against confusing value and physicality/use-value, Marx (1976) page 137,

> 'variations in productivity have no impact whatever on the labour itself represented in value. As productivity is an attribute of labour in its concrete useful form, it naturally ceases to have any bearing on that labour as soon as we abstract from its concrete useful form. The same labour, therefore, performed for the same length of time, always yields the same amount of value, independently of any variation in productivity. But it provides different quantities of use-values during equal periods of time; more, if productivity rises; fewer, if it falls.'

The New Interpretation.

Focus on the net product, NP, ensures we do not calculate our commodity's unit value in terms of labour-time by the SAD approach's equation (3), but by equation (9):

(3) $v^h_t = L^h_t / (Q^{ph}_t - C^{ph}_t) = L^h_t / (V^{ph}_t + S^{ph}_t)$

(9) $v^h_t = L^h_t / NP^{ph}_t$ But as,

$NP^{ph}_t = Q^{ph}_t - C^{ph}_t = V^{ph}_t + S^{ph}_t$

$v^h_t = L^h_t / NP^{ph}_t = L^h_t / (Q^{ph}_t - C^{ph}_t) = L^h_t / (V^{ph}_t + S^{ph}_t)$

We already know our NI system will share the same unit value in terms of labour-time of our one-commodity each period as our SAD system. For the NI variable capital in labour-time terms is defined by the wages paid to labour. We must divide

$V^{£}_{t}$ by the NI's net product monetary expression of labour time (MELT) established at the end of the period to find that period's variable capital input in labour-time terms:

$$(10) \quad \Phi_t = NP^{£}_{t} / L^{h}_{t} \qquad \text{so,}$$
$$V^{h}_{t} = V^{£}_{t} / \Phi_t \qquad \text{and} \qquad S^{h}_{t} = L^{h}_{t} - V^{h}_{t}$$

Capital's and labour's 'shares' of the net product are thus determined in labour-time terms. However as we exogenously set V^{ph}_{t} constant at 5 physical units each period, and the NI v^{h}_{t} is identical each period to the SAD v^{h}_{t}, $V^{h}_{t} = v^{h}_{t}V^{ph}_{t}$ is identical each period by NI or SAD calculation. As we assume L^{h}_{t} is constant at 60 hours of labour-time each period and NI or SAD calculation share the same V^{h}_{t} each period, S^{h}_{t} and e^{h}_{t} must also be identical each period by either approach. To find the rate of profit in labour-time terms we must, as with the SAD approach, re-value each period's constant capital input to its end-period unit value in labour-time terms, $C^{h}_{t} = v^{h}_{t}C^{ph}_{t}$. The rate of profit in labour-time terms, r^{h}_{t}, is still perfectly proxied by the physical rate of profit, r^{ph}_{t}:

$$(7) \quad r^{h}_{t} = S^{h}_{t} / (C^{h}_{t} + V^{h}_{t}) \qquad \text{But as,}$$
$$C^{h}_{t} = v_{t}C^{ph}_{t} \qquad \text{and} \qquad V^{h}_{t} = v_{t}V^{ph}_{t}$$
$$r^{h}_{t} = v_{t}S^{ph}_{t} / (v_{t}C^{ph}_{t} + v_{t}V^{ph}_{t}) = S^{ph}_{t} / (C^{ph}_{t} + V^{ph}_{t}) = r^{ph}_{t}$$

We do not need to produce a separate table recording how the NI views our scenario, as it would be identical to Table 2. Physical and nominal money terms are identical each period by our assumption of a common scenario, while C^{h}_{t}, V^{h}_{t}, S^{h}_{t}, e^{h}_{t}, Y^{h}_{t}, r^{h}_{t} and Φ_t are identical each period by NI or SAD calculation. Note the NI's calculation of a net product MELT by equation (10) appears different to equation (8), but:

$$(8) \quad \Phi_t = M'^{£}_{t} / Y^{h}_{t} = P^{£}_{t}Q^{ph}_{t} / (v^{h}_{t}C^{ph}_{t} + v^{h}_{t}V^{ph}_{t} + v^{h}_{t}S^{ph}_{t}) = P^{£}_{t} / v^{h}_{t}$$
$$(10) \quad \Phi_t = NP^{£}_{t} / L^{h}_{t} = P^{£}_{t}(V^{ph}_{t} + S^{ph}_{t}) / v^{h}_{t}(V^{ph}_{t} + S^{ph}_{t}) = P^{£}_{t} / v^{h}_{t}$$

As both approaches share the same $P^{£}_{t}$ and v^{h}_{t} each period, Φ_t must be identical by either approach each period. The unified physical profit rate/rate of profit in labour-time terms rises from period 2, from when productivity improvement commences, while the 'real-wage'/physical variable capital input remains fixed; our NI scenario also satisfies the Okishio theorem. In constrast to a SAD concept of value the NI's concept of value does not become internally inconsistent when we assume many types of commodities/enter the transformation problem. However at an aggregate level of analysis the NI offers no further insight into our scenario than the SAD approach, labour-time magnitudes are still perfectly proxied by physical magnitudes and labour-time still mysteriously disappear between periods. The NI shares the SAD approach's lack of memory/connection to the previous period. Last period's labour-time and money values are irrelevant to labour-time and money values this period.

We should note that as long as the unit labour-time value of inputs are re-valued to equal the unit labour-time value of outputs, whether through simultaneous calculation or through replacement cost valuation in a sequential approach (see Laibman. 1999a, 1999b, 2000a, 2000b), the result is the ultimately the same. Physical terms dominate, if the physical profit rate rises, the rate of profit in labour-time terms rises, thus fulfilling the Okishio theorem. In Laibman (2000b) we can clearly see how replacement cost valuation reduces the level of constant and variable capital applied in labour-time terms each period, despite continual growth each period, so as to force the rate of profit in labour-time terms to follow the physical profit rate up.

The NI's concern with the distribution of the net product between capital and labour leads us to focus on the capital-labour conflict. It is an easy step to assume that the capital-labour conflict is the dominant influence on the economic cycle, as conflict theories of inflation and the cycle contend (Goodwin, 1967, Rowthorn, 1977). We suggest that this focus reflects the times of the 1970's and 1980's when the capital-labour conflict did appear to be the biggest game in town. In contrast in Chapter 25 of Volume 1 of *Capital* (Marx, 1976) Marx argues that the rate of accumulation, as influenced by the rate of profit, is the biggest game of all. Wages and the rate of exploitation are seen to follow from the rate of accumulation rather than driving the rate of accumulation. Clearly if exploitation were to drop too low a crisis of profitability would occur. But in Chapters 13 and 14 of Marx (1981) it is accumulation itself rather than the potential counter-tendency of increased exploitation (not reduced exploitation) that causes the tendency for the profit rate in labour-time terms to decline, creating the inevitability of cyclical crisis. In contrast in our simple example of accumulation, the NI's treatment of constant capital ensures that the profit rate in labour-time terms rises identically with the physical profit rate (just as in our SAD example). Accumulation by raising the profit rate in labour-time terms is providing a benign environment for labour to potentially successfully increase their ‘real-wages’, while only potentially slowing, not reversing, the rise in the profit rate in labour-time terms. Accumulation in-itself is not a problem, we are back with the behaviour of workers and the influence of the level of unemployment on that behaviour as our central focus. Quite simply accumulation is potentially acting on the game/the direction of profitability in labour-time terms in precisely the opposite direction that Marx imagined. Finally focus on the net product may lead us view capital and labour as ‘partners’ ‘sharing’ the net product. Marx in contrast does not believe that workers share the results of their labour with capitalists, but are bought fair and square in bourgeois terms for the value of their labour power i.e. their cost of reproduction.[8] Marx (1976) pages 274-275, 677 and 731,

> ‘The value of labour-power is determined, as in the case of every other commodity, by the labour-time necessary for the production, and consequently also the reproduction, of this specific article. … His means of subsistence must therefore be sufficient to maintain him in his normal state as a working individual.’
>
> ‘What the worker is selling is his labour-power. As soon as his labour actually begins, it has already ceased to belong to him; it can therefore no longer be sold by him. Labour is the substance, and the immanent measure of value, but it has no value itself.’
>
> ‘The fact that this particular commodity, labour-power, possesses the peculiar use-value of supplying labour, and therefore of creating value, cannot affect the general law of commodity production. … The law of exchange requires equality only between the exchange-values of the commodities given in exchange for one another. … its result is:
> (1) that the product belongs to the capitalist and not to the worker;
> (2) that the value of this product includes, apart from the value of the capital advanced, a surplus-value which costs the worker labour but the capitalist nothing, and which none the less becomes the legitimate property of the capitalist;
> (3) that the worker has retained his labour-power and can sell it anew if he finds another buyer.’

The Temporal Single System Interpretation (TSSI) Of Marx.

Analysis at a one-commodity level will highlight the importance of the TSSI’s sequential nature but mask the significance of its non-dualistic nature/use of a single system. When defining our common base we pointed out how with only one-commodity we have no transformation problem. Our one-commodity cannot deviate in value produced and value appropriated as there is no other commodity available to match/facilitate this deviation. Within the TSSI’s single system the value in terms of labour-time of constant and variable capital inputs this period equals the money which is actually paid for them divided by the monetary expression of labour time (MELT) pertaining at the time of their purchase i.e. at the end of the previous period:[9]

(11) $C^h_t = C^£_t / \Phi_{t-1}$

(12) $V^h_t = V^£_t / \Phi_{t-1}$

Production now occurs with our single-commodity's produced unit value in labour-time terms given by equation (13). The TSSI MELT is established upon price formation at the end of production, before circulation purely redistributes commodities. In our one-commodity model we (still) calculate MELT by (8):

(13) $v^h_t = Y^h_t / Q^{ph}_t$

(8) $\Phi_t = M'^£_t / Y^h_t = P^£_t Q^{ph}_t / Y^h_t = P^£_t / v^h_t$

For period t-1 $\Phi_{t-1} = P^£_{t-1} / v^h_{t-1}$, so:

(11) $C^h_t = C^£_t / \Phi_{t-1} = P^£_{t-1} C^{ph}_t / \Phi_{t-1} = v^h_{t-1} C^{ph}_t$

(12) $V^h_t = V^£_t / \Phi_{t-1} = P^£_{t-1} V^{ph}_t / \Phi_{t-1} = v^h_{t-1} V^{ph}_t$

Let us be clear at a one-commodity level the unit value of inputs must equal their produced unit value last period, not because produced unit value last period supersedes appropriated unit value last period, but simply because produced unit value last period equals appropriated unit value last period.[10] With many types of commodities in the TSSI transformation 'problem' commodities may (are likely to, through the tendency for profit rate equalisation) deviate in produced unit value and appropriated unit value ($v^h_t \neq P^£_t / \Phi_t$). Inputs would deviate in value from their produced unit value last period ($P^£_{t-1} / \Phi_{t-1} \neq v^h_{t-1}$). For each capital value appropriated ($M'^£_t/\Phi_t$) may deviate from value produced ($C^h_t + V^h_t + S^h_t$). Each capital's appropriated value profit rate ($(M'^£_t/\Phi_t - M^£_t/\Phi_{t-1}) / M^£_t/\Phi_{t-1}$, where $M^£_t = P^£_{t-1}C^{ph}_t + P^£_{t-1}V^{ph}_t$) may deviate from their produced value profit rate ($S^h_t / (C^h_t + V^h_t)$). But, as in our one-commodity model deviations of appropriated value from produced value are impossible, we shall focus on value produced. Let us consider the profit rate in terms of labour-time, the SAD approaches equation (7) appears the same as the TSSI equation (14):

$$(7) \quad r^h_t = S^h_t / (C^h_t + V^h_t) = v^h_t S^{ph}_t / (v^h_t C^{ph}_t + v^h_t V^{ph}_t) = S^{ph}_t / (C^{ph}_t + V^{ph}_t) = r^{ph}_t$$

$$(14) \quad r^h_t = S^h_t / (C^h_t + V^h_t)$$

Recalling equation (13) and substituting in equations (11) and (12):

$$(13) \quad v^h_t = Y^h_t / Q^{ph}_t = (S^h_t + v^h_{t-1}C^{ph}_t + v^h_{t-1}V^{ph}_t) / (C^{ph}_t + V^{ph}_t + S^{ph}_t)$$

$$v^h_t C^{ph}_t + v^h_t V^{ph}_t + v^h_t S^{ph}_t = S^h_t + v^h_{t-1}C^{ph}_t + v^h_{t-1}V^{ph}_t$$

$$(15) \quad S^h_t = (v^h_t - v^h_{t-1})(C^{ph}_t + V^{ph}_t) + v^h_t S^{ph}_t$$

Following the TSSI, in contrast to the SAD approach and the NI, if $v^h_t \neq v^h_{t-1}$ the value of the physical surplus product in labour-time terms ($v^h_t S^{ph}_t$) will not equal surplus value in labour-time terms (S^h_t). Substituting (15), (11) and (12) into (14):

$$(14) \quad r^h_t = [(v^h_t - v^h_{t-1})(C^{ph}_t + V^{ph}_t) + v^h_t S^{ph}_t] / (v^h_{t-1}C^{ph}_t + v^h_{t-1}V^{ph}_t)$$

The profit rate in labour-time terms in our one-commodity model will not equal the profit rate in physical terms unless technology/productivity is constant i.e. $v^h_t = v^h_{t-1}$. Such divergence is made possible by the TSSI's sequential recognition that last period's values in labour-time terms effect this period's values in labour-time terms. Let us now calculate TSSI labour-time magnitudes for our common scenario. At the start of each period equations (11) and (12) calculate C^h_t and V^h_t. With L^h_t fixed at 60 hours of labour-time S^h_t simply follows from $L^h_t - V^h_t$, revealing e^h_t. At the end of production each period we calculate v^h_t by equation (13), r^h_t by equation (14) and Φ_t by equation (8).

Table 3 – The Temporal Single System Interpretation of Marx.

	Constant Capital C			Labour Power L	Variable Capital V			Surplus Value S			Exploitation e
	£ =	h =	ph=	h =	£ =	h =	ph=	£ =	h =	ph=	h =

Period	$C^{£}$	C^{h}	C^{ph}	L^{h}	$V^{£}$	V^{h}	V^{ph}	$S^{£}$	S^{h}	S^{ph}	e^{h}
0	120	120.00	**20**	**60**	30	30.00	**5**	30.0	30.00	5	100%
1	120	120.00	**20**	**60**	30	30.00	**5**	30.0	30.00	5	100%
2	150	150.00	**25**	**60**	30	30.00	**5**	32.6	30.00	8	100%
3	198	182.37	**33**	**60**	30	27.63	**5**	39.3	32.37	11	117%
4	264	217.64	**44**	**60**	30	24.73	**5**	48.8	35.27	15	143%

	Total Capital = Total Output			Profit Rate r			Unit Value v	Nominal Unit Price P	End Period MELT Φ
Period	£ = $M'^{£}$	h = Y^{h}	ph= Q^{ph}	£ = $r^{£}$	h = r^{h}	ph = r^{ph}	h = v^{h}	£ = $P^{£}$	£/h = Φ
0	180	180.00	**30**	20.00%	20.00%	20.00%	6.00	**6**	1.000
1	180	180.00	**30**	20.00%	20.00%	20.00%	6.00	**6**	1.000
2	228	210.00	**38**	26.67%	16.67%	26.67%	5.53	**6**	1.086
3	294	242.37	**49**	28.95%	15.41%	28.95%	4.95	**6**	1.213
4	384	277.64	**64**	30.61%	14.55%	30.61%	4.34	**6**	1.383

Through our use of a common scenario Table 3 is identical to Table 2 in nominal money and physical terms. The TSSI's sequential nature ensures in our one-commodity model that we must know end period 0-1 v^{h}_{t} and $P^{£}_{t}$ to calculate input values for period 0. We assume unchanging simple reproduction has occurred for all periods prior to period 0, so $v^{h}_{0\text{-}1}$ = 6 hours of labour-time and $P^{£}_{0\text{-}1}$ = £6. In period 0 and period 1 simple reproduction continues with constant technology/productivity. With period 0 $v^{h}_{t} = v^{h}_{t-1}$ and period 1 $v^{h}_{t} = v^{h}_{t-1}$ equations (11), (12) and (14) deliver the same C^{h}_{t}, V^{h}_{t} and r^{h}_{t} respectively each period as the SAD system's equations (4), (5) and (7). Period 0 and period 1 are identical in labour-time terms by SAD, NI or TSSI calculation. We have set our common scenario so accumulation, at its highest possible rate MER, begins in period 2 and continues until the end of our scenario in period 4. If we assumed productivity were constant so $v^{h}_{t} = v^{h}_{t-1}$ each period labour-time magnitudes would still be identical by SAD, NI or TSSI calculation. In contrast we have set Q^{ph}_{t} such as to ensure rising productivity/technological change accompanies MER in our common scenario. Rising productivity $v^{h}_{t} < v^{h}_{t-1}$ breaks equations (11), (12) and (14) equivalence to equations (4), (5) and (7); TSSI labour-time magnitudes will diverge from SAD or NI labour-time magnitudes.

The rate of profit in labour-time terms by SAD or NI calculation is tied to rising physical profitability from period 2 to period 4, but in sharp contrast the TSSI rate of profit in labour-time terms breaks free from the physical profit rate from period 2 to period 4. Equation (14) shows how the TSSI rate of profit in labour-time terms will fall below the physical profit rate as soon as $v^h_t < v^h_{t-1}$. In contrast to the SAD approach and the NI following the TSSI ensures hours of labour-time are no longer mysteriously lost between periods upon the commencement of technology change. At the end of period 1 $Q^{ph}_1 = 30$ with a value of 180 hours of labour-time. At the start of period 2 $C^{ph}_2 + V^{ph}_2 = 30$ and $C^h_2 + V^h_2 = 180$ hours of labour-time. From period 2 to period 4 the value in terms of labour-time of this period's inputs equals the value in terms of labour-time of last period's output as MER (applying all of last period's output as input this period) implies it should.

The rate of exploitation of labour does not rise in period 2 as it does by SAD or NI calculation. Workers have already been paid at the start of period 2 $V^£_2 / \Phi_{t-1} = 30$, money equivalent to 30 hours of labour-time, so any change in productivity would only potentially be relevant to their wage bargain for period 3. In period 2 a surplus value of 30 hours of labour-time is extracted from labour plain and simple, no matter the level of physical output at the end of the period. As we assume V^{ph}_t is constant at 5 physical units each period and L^h_t is constant at 60 hours of labour-time each period, the rate of exploitation of labour does rise in period 3 as, $v^h_2 < v^h_1$ so, $V^h_3 = v^h_2 V^{ph}_3 < V^h_2 = v^h_1 V^{ph}_2$. Rising exploitation thus acts, with a one-period lag, as a counter-tendency to falling profitability in labour-time terms. Likewise constant capital does cheapen, but not simultaneously within the same period. Although technological change begins in period 2, C^h_2 depends on $v^h_1 C^{ph}_2$ so does not cheapen in that period, rather $v^h_2 < v^h_1$ has effect at the start of the next period, period 3, $C^h_3 = v^h_2 C^{ph}_3$. We have the counter-tendencies described in Chapter 15 of Marx (1981), but the overall tendency, confirming Marx (1981) is for the rate of profit in terms of labour-time to decline. TSSI calculation clearly rejects the Okishio theorem and confirms Marx's original conclusion; we do have unit cost reducing technological change and a fixed 'real-wage' but profitability is falling in labour-time terms.

For our one-commodity model SAD and NI calculation of labour-time magnitudes differs from TSSI calculation of labour-time magnitudes, not by mathematical error, but due to the approaches differing concepts of value. We suggest value theorists should focus on contrasting their preferred concept of value to other concepts of value, rather than seeking to prove that it is only their own concept of value, which is mathematically correct. We have seen how our SAD and NI systems essentially share mainstream economics' physical concept of value and thus offer no greater insight into our scenario than mainstream economics would. Only the TSSI presents us with a different insight into our scenario than a pure physical insight, a labour-time perspective the very perspective Marx chose to develop in-order to understand capitalism.

Following the TSSI money expressions and labour-time expressions are commensurate i.e. any variable expressed in money may be adjusted by the appropriate MELT to be expressed in labour-time and any variable expressed in labour-time may be adjusted to monetary expression by the appropriate MELT. In this sense we do not need to say value in terms of labour-time, just value will do, as value in terms of labour-time or money, when adjusted by the appropriate MELT, is the same. However, we do not directly observe monetary expressions already adjusted by appropriate MELTs, we can only observe nominal money expressions. So the question remains as to how value magnitudes (in labour-time or money adjusted by MELT) and nominal money magnitudes may be related. Kliman (1999b) argues that accumulation and accompanying technological change, causing the rate of profit in labour-time terms to decline, will, by ensuring commodities' unit values in terms of labour-time fall, create a deflationary trend (reducing prices or the rate of inflation). Such a deflationary trend will ensure that the nominal money profit rate will tend to follow the rate of profit in labour-time terms down. We believe that much research informed by the TSSI of Marx's concept of value remains to be done on how the productive economy and the monetary/financial system may be related.[11]

Conclusion.

Our paper aims to bring aspects of the often highly technical and heated debate on value theory to a wider audience. We do not suppose that our paper is an 'easy' read, but through use of numerical examples and avoidance of complicated mathematical techniques, we hope that it is comprehensible to all those interested in Marx's work. We cannot pretend to be neutral between approaches. We accept the hermeneutic principle that, as the TSSI of Marx confirms Marx's central arguments, those arguments cannot be rejected as simple errors by other approaches, which contend that Marx's concept of value is inconsistent after they have adjusted it to their own mathematical approach/actually created a different concept of value. Furthermore we contend that Marx's concept of value is entirely central to his conception of capitalism. This is not to say that Marx was necessarily right, but rather we cannot really understand what Marx was attempting to do if we rule out his central methodological tool/innovation as invalid from the start.

Nick.Potts@Solent.ac.uk April 2007

Endnotes.

1. In the introduction to Marx (1981) Mandel does contend that Marx predicted the eventual 'economic' collapse of capitalism, citing Marx (1976) pages 929-30 as textual support. However, as Kliman (2007) makes clear, examination of this text fails to reveal a collapse theory but rather, a prediction that capitalism's centralising tendencies, alongside the growing revolt of the working class, will produce a social revolution. Kliman (2007) explains how Marx did imagine that profitability would have a tendency to decline in times of accumulation, but that it would be restored through recurrent crises.

2. The validity of the FMT has been subsequently questioned, firstly in the context of joint production (Steedman, 1977), and more recently without joint production i.e. with each industry producing a single product (Kliman, 2001 and 2007).

3. We agree with Izquierdo (2006) that Laibman's (1992, 1999c) desire to drop the productive/unproductive labour distinction undermines Marx's theory of value (but do not entirely agree with Izquierdo's definition of productive and unproductive labour). Potts (2006) explains how Marx's theory of value implies a certain definition of what is 'productive' and 'unproductive' labour. If we specify for any particular purpose a different definition of 'productive' and 'unproductive' labour (like Harvie, 2006) we thus lose any coherent link to Marx's theory of value and the inherent tendencies within capitalism Marx identifies precisely through employing his theory of value.

4. Abstracting from fixed capital ensures we do not introduce multiple commodities into our one-commodity model by imagining that different vintages (ages) of fixed capital represent different commodities/vary in use-value. Alternatively we could preserve our assumption of a single commodity by assuming our commodity is everlasting when it is applied as fixed capital so that newly produced units of our identical commodity remain identical in use-value over time.

5. We assume L^h_t and all other labour-time magnitudes are in units of average socially necessary simple labour-time (with no specific skill and average intensity, put to work under socially average conditions of production).

6. If initial simple reproduction is to be considered as an 'arbitrary' initial condition (Mongiovi, 2002) then it is equally arbitrary for all three of the approaches we consider, while our focus is not on this 'uncontroversial' initial situation but on the differences between approaches that emerge when we leave this stationary world behind.

7. New 'improved' simultaneous and dualistic interpretations of the transformation problem, such as Loranger (2004), may appear to satisfy all three equalities, but only upon the pain of introducing further assumptions/restrictions to the 'solution'. Kliman (2007) demonstrates how Loranger's 'solution' cannot always satisfy all three equalities unless prices and money wages are, when required, allowed to be negative!

8. Marx normally assumes for analytical convenience that wages equal the value of labour power. In contrast, when considering the process of capitalist accumulation as a whole in Chapter 25 of Marx (1976), he considers the very real possibility that wages may drop below the values of labour powers.

9. To be precise the value of an input to the production process is defined by its price/monetary expression when it enters production divided by the MELT holding at that time. Stocks may not enter production until many periods after purchase, with a possibly different price than their original purchase price. See Potts (2004) for further discussion on how to treat stocks in the TSSI of Marx.

10. Critics of the TSSI such as Veneziani (2004) miss the point by claiming that the TSSI simply collapses produced values onto appropriated values; it is not an

assumption but a consequence of aggregate analysis respecting Marx's conceptual intention.

11. Research, we believe that is precisely hampered by non-TSSI authors failure to accept the TSSI's concept of value as a valid concept of value, ensuring TSSI authors have to devote their time to repetitively answering the same criticisms. The debate appears stuck, with non-specialist onlookers wondering what on earth is going on behind the confusing language and often-impregnable mathematical analysis e.g. Loranger (2004).

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