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Simultaneous and Temporal Valuation Contrasted

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ABSTRACT

This joint paper was presented to the Marx International II conference in Paris, 30th September-2nd October 1998. It sets out the principal propositions of the Temporal Single System Interpretation of Marx's theory of value in a systematic and comprehensive way, making it a reference document of this school of thought. It establishes many theorems that underpin subsequent debates, for example

- (1) An early systematic refutation of the Fundamental Marxist Theorem (FMT) for the simultaneous interpretation and a demonstration that this yields negative profits with positive surplus value under quite normal conditions of capitalist reproduction;
- (2) An explanation of why simultaneous valuation cannot support Marx's theory of the tendency of the rate of profit to fall whilst temporal valuation does;
- (3) A demonstration that under simultaneous valuation, the value of the product is not in general equal to the time of labour whereas under the temporal interpretation it is always so.

The remainder of this paper is taken directly from the original except where defunct web links have been amended or removed. The original abstract has been included as part of the paper.

Keywords: Value; TSSI; temporalism; rate of profit; Marx; MELT; Okishio

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Simultaneous and Temporal Valuation Contrasted

Andrew Kliman and Alan Freeman, March 14, 1999

ABSTRACT

Contrary to popular belief, under simultaneous valuation – the universal official definition of value – exploitation (surplus-labor) is neither necessary nor sufficient for profit to exist. Surplus-labor cannot therefore be the sole source of profit, if the official definition of Marx's values is accepted.

We show this, and then present an alternative interpretation of Marx's value theory – the “temporal single-system” interpretation, according to which exploitation is indeed the sole source of profit, that is, it is a necessary and sufficient condition for profit. We also show that other important “errors” attributed to Marx no longer exist under this interpretation.

A universal claim of economics – that simultaneous valuation represents Marx's own value theory – is invalidated by these two findings. All conclusions and debates concerning “Marx's” theory that have hitherto been treated as settled must therefore be re-examined, since they apply not to Marx's theory but to a different theory, advanced in the 20th Century in a continuous tradition passing from von Bortkiewicz, via Sweezy, Seton, Morishima, and others to Sraffa and his successors. This tradition is a valid contribution to economics, but it is illegitimate to conclude from its acknowledged defects that Marx's own theory is erroneous, inadequate, flawed, or superseded.

On the other hand, many of the most puzzling yet empirically evident features of modern capitalism are explained better than by such value categories. These include cyclic crisis as an endogenous consequence of accumulation, growing inequality between nations, the social regress which generally accompanies technical progress, and liquidity preference, re-interpreted as a dynamic consequence of value movement in a money economy.

Economics' refusal to discuss – indeed, its effective suppression of – a coherent theoretical approach which successfully interprets real-world phenomena that mainstream theory cannot account for, means that it cannot be considered a scientific discipline and its claims to authority as a source of objective truth cannot be accepted.

PREAMBLE

We thank the Marx International II conference for the chance to speak, and warmly invite its participants to the fifth conference of the International Working Group on Value Theory on March 12th-14th, 1999, in Boston. It is a pluralist event and all contributions generally related to value are welcome; in particular, you don't have to agree with this paper. Indeed, if you disagree, it is all the more important to hear your views. Our web page www.greenwich.ac.uk/~fa03/iwgvf is also open to contributions.¹

We wrote this paper in two separate sections but much of it represents our joint view. The first section supplies the critique of the exploitation theory proposed by simultaneous valuation and was mainly written by Andrew Kliman; the second explains the temporal-single-system approach and its relation to the simultaneist paradigm in general; it was mainly written by Alan Freeman. Though any errors are our own, it is the fruit of a long collaboration with many others whose views are often suppressed or ignored by official economics. We acknowledge particular debts to Alejandro Ramos, Eduardo Maldonado-Filho, Ted McGlone and Paolo Giussani. To assist the harassed reader we begin with the conclusions of each part, and then proceed to the argument.

SUMMARY OF CONCLUSIONS OF THE FIRST PART

Due to their static character, simultaneist interpretations of Marx's value theory grant value no role in explaining the dynamics of capitalism. Although proponents of simultaneist interpretations have acknowledged this, they seem untroubled by it. They contend that the "core of the explanatory power of the labor theory of value lies in the analysis of exploitation" rather than the dynamic analysis (Duménil and Lévy (1997:16)) and, invoking the FMT and similar theorems, they have argued that their interpretations do imply that exploitation of workers is the sole source of profit.

This paper demonstrates, to the contrary, that simultaneism and the exploitation theory of profit are incompatible. The FMT holds only when all physical surpluses are positive (or profit rates are equal) in every period, and similar theorems pertaining to more recent simultaneist interpretations hold only when the aggregate price of the net product is positive in every period — *no matter how brief the period*. These conditions are shown to be implausible and completely unnecessary for reproduction. A choice between simultaneous valuation and the exploitation theory of profit must therefore be made.

Marx's value theory thus seems to be far more of a "package deal" than has hitherto been recognized. The attempts to fragment it into dynamic and static aspects, and to reject the former while embracing the latter, have not succeeded. When his value theory is given a static interpretation, not only do his explanations of dynamic issues, such as the tendency of the profit rate, seem to be false, so does his explanation of the origin of profit, a putatively static issue. Conversely, the temporal single-system interpretation, which vindicates the internal consistency of his value theory in other respects, also vindicates the logical coherence of the exploitation theory of profit.

¹ This site is no longer operational. Many original papers dealing with the TSSI can be found at the web site of the International Working Group on Value Theory (IWGVT) which has moved to www.valuethory.org. Remaining papers of archival value are housed (at the time of depositing this paper) in the Repec repository where they can be accessed via <http://ideas.repec.org/e/pfr102.html>, or in a more organised manner via www.londonmet.academia.edu/AlanFreeman - AF

SUMMARY OF CONCLUSIONS OF THE SECOND PART

The temporalist and simultaneist (equilibrium) paradigms

- (1) Most of this section explains the *Temporal Single-System* (TSS) approach. This results in a distinct definition of value, and hence a distinct definition of all other substantive categories of economics
- (2) We argue that this belongs to a distinct *paradigm*, the temporal or non-equilibrium paradigm, which is a minority, heterodox wing of more or less every branch of economic theory: Post-Keynesian macroeconomics, process or recursion theory in econometrics, Austrian and neo-Austrian marginalism, monetary circuit theory, and so on.
- (3) The distinctive feature of temporalism is, quite simply, that it supposes the past produces the future. More concretely, it defines its objects without presupposing any fixed relation between them. Above all, it does not presuppose a stationary state economy in order to deduce the fundamental categories of price, value, profit, or money.

Equilibrium: a Platonic ideology

- (4) Temporalism stands opposed to the dominant tradition in economics which we term the *simultaneist* or *equilibrium* paradigm: the ISLM interpretation of Keynes, simultaneous equation econometrics, Walrasian general equilibrium, monetarist and quantity-theory analysis of money, and so on.
- (5) The function of simultaneism is not reducible to a particular model or explanation: it constitutes an ontological system: a *definition of what is*. Above all, it approaches this by eliminating motion; it seeks to define the objects that we study by asking what they would be like, if they never changed.
- (6) This ontology, which has its origin in the method of Plato, substitutes an *ideal* system for the real world. It claims that this ideal system represents the world. In consequence, it becomes impossible to theorise crisis or imperfection in the market, which is perfect by definition. Any imperfection must therefore result from 'outside' interference: from exogenous factors, imperfections, adjustments, or shocks. These are the names which economics reserves for the things that it cannot explain: *by definition* they are not the product of the market, but a deviation from it. The market therefore, *by definition*, cannot violate the conditions for its own existence. This ideological function is the prime reason for simultaneism's dominance.
- (7) The dominance of simultaneism makes economics a retrogression compared to all true sciences, which have progressed to the temporal paradigm: the Copernican concept in Astronomy, the laws of motion of Physics elaborated by Galileo, Newton and Einstein, the atomic concept in chemistry, the evolutionary concept in biology, and so on. Simultaneism is Creationist Economics.

The use-value concept of value and its relation to simultaneism

- (8) The concept of value towards which all vulgar economics is drawn, as a result of commodity fetishism, is the idea that the measure of production is *use-value*; the size of a thing. Faced with the dual aspect of the commodity defined by Marx, who clearly distinguished exchange-value from use-value, they impose an immediate and violent unity between these two aspects and seek to *measure and define the value of goods in terms of their quantity*: that which Marx termed 'riches' as opposed to 'wealth'.

- (9) It is impossible to derive a coherent and consistent use-value concept of value, except in equilibrium. The relation of the simultaneist paradigm to the value concept is therefore the following: it provides a logically-coherent value concept rooted in use-value.
- (10) The unscientific character of this value concept is the following: it does not, and cannot, describe or approximate to reality. In particular, it cannot describe a reality in which there is systematic secular change – in particular, inflation and technical change. Temporal calculation in systems undergoing secular change leads to systematically different results, in many cases *directly* opposed to the results which economics takes for granted.

Physicalist and Marginalist variants of the use-value concept of value

- (11) The use-value concept in economics takes two forms, representing the two aspects of use-value. It is no more possible to separate the use of a thing from its body, than to separate the body of a thing from its use. Despite the violence of the dispute between marginalist and physicalist schools, We argue that they share a common value concept.
- (12) We do not deny the scientific merit of this dispute, which, as Sraffa intended, demonstrates the contradictions that arise from a one-sided presentation of use-value as pure utility. The basis of this demonstration is precisely the unity of the two aspects of use-value. But any subsequent attempt to ground an alternative concept in the purely physical being of the commodity is equally one-sided. For this very reason it does not establish an adequate alternative value concept.
- (13) We define the specific combination of simultaneous paradigm with a use-value value concept to be the essence of the neoclassical concept of value. When we refer to a ‘neoclassical value concept’ this is what we mean. It is not intended as a term of abuse, but as a precise, scientific characterisation; as a definition of a coherent set of logical presuppositions or axioms, which we must entertain if we are to think with this value concept, and which must be found in the world if this value concept is to apply to reality.

Neoclassical Marxism

- (14) The evolution of the Marxist wing of economics, from Bortkiewicz onwards, has been to perfect an interpretation of Marx *as if he were promulgating a neoclassical value concept*. In particular, all simultaneist versions of Marx, it can be shown, yield a use-value measure of value when time is introduced.
- (15) Therefore, Marx’s actual contribution to economics, whether wrong or right, has never been assessed by economics. Instead it has discussed – and dismissed – a *neoclassical Marx*; the economists have attempted to understand, and indeed, for three generations have promulgated, their own concepts as if they were Marx’s. The contradictions and errors that they discover arise, not from Marx’s value concept but from the neoclassical value concept.
- (16) We therefore find that, in economics *two value systems* stand opposed to each other, namely, the use-value concept, which is rendered coherent only by the simultaneist paradigm, and the temporal paradigm, which is rendered coherent only by the labour-value concept. But the labour-value concept in its temporal form has never been assessed by economics. To this extent it cannot possibly conduct itself as a science, since it completely excludes an entire theoretical account which, moreover, explains most of the real phenomena that it cannot itself account for.

What is to be done?

- (17) Because it is an ideology in constant conflict with the real world, economics is in a constant state of crisis which is at this moment particularly sharp. This crisis produces a constant flux of ideas which break and fragment away from the neoclassical value concept, and are then re-absorbed within it, or destroyed.
- (18) Individual contributions and insights which result from such breaks can and do possess genuine scientific merit, either in that they succeed in explaining things that happen in the world, or that they develop concepts which do not depend on a Platonic ontology.
- (19) Nevertheless, economics consistently demonstrates that because of its social function and organisation, it will not permit any complete theoretical development beyond individual insights.
- (20) The method by which economics prevents such a complete development cannot be reduced to the bad practices of its organisers; it is a church, and the only way to reform a church is to deprive it of secular power. It is in fact the *simultaneist paradigm itself*, as a method of conducting and organising discussion, which prevents any coherent theoretical development. This can be seen from the practices of many past debates among heterodox but simultaneist currents, who constantly fragment and frequently fight among each other with more vigour than they fight the mainstream, around issues that seem to resemble ancient debates about the number of angels that can dance on a pin.
- (21) This fragmentation derives precisely from the substitution of the methods of neoclassical debate for genuine scientific discourse, and the way that this intersects with the organisation of the economics profession. Instead of argument with respect to *evidence*, simultaneism substitutes argument with respect to *authority and pure logic*. The attempt which is made by each dissident school, therefore, is to set itself up as a unique source of authority, with graduate schools, professorships and prizes. But this necessarily sets it against all other schools. Since every such individual school necessarily offers one-sided and partial insights, and since the funders of economics in any case always promote the more comfortable, equilibrium variants in each school, the apparatus of the economics profession works very effectively to prevent the evolution of science.
- (22) The alternative requires what we term *critical pluralist engagement*; a genuine confrontation in which each is prepared to examine, and confront, the concepts of the other *without eliminating them a priori as logically illegitimate*.
- (23) This is not a post-modernist view. We do not argue that all points of view are equally valid or that no criterion of truth exists. We argue, however, that the question of validity, and the question of truth, *may not be settled from within the profession of economics*. The practice of heterodox economics should aim at making all the various points of view, and their conclusions, available to the general public: to restore to the public the right to make its own judgements on matters of economic theory and policy. This is not merely a scientific, but a democratic duty.
- (24) The simultaneist paradigm militates against critical pluralism. Simultaneist thinking finds it very hard to conceive that it may be possible to think about the world differently, and reacts very violently against temporal alternatives, for the reasons given above. This leads us to conclude that the principal task, in developing a scientific alternative, is to develop an effective and pluralist

dialogue between temporalist currents. We agree with the ‘Weintraub-Davidson-Eichner’ project to create such a dialogue but with one obvious amendment: hitherto there has been no temporalist Marxism. Now there is, and it should both be included, and seek to be included.

- (25) We do not argue to exclude or denounce simultaneist ideas from this dialogue. The problems arise only because simultaneist thinkers systematically tend towards solipsism: to argue as if their own way of conceiving the world were the only one possible. This makes it very hard to hold a discussion. We propose only, therefore, that there are certain rules of discourse which we need to establish, to prevent a recourse to tradition, logic and authority as a substitute for genuine open engagement.

SIMULTANEOUS VALUATION VS. THE EXPLOITATION THEORY OF PROFIT

INTRODUCTION

Despite their other differences, all interpretations of Marx’s value theory agree that it identifies the exploitation of workers, i.e., the extraction of surplus-labor, as the sole source of profit. Proponents of the various interpretations, moreover, all claim to have replicated this feature of his value theory. Yet the mathematics of their systems often tells a different story. As we will show, in those systems in which the prices and values of inputs are determined simultaneously with the prices and values of outputs, the extraction of surplus-labor is insufficient and, generally, unnecessary for the existence of positive profit. In these “simultaneist” interpretations, then, surplus-labor is not the sole source of profit.

It is well known that, when joint products are produced, the standard interpretation is incompatible with Marx’s theory of profit (see Steedman (1977)). As section 1 will show, however, even without joint production, all simultaneist interpretations (not only the standard one) are incompatible with his theory.ⁱ

Because theorists have failed to study the problem in a general setting, this incompatibility has not received attention. In some special cases — those in which, in every period, a positive physical surplus of every good is produced or the aggregate price of the net product is positive — simultaneist interpretations do imply that surplus-labor and positive profit go hand in hand. Yet section 2 will demonstrate that this result cannot be generalized. We will argue, moreover, that these special cases impose conditions that are much more restrictive and less plausible than is usually thought. In particular, economies can easily reproduce themselves physically without fulfilling either of these conditions.

Even under the most general conditions, on the other hand, surplus-labor becomes both necessary and sufficient for positive profit once simultaneous valuation is eschewed. This will be shown in section 3. Section 4 contains a brief summary and conclusion.

THE INCOMPATIBILITY

The Fundamental Marxian Theorem

In the standard interpretation of Marx’s value theory, distinct price and value systems exist, and the inputs and outputs in each are valued simultaneously. Another distinctive feature of this interpretation

is that it construes wages in the price system as the price of the wage goods workers receive, and wages in the value system as the value of these wage goods.

Employing this interpretation, Okishio (1993a, 1993b) discovered a set of theorems which Morishima (1973) later dubbed the “fundamental Marxian theorem” (FMT). The FMT is often said to have shown that surplus-labor is necessary and sufficient for positive profit when no joint products are produced (see, e.g., Howard and King (1994, pp. 230, 239)). Yet the FMT relies crucially on a very restrictive condition: in every period, a positive physical surplus of every good is produced.ⁱⁱ

Physical surplus is output net of both consumed inputs and workers’ consumption, and, in this interpretation, profit is simply the vector of physical surpluses valued at end-of-period (replacement) prices. Using the usual input-output notation,ⁱⁱⁱ the column vector of physical surpluses is

$$\mathbf{f} = (\mathbf{I} - \mathbf{A} - \mathbf{b}\ell)\mathbf{x},$$

so profit is
$$\pi = \mathbf{p}\mathbf{f} \tag{1.1}$$

where \mathbf{p} is a row vector of unit prices. Unit values are defined as the row vector of vertically integrated labor coefficients λ , so surplus-labor, s , is the living labor extracted minus the value of wage goods: $s = \ell\mathbf{x} - \lambda\mathbf{b}\ell\mathbf{x}$. But since $\lambda = \ell(\mathbf{I} - \mathbf{A})^{-1}$, it follows that $\lambda(\mathbf{I} - \mathbf{A}) = \ell$ and thus that $\ell\mathbf{x} = \lambda(\mathbf{I} - \mathbf{A})\mathbf{x}$. Surplus-labor can thus be expressed as $s = \lambda(\mathbf{I} - \mathbf{A})\mathbf{x} - \lambda\mathbf{b}\ell\mathbf{x} = \lambda(\mathbf{I} - \mathbf{A} - \mathbf{b}\ell)\mathbf{x}$, or simply as

$$s = \lambda\mathbf{f} \tag{1.2}$$

In the standard interpretation, then, profit and surplus-labor are simply the same vector of physical surpluses valued in two different ways. When all elements of \mathbf{f} are positive, i.e., when a positive physical surplus of every use-value is produced, it is obvious that the FMT holds. Both π and s must then be positive, given only that no prices or values are negative and that some of both are positive. Because all physical surpluses are positive, it does not matter that prices and values differ, or by how much; a set of strictly positive physical surpluses valued according to either must be positive.

It is, however, equally obvious that the FMT fails to hold unless all physical surpluses are positive. Once there is a negative physical surplus of some good, it matters that values and prices differ. The total “worth” of the physical surplus vector can then be negative when valued at prices and positive when valued at values, or vice-versa.^{iv} Assume, for instance, a two-good economy, in which $f_1 = -1$ and $f_2 = 2$. If $\lambda_1 = 19$ and $\lambda_2 = 10$, then $s = 19(-1) + 10 \cdot 2 = 1$. Yet if $p_1 = 21$ and $p_2 = 10$, then $\pi = 21(-1) + 10 \cdot 2 = -1$. If, however, $\lambda_1 = 21$ and $p_1 = 19$, then $s = -1$ but $\pi = 1$. This proves that, under the standard interpretation, surplus-labor is neither sufficient nor necessary for profit to exist.

“New Interpretation” and Simultaneous Single-System Interpretations

In the past two decades, other simultaneist interpretations of Marx’s value theory have also emerged. In the context of the present paper, the key difference between the standard interpretation, on the one hand, and both the “New Interpretation” (e.g., Duménil (1983), Foley (1982)) and the simultaneous single-system interpretations (e.g., Lee (1993), Moseley (1993), Ramos and Rodriguez (1996)), on the other, concerns their definitions of wages and surplus-labor.

Rather than defining wages as the price or value of wage goods, the latter interpretations construe wages as the sum of money paid to workers. To assess whether surplus-labor is extracted, money wages are converted into the equivalent sum of labor-time (or living labor is converted into a monetary

equivalent). The ratio of the aggregate net product, $(I - A)x$, valued at end-of-period (replacement) prices, to living labor,

$$s = p(I - A)x / \ell x \quad (1.3)$$

is used to convert monetary sums into labor-time sums. I call this ratio s to indicate the “simultaneist monetary expression of labor-time.” It is alleged to be the ratio between the monetary and labor-time measures of value added.

In these interpretations, profit is thus defined as the vector of physical net products, valued at end-of-period prices, minus the wage bill:

$$\pi = p(I - A)x - w\ell x \quad (1.4)$$

where w is the money wage per unit of living labor extracted, and surplus-labor is defined as living labor minus the labor-time equivalent of the money wage:

$$s = \ell x - (1/s) w\ell x \quad (1.5)$$

Multiplication of (1.5) by s yields $ss = s\ell x - w\ell x = p(I - A)x - w\ell x$, or, equivalently,

$$\pi = Ss \quad (1.6)$$

This result has led proponents of the “New” and single-system interpretations to claim that they yield an exact correspondence between surplus-value and profit. Not only is surplus-labor necessary and sufficient for positive profit, but the magnitudes of surplus-labor and profit are strictly proportional.

Yet it simply does not follow from this proportionality that surplus-labor is sufficient for positive profit. Indeed, it is not sufficient. Equation (1.3) implies that, if the net product valued at end-of-period prices is negative, then so is s . Profit is therefore negative although surplus-labor is positive.

Another perverse implication of these interpretations is that, when the price of the net product and therefore s are negative, equation (1.5) implies that a fall in the money wage rate will lead to a fall, rather than a rise, in the amount of surplus-labor extracted! This paradox, like the one above, discloses a serious conceptual flaw in the claim that the price of the net product is, by definition, the monetary value added by living labor.^{vi}

The proportionality of surplus-labor and profit also fails to imply that surplus-labor is necessary for profit to exist. As Dmitriev (1974) discovered, if we imagine a fully automated economy that produces a positive net product of all goods — and if, in addition, prices in such an economy exist and are positive — then profit as defined above is positive, even though no labor or surplus-labor is extracted.

Apart from this case, the interpretations in question do imply that, when the price of the net product happens to be positive, positive profit and positive surplus-labor will coexist. The relevant issue, however, is not *whether* they coexist, but *why*. Unless a theory denies that profit could be positive if no human labor were employed — and those under consideration seem not to do so^{vii} — then we must conclude that it admits the possibility of positive profit without surplus-labor.

REPRODUCTION

General Issues

Perhaps the main reason that the obvious points made in section 1 have not received attention is that theorists have been interested in economies that are able to reproduce themselves physically. Negative physical surpluses, or a negative price of the net product, have been thought to imply an economy incapable of long-run reproduction, and have therefore been deemed unworthy of theoretical consideration.

In response, four things may be noted. First, the appeal to physical reproducibility is either an evasion of the issue at hand or the result of a logical fallacy. Even were it true that, *if* an economy is capable of reproduction, *then* both surplus-labor and profit are positive according to the simultaneist interpretations, it would not follow that surplus-labor is either necessary or sufficient for positive profit. Analogously, *if* I am a man, *then* I am both male and adult. Yet not all males are adults, nor are all adults males.

Second, the existence of negative net products of some goods is not as implausible a condition as is sometimes suggested, and negative physical surpluses are even more plausible. Net products can be negative even in very productive economies. The Hawkins-Simon conditions, which stipulate that more of a good is produced than is consumed (directly and indirectly) in its own production, do not preclude negative net products, the existence of which also depends on scales of production. Imagine, for instance, that good A is the only input into the production of itself and of good B, and that each process requires $\frac{1}{2}$ unit of good A per unit of output. Thus, only $\frac{1}{2}$ unit of A is needed to produce 1 unit of A. Yet if 10 units of good A and 12 units of good B are produced, then the net product of A equals $10 - (\frac{1}{2})10 - (\frac{1}{2})12 = -1$.

Third, to exclude negative physical surplus and negative net product cases as unworthy of theoretical consideration is to deem all actual economies unworthy of theoretical consideration. All actual economies produce some negative net products, because some goods (386 computers, for instance) are used as inputs without being reproduced. The economies sustain themselves and even grow by producing, instead, similar but not identical goods (586 computers).^{viii}

As was noted above, when they claim that surplus-labor is sufficient for positive profit, simultaneist theorists must postulate either that all net products are positive or that the aggregate price of the net product is positive. Since this postulate is violated in every actual economy, it follows that the claim does not apply to the real world. It is impossible, moreover, for simultaneists to construct comparable theorems to cover real-world situations, because simultaneous valuation is impossible when some inputs are not reproduced as outputs. To compute the aggregate price of the net product, one takes the gross price of the outputs and subtracts the *replacement* cost of the inputs, i.e., the vector of inputs pre-multiplied by their end-of-period prices. Yet inputs that have been used up without being reproduced do not have end-of-period prices, so this is impossible.

One could, of course, use their prices when they entered production, but then one would not be valuing inputs and outputs simultaneously. The only other alternative is to impute end-of-period prices to the inputs by trying to establish an equivalence between them and goods which have replaced them as outputs. Yet any attempt to homogenize heterogeneous things is not only conceptually dubious; it also leads to arbitrary results. One estimate may conclude that the price of the aggregate net product is

positive, while another, even slightly different, estimate may conclude that it is negative. The truth of a theorem that surplus-labor is necessary and/or sufficient for positive “profit” would then depend on the idiosyncrasies of the estimators!

Reproducibility Without “Reproducibility”

Fourth, even if we ignore non-reproduced inputs, it is very probable that actual economies, even highly productive ones that do reproduce themselves over time, fail to satisfy the received definitions of “reproducibility” (e.g., Roemer, 1981, p. 19). To satisfy such definitions, they must produce non-negative physical surpluses of all goods *in each and every period*. In reality, however, reproducibility merely requires that non-negative surpluses be produced over some longer time span (and that initial reserve stocks be of sufficient size).^{ix} Assume, for instance, a two-good economy in which the physical surpluses of goods A and B are -1 and 10 , respectively, in period 1, and 10 and -1 in period 2. Over these two periods, 9 more units of each good have been produced than were consumed. Given an initial stock of A of at least 1 unit, there is no technological barrier to this economy’s expanded reproduction.

Since the length of a “period” is arbitrary, one may of course lengthen the period and thereby include such cases among those in which all physical surpluses are non-negative in every period. Yet, once one does so, simultaneist theorems that surplus-labor is necessary and sufficient for positive profit will become false. Prices may change during the lengthened period in such a way that, for instance, even though surplus-labor is extracted in both sub-periods, profit may be negative in each of them and therefore over the lengthened period as a whole.

This is demonstrated in Table 1. It assumes a zero wage rate in order to apply to all simultaneist interpretations; their definitions of surplus-labor are identical in this case. If one were to assume a very low real wage consisting of equal amounts of the two goods, the same qualitative results would obtain. Table 1 also assumes that technical coefficients are unchanged over the two days, so that the 2% variations in each sector’s daily output are due to changes in activity levels alone.

Examining the lengthened period, Day 1+2, we seem to have an example of strictly positive physical surpluses — 40,002 units of each good are produced, while only 40,000 units are used up in production. Surplus-labor (equal to living labor because wages are zero) is likewise positive, over the whole period, and in each sector on each day. Each sector’s profit for Day 1+2 is negative, however, because the cost of its inputs exceeds the total price of its outputs.

Yet, given that physical surpluses are positive, how is this possible? The solution to this riddle lies in the slight (2%) variations in each sector’s price and activity levels over the two sub-periods, the latter of which causes a 2% physical deficit of good 2 on Day 1, and a 2% physical deficit of good 1 on Day 2. Because, on each day, the size of one sector’s deficit is about equal to the other’s surplus, and because the unit price of the deficit sector is slightly (2%) higher than that of the surplus sector, the deficit is worth more than the surplus. Profit is thus negative on each day.

Table 1

POSITIVE SURPLUS-LABOR WITH NEGATIVE PROFIT

PHYSICAL QUANTITIES

<u>Day</u>	<u>Sec-</u> <u>tor</u>	<u>Inputs</u>			<u>Output</u>
		<u>Good 1</u>	<u>Good 2</u>	<u>Living Labor</u>	
1	1	10,100	10,100	1.01	20,201.01
	2	9,900	9,900	0.99	19,800.99
	tot.	20,000	20,000	2.00	
2	1	9,900	9,900	0.99	19,800.99
	2	10,100	10,100	1.01	20,201.01
	tot.	20,000	20,000	2.00	
1+2	1	20,000	20,000	2.00	40,002.00
	2	20,000	20,000	2.00	40,002.00
	tot.	40,000	40,000	4.00	

PRICES AND PROFITS

<u>Day</u>	<u>Sec-</u> <u>tor</u>	<u>Unit Price</u>	<u>Costs</u>			<u>Total Price</u>	<u>Profit</u>
			<u>Good 1</u>	<u>Good 2</u>	<u>Total</u>		
1	1	0.99	9,999	10,201	20,200	19,999.00	-201.00
	2	1.01	9,801	9,999	19,800	19,999.00	199.00
	tot.		19,800	20,200	40,000	39,998.00	-2.00
2	1	1.01	9,999	9,801	19,800	19,999.00	199.00
	2	0.99	10,201	9,999	20,200	19,999.00	-201.00
	tot.		20,200	19,800	40,000	39,998.00	-2.00
1+2	1		19,998	20,002	40,000	39,998.00	-2.00
	2		20,002	19,998	40,000	39,998.00	-2.00
	tot.		40,000	40,000	80,000	79,996.00	-4.00

NOTES: The equalized wage rate = 0. Over the two-day period, the profit rate is equalized, positive physical surpluses are produced, and balanced expanded reproduction occurs. "Total Price" and "Profit" figures are rounded to two decimal places.

It is also worth noting the plethora of equilibrium conditions packed into this example. The wage rate is equalized across sectors. Techniques of production are not changing, and it is consistent with the example to assume that all firms in a sector use the same technique. Over the two-day period, the two sectors' physical growth rates are equal, as are their profit rates. By any reasonable definition, everything is in equilibrium except that prices vary slightly.^x

Hence, taking a "period" to be some reasonable length of time, say two days (or hours or minutes), surplus-labor is insufficient for positive profit to exist, even when (a) daily physical deficits are very small in percentage terms, (b) physical deficits are non-existent over two days, and (c) profit rates are equal. The theorems that claim the opposite are therefore true only if a non-negative surplus of each use-value is produced in each and every period, *no matter how short one takes a period to be*. (A period in this

context can be no longer than the length of time during which prices remain constant; but they can change from one instant to the next.)

This is the only way to rescue these theorems' formal validity. The shorter the period, however, the less likely it is that all physical surpluses will be positive. For very short periods, it is almost inconceivable that this is the case. Many factories and offices shut down overnight, but night in one part of the world is midday in another. Some business is therefore always using up some input that its supplier is not reproducing at that moment. Hence, if the theorems in question are valid, they are irrelevant, because their key premise is never true, while if they are relevant, they are invalid.

Table 2
ZERO SURPLUS-LABOR WITH POSITIVE PROFIT

PHYSICAL AND VALUE QUANTITIES

<u>Day</u>	<u>Sec-</u> <u>tor</u>	<u>Wage Bundles</u>		<u>Living</u> <u>Labor</u>	<u>Surplus-</u> <u>Labor</u>	<u>Output</u>
		<u>Good 1</u>	<u>Good 2</u>			
1	1	29,997	29,997	59,994	0	59,994
	2	9,999	9,999	19,998	0	19,998
	tot.	39,996	39,996	79,992	0	
2	1	9,999	9,999	19,998	0	19,998
	2	29,997	29,997	59,994	0	59,994
	tot.	39,996	39,996	79,992	0	
1+2	1	39,996	39,996	79,992	0	79,992
	2	39,996	39,996	79,992	0	79,992
	tot.	79,992	79,992	159,984	0	

PRICES AND PROFITS

<u>Day</u>	<u>Sec-</u> <u>tor</u>	<u>Unit</u> <u>Price</u>	<u>Wage Costs</u>			<u>Total</u> <u>Price</u>	<u>Profit</u>
			<u>Good 1</u>	<u>Good 2</u>	<u>Total</u>		
1	1	<u>10,401</u> 9,999	31,203	29,997	61,200	62,406	1206
	2	1	10,401	9,999	20,400	19,998	-402
	tot.		41,604	39,996	81,600	82,404	804
2	1	<u>9,601</u> 9,999	9,601	9,999	19,600	19,202	-398
	2	1	28,803	29,997	58,800	59,994	1194
	tot.		38,404	39,996	78,400	79,196	796
1+2	1		40,804	39,996	80,800	81,608	808
	2		39,204	39,996	79,200	79,992	792
	tot.		80,008	79,992	160,000	161,600	1,600

NOTES: The wage rate is equalized. Over the two-day period, the profit rate is equalized, physical surpluses are non-negative, and simple reproduction occurs.

Table 2 presents a similar example that applies to the standard interpretation. Surplus-labor is zero, but profit is positive. The unit value of each commodity is 1, so the top set of figures represent both physical and value magnitudes. Again, wage rates are equal, techniques are not changing, the two sectors grow at the same rate (zero) in physical terms, and their (positive) two-day profit rates are equal (1%). This economy can also sustain itself *ad infinitum*, both in a physical sense — two-day surpluses of both goods are non-negative — and because the capitalists are making profits. Even in this tableau, in which the economy is in simple reproduction and everything is in equilibrium except that relative prices vary modestly, the standard interpretation implies that surplus-labor is unnecessary for positive profit.

THE TEMPORAL SINGLE-SYSTEM INTERPRETATION

The results to this point have been negative. It might therefore be thought that, no matter how Marx's value theory is interpreted, surplus-labor turns out not to be the sole source of profit. This is not the case. The temporal single-system interpretation which is dealt with in the next section (see, e.g., Ernst (1982), Kliman and McGlone (1988), Giussani (1991-92), Freeman and Carchedi, eds. (1996), Maldonado-Filho (1997), Ramos (1997)) does imply that surplus-labor is both necessary and sufficient for profit to exist, and under completely general conditions. More precisely, although negative (positive) *nominal* profit and positive (negative) surplus-labor can coexist, *real* profit is positive (negative) when surplus-labor is positive (negative).

This interpretation, like the newer simultaneist interpretations, construes surplus-labor as living labor minus the labor-time equivalent of the money wage:

$$s = \ell x - (1/\tau_t)w_t \ell x. \quad (1.7)$$

Note, however, that variables are now defined within historical time. In particular, τ , the "temporalist monetary expression of labor-time," differs from s because the relation between money and labor-time is allowed to vary between the time of input and the time of output.

Nominal profit is interpreted as $\pi^N = \mathbf{p}_{t+1}\mathbf{x} - \mathbf{p}_t\mathbf{A}\mathbf{x} - w_t \ell x$ (inputs enter production at time t , output is produced at time $t+1$). Real profit, however, deflates sales revenue ($\mathbf{p}_{t+1}\mathbf{x}$) in order to adjust for changes between times t and $t+1$ in the amount of money that represents one unit of value. Thus

$$\pi^R = (1/[1+i])\mathbf{p}_{t+1}\mathbf{x} - \mathbf{p}_t\mathbf{A}\mathbf{x} - w_t \ell x, \quad (1.8)$$

where $i = (\tau_{t+1} - \tau_t)/\tau_t$ is the rate of inflation in the monetary expression of labor-time.

τ_{t+1} is defined as the ratio of the money price of output to the sum of dead and living labor needed to produce it:

$$\tau_{t+1} = \mathbf{p}_{t+1}\mathbf{x}/([\mathbf{1}/\tau_t]\mathbf{p}_t\mathbf{A}\mathbf{x} + \ell x) = \tau_t \mathbf{p}_{t+1}\mathbf{x}/(\mathbf{p}_t\mathbf{A}\mathbf{x} + \tau_t \ell x), \quad (1.9)$$

where $[\mathbf{1}/\tau_t]\mathbf{p}_t\mathbf{A}\mathbf{x}$, the labor-time equivalent of the price of means of production, is interpreted as dead labor. Since $1+i = \tau_{t+1}/\tau_t$, (1.9) implies that $\tau_{t+1}/\tau_t = 1+i = \mathbf{p}_{t+1}\mathbf{x}/(\mathbf{p}_t\mathbf{A}\mathbf{x} + \tau_t \ell x)$. Substituting this result into (1.8), one obtains

$$\pi^R = (\mathbf{p}_t\mathbf{A}\mathbf{x} + \tau_t \ell x) - \mathbf{p}_t\mathbf{A}\mathbf{x} - w_t \ell x = \tau_t \ell x - w_t \ell x, \quad (1.10)$$

which implies that

$$\pi^R = \tau_t s. \quad (1.11)$$

This looks very similar to the proportionality between surplus-labor and profit that was derived from the newer simultaneist interpretations. Yet whereas S , the simultaneist monetary expression of labor-time, need not be positive, examination of (1.10) shows that, if prices and the initial condition τ_0 are positive, then all subsequent terms of the τ -series must also be positive. The proportionality between surplus-labor and real profit, *together* with this result on τ , imply that surplus-labor is both necessary and sufficient for real profit to be positive.

A DIALOGUE BETWEEN THE TWO CHIEF SYSTEMS OF VALUE

DOES IT MATTER WHAT MARX REALLY SAID?

Let us suppose we were offered a refutation of Einstein's special theory which supposed a fixed frame of reference. Would this constitute a refutation of relativity? Since Einstein does not suppose a fixed frame of reference, we would have to conclude that the refutation was manifestly false. No matter how valid or cogent the logic, the 'refutation' would refer to a different theory. No conclusions concerning either Einstein or relativity could be drawn from it. Of course, one would have to demonstrate that Einstein does not suppose a fixed frame. This would not be difficult, since he insists on this point in many places.

Of course also, he could be wrong for other reasons. To reject a refutation is not the same as accepting that which is refuted. One would at least have to show that his was a rigorous and coherent theory of space and time in its own terms. The issue would then be only: how well does this theory explain the observable world? Relativity could not be discarded on *purely logical* grounds. Only one procedure could ascertain its validity, namely to test them against rival theoretical systems to see how well each such system explains observed reality.

But suppose physics systematically refused to contemplate anything issuing from the pen of Einstein, and likewise refused to conduct such tests, on the basis of the above 'refutation', rejecting relativity as a viable option on the basis that it was illogical? We would have to conclude that physics had ceased to function as a science and had become a dogma.

Marx in many places clearly insists that he does not presuppose equilibrium, and indeed polemicises violently against it, particularly in relation to Say, to Proudhon, to James Mill and not least in reference to Ricardo's deference to Say.

Nevertheless, the literature on Marx universally attributes to him a concept of value which does, in fact, presuppose equilibrium. Moreover on this basis it *does* discard him on purely logical grounds. It refuses to subject his theory to the normal scientific test of asking whether it explains the world we live in. It rules his theory out of court *before* such a dialogue is permitted.

This could be excused as a mere omission, were it not for the following: a substantial literature, dating back at least a decade, offers an alternative, non-equilibrium interpretation of Marx. Moreover there is an earlier history, dating back to the late 1970s, of systematic silence concerning, and in places suppression of, contributions leading towards this interpretation.

We believe this silence is not an oversight but arises from the nature and requirements of the profession of economics itself. In short, we do not confront a 'normal' scientific debate because the profession for which we work is not a science, but a machine for suppressing science. Our argument

must therefore follow an unusual course; we have to conjoin a study of the value concept to an analysis of the ideology that denies it.

A SIMPLE ILLUSTRATION CONCERNING THE FALLING RATE OF PROFIT

In the literature on Marx's 'tendency of the rate of profit to fall' it is universally asserted that he made a logical error, because he failed to take into account the cheapening of inputs. Indeed this proposal is generally put in an extremely strong way:

Our conclusions are negative to Marxian Gesetz des tendenziellen Falls der Profitrate (Okishio 1961:95)

It cannot be shown in general that a rise in the organic composition of capital leads to a fall in the rate of profit...A falling-rate-of-profit crisis is not a theoretical necessity; indeed, it is not even a possibility under conditions of competitive capitalism (van Parijs 1980:1)

In the absence of sufficient accumulation, capitalist-using labor-saving technical change, and, further, technical change in which the organic composition of capital rises, induces a rise in the rate of profit (Thompson 1995:97)

By any normal usage of the English language, such statements assert:

- (a) that Marx's own profit rate cannot possibly fall as he predicted – as a necessary consequence of a rise in the organic composition of capital in the absence of a change in the mass of surplus value.
- (b) moreover the *actual* profit rate in the economy cannot fall for the same reason.

Almost nowhere do we find the much more scientifically correct statement: "The profit rate which the economists attribute to Marx does not behave as Marx predicted." When correctly stated, such findings are open to a much simpler explanation, namely, that Marx and the economists are talking about two different things. The 'proof' of his error, and of the alleged actual course of the profit rate, depends on a *definition*. The proof applies only if value, price and profit are defined, even when the economy is changing continuously, as those magnitudes which *would* pertain *if* the economy were to become miraculously static. The 'refutation' depends on a distinct value concept, which we term the *simultaneous* or *equilibrium* value concept. This concept is alleged to be Marx's, and on this basis, his theory is alleged to be false.

This is not an insignificant or merely hermeneutic issue, of interest only to historians. Ultimately at issue is what happens to the actual profit rate in the actual world economy – that is, why crises happen. Economics rules out of court, by this device, the one explanation that accounts for what any averagely-educated person may plainly see.

As we shall now show, the simultaneous definition of these magnitudes is not the only one possible. An alternative set of definitions, corresponding to a distinct value concept which we term *temporal* or *non-equilibrium*, arises if the presupposition of a static economy is dropped.

The example

To illustrate these two concepts we begin by supposing a market economy producing a single good. Since this idea has given rise to spurious objections, we note in passing that there are two commodities, the good itself and labour-power.

We suppose that this economy undergoes steady technical change, such that with a constant labour force, that outputs and inputs rise constantly but that outputs rise faster than inputs. For simplicity we also suppose that the workers consume nothing.^{xi}

We also suppose, again for simplicity, that it is possible to invest the entire product each year (maximum expanded reproduction).

To fix ideas we have chosen a sequence of outputs that gives whole numbers; the reader can easily obtain the same qualitative results for any sequence satisfying the assumptions above. Table 1 then gives the sequence in terms of use-values:

Period	C	L	Produces	X
1	10	10	→	12
2	12	10	→	15
3	15	10	→	20
4	20	10	→	28

Table 1: use-value, maximum expanded reproduction

C = means of production consumed as constant capital,

L = quantity of labour power

X = output

Some notation

It is useful to keep track of the units in which a quantity is measured by extending normal money symbols in an obvious way, writing h100 to mean 100 hours of labour-time. It is easier to see these by raising them, thus: ^b100 means 100 bushels of corn. If omitted, the implicit unit is use-value.

Ratios can then be denoted by subscripting the denominator: ^R_h10 means “10 Reals per hour”. Usefully, subscripts and superscripts then cancel out just like fractions. For example if the exchange-rate of dollars for Reals is ^{\$}_R1.6, then ^R10 in dollars is ^R10 × ^{\$}_R1.6 = ^{\$}16

The time at which any variable is measured will from now on be represented with a subscript: for example C_t is constant capital at time t . For period (discrete) systems t indicates a measurement made at the beginning of period $[t, t+1]$.

The simultaneous value calculation

Now calculate the values which correspond to this sequence in the normal, simultaneous manner. To do this, we ask what price would, in each period, reproduce the economy without changing its proportions – even though its proportions are in fact changing. We must then suppose that the value at the end of each period is the same as the value at the beginning of the same period; otherwise, we cannot calculate any value at all. Hence for the first period, we can solve for the value v_1 by writing

$$10 \times v_1 + 10 = 12 \times v_1$$

that is

$$v_1 = 10 / (12 - 10) = 5$$

We can calculate values in each period in the same way and so convert all magnitudes to values:

Period	v	hC	hL	Equals	hX
1	5	50	10	=	60
2	3.33	40	10	=	50
3	2	30	10	=	40
4	1.25	25	10	=	35

Table 2: simultaneous values, maximum expanded reproduction

From this follow a number of conclusions that are taken as ‘standard’ conclusions in the normal interpretation of Marx:

Conclusion 1: values are directly determined by the physical structure of the economy. In each period, there is one and only one possible row in table 2, completely given by the corresponding row in table 1. Values are ‘redundant’; use-values determine all the properties of the economy.

Conclusion 2: organic composition falls, and the rate of profit inevitably rises, with technical progress. Values are as just observed irrelevant to this conclusion; profit is directly given by the physical structure of the economy. We just subtract the physical input from the physical output and divide by the physical input.

Period	C	X	$X-C$	$R = \frac{X-C}{C}$
1	10	12	2	0.2000
2	12	15	3	0.2500
3	15	20	5	0.3333
4	20	28	8	0.4000

Table 3: use-value, maximum expanded reproduction

These conclusions are quite conventional in the simultaneous paradigm. However, a number of stranger conclusions spring to the eye.

Conclusion 3: values so defined cannot function as prices. Although values are defined as rates of exchange, that is, actual prices, in fact they cannot be so given the sequence we have specified. The product at the end of period 1 is *sold* for 5 hours per bushel (h_b5 in our full notation). But when used as an input in period 2, it would be paid for at the prices of period 2, so it would have to be *bought* for ${}^h_b3\frac{1}{3}$. If this were a real exchange, it would be impossible. A commodity cannot be sold for one price, and bought for another.

Conclusion 4: the value added to the total product is not equal to the time worked. At the beginning, we had h50 in input. Consider the combined effect, now, of periods 1 and 2. No product was consumed except in production. The living labour added in both periods was h20 . We should have ${}^h50 + {}^h20 = {}^h70$. But we don’t; we have h50 . 20 hours have been lost. It is hardly surprising that the organic composition falls, if we throw away half the value created at the end of every period.

Conclusion 5: value can be created from nothing. It is common for the problem of value *loss* to be dismissed, or even welcomed, because it does not make *extra* value appear. Somehow, people feel happier with the idea of something disappearing without trace than appearing without reason.

Strangely enough, this happiness is confined to value; when money or people disappear without trace, it is a great deal more alarming than when they appear without reason.

Nevertheless, if we simply reverse the figures, the above reasoning creates value from nowhere. If we suppose a *decrease*, instead of an *increase*, in productivity, then the inputs to each period will be magically *greater* than the output of the last period. Moreover, the greater the decrease, the more value from nowhere, so that the most productive activity of all is to do nothing at all but simply wait for nature to make inert copies of itself.

Conclusion 6: profits are independent of money: that is, they are independent of the numéraire. This is an extraordinary result, though it fully accords with neoclassical general equilibrium. In a real economy the monetary profit rate depends on the money used, as discussed in section 2.7. If the dollar is rising relative to the pound, then the profit rate in pounds will be lower than the profit rate in dollars.

The only circumstance in which the profit rate really is independent of the numéraire is if the numéraire is constant, that is, in a stationary economy.^{xiii} Otherwise, there are as many profit rates as there are moneys or numéraires. But, according to the presentation above there is only *one* profit rate; this is ‘the’ profit rate, and Marx’s great error was in failing to understand that it has to rise. As we will shortly show (see equation 2.3) there are as many different profit rates as there are value concepts.

There *is* therefore no unique profit rate. Before deciding either if Marx was wrong, or assessing what really happens in the economy, we must first enquire *which* profit rate is under discussion.

Monetarising the simultaneous value concept

We can enquire further into all these results if we ask the following question: how *could* such an economy function according to sensible market rules, that is, in such a way that the money paid for a commodity is equal to the money received for it? This would happen if, for example, at the end of period 1 we exchanged one hour of labour for $60/40 = \$1.5$; if at the end of period 2 we devalued by a further $50/30$, at the end of period 3 by a further $40/25$, and so on. Defining the *monetary expression of labour* to be the ratio between dollars and hours and calling this also e we have

$${}^{\$}_h e_0 = 1$$

$${}^{\$}_h e_1 = 60/40 = 1.5$$

$${}^{\$}_h e_2 = 60/40 \times 50/30 = 2.5$$

$${}^{\$}_h e_3 = 60/40 \times 50/30 \times 40/25 = 4$$

and we can write a table of *money* transactions in this money, thus:

Period	${}^{\$}_h P$	${}^{\$}C$	${}^{\$}L$	Equals	${}^{\$}X$
1	5	50	10		60
2	5	60	15		75
3	5	75	25		100
4	5	100	40		140

Table 4: use-value, maximum expanded reproduction

Now we have a set of transactions that makes complete monetary sense. The money paid for everything is equal to the money received for it; all the figures add up, and so on. It also yields the exact same profit rates as the ‘value system’ exhibited at the beginning. But how has this been achieved? What we have

actually done is to revalue the value contribution of labour-power in each period, by an amount exactly equal to the increment in its productivity. In consequence, the prices, down the lefthand side, are simply 'corn-prices'; they use the commodity itself, instead of labour, as numéraire. In short, we have a use-value measure of value. The only difference, therefore, between a 'labour-value' system calculated simultaneously, and a straightforward system of corn-values, is the numéraire; moreover, when we adopt a numéraire which is correctly adjusted, in each period, to permit monetary exchange, simultaneous 'labour values' are identical to corn-values.

We summarise this by the assertion that simultaneous valuation yields a *use-value* concept of value.

The temporal calculation

The temporal calculation follows from the following, simple idea: outputs have a different value from inputs. While production takes place, values change. The value of outputs is then given, not by solving a simultaneous equation but a difference equation corresponding to the temporal order of the circuit

$$M-C-P\dots C'-M'$$

We have to suppose an initial value v_0 , as with any difference equation. This initial condition reflects the whole of a past history that we do not know. It can be demonstrated that the errors that might result from an incorrect initial condition decay exponentially. Here, for illustration, we suppose it to be the simultaneous value, 5.

In period 1, we then calculate v_1 as follows:

$$10v_0 + 10 = 12v_1$$

that is

$$10 \times 5 + 10 = 12v_1$$

giving

$$v_1 = 5$$

So far this is the same as the simultaneous value since we chose v_0 this way, to achieve a level playing field. However in the next period we find

that is

$$12 \times 5 + 10 = 15v_2$$

giving

$$v_2 = 4\frac{2}{3}$$

This is greater than the simultaneous value, but less than the old value. Value, according to this concept, has declined but has not fallen as far as it would in the ideal, simultaneous, economy of table 2. We can now reproduce a different table of values in which we will write, in a separate column, the *value* rate of profit.

Period	C	L	X	X-C	$R = \frac{X-C}{C}$
1	50.00	10.00	60.00	10.00	0.2000
2	60.00	10.00	70.00	10.00	0.1667
3	70.00	10.00	80.00	10.00	0.1429
4	80.00	10.00	90.00	10.00	0.1250

Table 5: temporal value, maximum expanded reproduction

In this system,

- (a) Goods are bought for exactly the amount of money for which they sell. This system is compatible with an exchange economy
- (b) No value is 'lost' and no value can appear from nowhere. The only source of value is living labour.
- (c) A variable numéraire is not required for the economy to behave in a reasonable monetary manner. In consequence, the value contribution of labour-power is always exactly given by the time of labour.
- (d) The organic composition of capital grows, and the rate of profit falls, exactly as Marx suggests. The 'experts' are wrong; there is no logical error in Marx's suggestion.

Note that conclusion (d) follows whether or not we agree with temporalist values. As soon as it is recognised that the above interpretation is legitimate and possible, the argument that Marx cannot but have made a logical error, falls.

THE CHURCH OF THE MARKET IMMACULATE

Equilibrium is a paradigm, not just a model

The results above have been known for twenty years and in the public domain for at least ten years. Moreover the idea is not difficult, and anyone could have 'discovered' it at any time in the past eighty years. The results involve no difficult mathematics; the calculations are so simple a child can perform them. The same applies (see Freeman and Carchedi 1996) for Marx's alleged failure to transform inputs. We may therefore entirely reverse Ian Steedman's (1977:49n) famous question:

The present type of argument has been examined in various forms, by many different writers over the last 80 years. The same conclusions have always been reached and no logical flaw has ever been found in such arguments.

Since there is a logical flaw, and since it is very straightforward, what must now be explained is why so 'many different writers' failed to see it. How did the finest brains of economics, including Nobel Prize winners and quantum theorists whose logical and mathematical capabilities are beyond question, either fail to notice this logical flaw, or reject it out of hand? What does this tell us about the economics profession?

It is also pertinent to ask what *else* such a profession get might wrong: on 30th August 1998 *Time* magazine polled 40 economists, of whom 39 concluded there was not going to be a world slump. We are inclined to think this tells us somewhat more about the economists than it does about the economy.

We believe more is involved than a mere trick of arithmetic or choice of model. Any attempt to understand the differences between temporal and simultaneist results in such terms is more or less doomed. The problem is that in order to adopt a temporal value concept one must actually *think differently*. Temporal concepts corresponds to a different way of looking at the world, and call for a conceptual leap every bit as great as that involved in passing from Ptolemaic to Copernican astronomy or from Newtonian to Einsteinian mechanics. Following Kuhn we would describe this as a *paradigm* change.

To understand and employ temporal value concepts, we ourselves found that we had to overturn our ideas, not just about how we calculate value or price, or profit, but what these words actually *mean*. Such changes always the most difficult for established thinking to accept. As Kuhn notes:

Consider, for another example, the men who called Copernicus mad because he proclaimed that the earth moved. They were not either just wrong or quite wrong. Part of what they meant by 'earth' was fixed position. Their earth, at least, could not be moved. Correspondingly, Copernicus' innovation was not simply to move the earth. Rather, it was a whole new way of regarding the problems of physics and astronomy, one that necessarily changed the meaning of both 'earth' and 'motion.' Without those changes the concept of a moving earth was mad." (Kuhn 1962:148-149)

A paradigm difference does not reduce to a clash of models or calculations. Each paradigm gives a different meaning to the concepts it employs, expresses the laws governing their mutual relations differently, and hence conducts their empirical study using distinct methods.

Our conclusions are difficult to accept, not because they are mathematically complex but because they involve a complete conceptual revolution. It seems, when one begins to think along these lines, as if nothing that one ever considered to be certain, can be trusted any more. One must rethink absolutely everything, from the very beginning – as is always the case in any major scientific revolution.

GRESHAM'S LAW OF ECONOMIC THOUGHT: ECONOMICS AS COUNTER-REFORMATION

Paradigmatic clashes in economics are not uncommon. There is however a decisive difference, in comparison with the rest of science. In all other sciences, there is a *progression* of knowledge as new paradigms, with greater explanatory power, transcend and supercede others.

In economics the reverse occurs. The temporal paradigm in fact surfaces again and again, not just in the field of Marx's value theory but in every branch and every school. The history of the subject shows that in these circumstances it moves backwards. The simultaneous concept drives out and marginalises the temporal concept, as the participants themselves testify:

On the plane of theory the main point of the 'General Theory' was to break out of the cocoon of equilibrium and consider the nature of life lived in time, the difference between yesterday and tomorrow, here and now, the past is irrevocable and the future is unknown. This was too great a shock...In the Keynesian theory after the war this simple point is lost. The whole of Keynes's argument is put to sleep. Keynes is smothered and orthodox equilibrium theory is enthroned once more.' (Joan Robinson 1980:12)

There was no obvious intellectual victory in the debate, yet there is no doubt that process analysis was effectively squashed out of econometrics. (Mary Morgan 1994:225)²

Indeed as Pascal Bridel's (1997) brilliant exegesis of Walras' and Pareto's monetary theory demonstrates, this retrogression, this *reversion* to the implicit internal logic of equilibrium, presents itself even in the evolution of the thought of a single person:

² For a full account of the temporal tradition in econometrics see Louça (1996)

Trapped from his first edition by the logic of an equilibrium model congruent only with a purely static approach, and despite heroic analytical efforts, Walras (and his monetary theory) eventually fell victim to his relentless search for an internal coherence from which any claim of describing a price formation process is finally excluded. And money as a medium of exchange, but not as a numéraire, was the prime victim of this first (but not last) victory of the internal over the external coherence of general equilibrium analysis, the epitome of all rational economic models [emphasis in original]

The process by which economics rejects temporalism is not at all confined to its treatment of Marx. It is recorded, by the actual participants, in every major school or field of study. In every case, it is the equilibrium variant that triumphs: General equilibrium over Austrian marginalism, simultaneous equations econometrics over process theory, the ISLM presentation of Keynes, and so on and so on.

The supplanting of temporal by equilibrium theories in economics is thus neither accidental nor specifically directed against Marx. Marx is the principal object of suppression only because he is the most coherent exponent of the alternative. In every meaningful sense, he *is* the alternative. But the process which excludes him from economic thinking extends to every path that leads back to his theory. We confront a general, not a specific, institutional process of suppression.

What is involved is profoundly regressive: a Gresham's law of selection for economic theories, which systematically promotes more backward and less general equilibrium variants over more general, and more advanced non-equilibrium variants, whenever there is a clash. As Morgan records, this rejection is not the outcome of any scientific evaluation.

The history of economics is a history not of scientific revolution but of ideological *counter*-revolution. Economics functions, not as a science but as an ideology: in fact as a latter-day church, an organised machine for promulgating the divinity of the market. It does so, we will argue, by promoting equilibrium not merely as a hypothesis but as the foundation of an ontology: a definition of what is permitted to exist.

A short mathematical statement of the problem

A short mathematical statement may help, though the listener can skip this argument if required.

If x^t is a state vector, a *temporal* definition gives x^t as the solution to

$$x^{t+1} = f(x^t),$$

or, in continuous time,

$$x = f(x, x', x'' \dots)$$

and simultaneism defines it as the *fixed point* $x = f(x)$.

Comparative statics is said to introduce time; in fact it partitions x^t into $\{y, a\}$ where a is a parameter vector that changes in time, and solves

$$(2.1) \quad \{y, a^t\} = f(y, a^t)$$

giving x as the fixed point of $f(\cdot, a^t)$ for each successive a . This give the illusion of motion but is quite different from the temporal solution

$$(2.2) \quad \{y^{t+1}, a^t\} = f(y^t, a^t)$$

or, in continuous time,

$$\{y, a\} = f(a; y, y', y'' \dots).$$

It also yields no continuous equivalent; when the time period is reduced to zero, in general it produces singularities.

The essence of the simultaneist paradigm is that equation (2.1) constitutes an *adequate approximation to reality*. We argue that it cannot possibly do so. In general the solution to (2.2) is necessarily different because of the appearance of dynamic or path-dependent terms in the equation. If, in particular, the parameter a is changing secularly in a single direction, the results of the two approaches are completely different. Since a includes both technical change and inflation, in general, the two approaches yield different results.

More or less every issue in economics can be formulated in terms of two alternative concepts, one corresponding to equation (2.1) and the other to equation (2.2). These correspond to two entirely different ways of looking at the world, that is, two paradigms: the simultaneous and the temporal. We will now study how the concept of value appears in each of these paradigms.

The simultaneous value paradigm defined

The current, generally-accepted definition of value – which comes to us through a very specific line of inheritance, via Bortkiewicz, Sweezy, and successive refinements by Seton and Morishima – defines both value and price with respect to a *stationary system*. Value is defined as the set of exchange ratios that can reproduce, without excess supply or demand, and without change, an economy from which capital is absent. Price is defined as a different set of exchange ratios which can reproduce, also without excess supply or demand, and also without change, an economy in which capital is so completely mobile as to yield a uniform profit rate.

Time is not merely suspended, but abolished, in this approach. The essential argument is that we may approximate to a moving system by first abstracting from the motion, and then re-introducing it afterwards. All the objects of the system are defined at the *same time*. Hence our use of the term *simultaneous* or *simultaneist* paradigm.

It is our argument that simultaneism involves, not just a calculation, but an ontological definition. It defines value *to be* the solution to a set of simultaneous equations. In consequence, it demands that all motion is abolished before the category itself can be established. It acts, in effect, as if Marx had written Volume II before Volume I, and had taken the requirement to reproduce capitalism to be the definition of value.

The result is, we maintain, that the motion that was removed at the outset cannot then be re-introduced. One may speak of equilibrium using a non-equilibrium concept, but one may not speak of non-equilibrium – that is, reality – with an equilibrium concept.

If, therefore, value is defined in another way, without the prior supposition of stationarity, the difficulties are far greater than merely comprehending our computation. The results that we come up with are literally inconceivable, in a simultaneous paradigm.

The temporal definition: an initial statement

Now consider the temporal definition of value. This defines value *without the prior supposition of stationarity*. Precisely because value is defined differently, so is everything else – price, profit, capital, productivity, technical change, money, inflation, output, not to mention cause and effect. The results

contradicts 'traditional commonsense' in economics because, though we use the same words, we do not mean the same thing.

The ontological framework is therefore different. One of the first things that must be confronted, if one abandons the comforting crutch of supposing that the world is made up of eternal and unchanging universals, is simply to be able to decide what exists. One must confront, head-on, the problem of *persistence*; how it is that something which changes in every respect, nevertheless in some sense continues to be. Each day, every atom of our bodies is completely renewed. Nevertheless, the persons that we are, remain in some sense, identical through their difference.

When we move from the individual to the quantifiable, this same issue assumes the requirement of a concept of *conservation*; in order to formulate the idea, for example, of a *capital of \$1000* even though this capital completely changes its bodily form during its various transformations, we require the idea that some abstract identity-through-difference is preserved despite these changes. Value, in our view, is the fully rigorous formulation of this view.

As we will see, however, accepting this way of looking at things involves rethinking the very notion of what a theory consists of. To take just one example, in our, temporal framework, *cause* means the same thing as it does in everyday speech. Before one thing can be 'caused' by another, it has to follow it in time. The idea, therefore, that the value or price of a commodity today may be 'determined by' its value or price tomorrow, is – though commonplace in economics – as alien to our paradigm as it is to the person on the street. To take another example 'price' for us is not something that we can determine. It is a datum, something that is observed in the world; the actual sum of money paid for a thing. The idea, again commonplace in economics, that the true or natural 'price' of a thing is something different from the money paid for it, is again as alien to our paradigm as to any normal human being.

In our view, therefore, what is at stake is not just a difference of models, but a difference of world-views; a gulf every bit as large as that which separated Copernicus and Galileo from the Ptolemaic astronomers and their clerical successors.

Our results can, therefore, be understood only by suspending the 'commonsense' that we learn from economics, and approaching them with a genuinely open mind.

The source of simultaneist resistance

Why, and how, is the temporal paradigm so vigorously resisted in economics? In our view, because its conclusions are a marketable commodity. Its ontology, which has its origin in the method of Plato, substitutes an *ideal* system for the real world. It claims that this ideal system represents the world:

There exists, first, the unchanging form, uncreated and indestructible, admitting no modification, and entering no combination, imperceptible to sight or the other senses, the object of thought (Timaeus 20).

The issue is not just the idea of universals or essences but a specific concept of them: form is *that which does not change*; and this is the true reality. This leads to a view remarkably close, in fact, to the way that economists conceive of the real world and its relation to their ideal pictures of the market.

No-one, I should say, can ever gain knowledge of any sensible object by gazing upwards any more than by shutting his mouth and searching for it on the ground, because there can be no knowledge of sensible things...These intricate traceries in the sky are, no doubt, the loveliest and

most perfect of material things, but still part of the visible world, and therefore they fall far short of the true realities – the real relative velocities, in the world of pure number and all perfect geometrical figures, of the movements which carry round the bodies involved in them. These, you will agree, can be conceived by reason and thought, not seen by the eye ...Accordingly, we must use the embroidered heaven as a model to illustrate or study these realities (Plato, *Republic* 7:529A, cited in Sambursky 1987:44);

We merely note in passing that Walras avers:

A Truth long ago demonstrated by the Platonic philosophy is that science does not study corporeal entities but universals of which these entities are manifestations. Corporeal entities come and go, but universals remain for ever. Universals, their relations, and their laws, are the object of all scientific study. (Walras 1984:61)

And, more tellingly still:

Mathematical mechanics demonstrates that the harmony of the spheres operates in a free enterprise system as well as in the heavens.^{xiii}

Bortkiewicz in turn introduces his correction to Walras thus:

Alfred Marshall said once of Ricardo: ‘He does not state clearly, and in some cases he perhaps did not fully and clearly perceive how, in the problem of normal value, the various elements govern one another *mutually*, not *successively*, in a long chain of causation’. This description applies even more to Marx ... [who] held firmly to the view that the elements concerned must be regarded as a kind of causal chain, in which each link is determined, in its composition and its magnitude, only by the preceding links ... Modern economics is beginning to free itself gradually from the successivist prejudice, the chief merit being due to the mathematical school led by Léon Walras. (Bortkiewicz 1952:23-24)

Using such an ideal system it becomes impossible to theorise crisis or imperfection in the market, which is perfect by definition. If one goes further and asserts, like Plato, that the ideal model is the truly real, and the truly real is just an imperfect copy, then any observed imperfection must result from ‘outside’ interference: from exogenous factors, imperfections, adjustments, or shocks. These are the names which economics reserves for the things that it cannot explain: by *definition* they are not the product of the market, but a deviation from it. The market therefore, *by definition*, cannot violate the conditions for its own existence. This ideological function is the prime reason for simultaneism’s dominance.

The dominance of simultaneism makes economics a retrogression compared to all true sciences, which have progressed to the temporal paradigm: the Copernican concept in Astronomy, the laws of motion of Physics elaborated by Galileo, Newton and Einstein, the evolutionary concept in biology, and so on. Simultaneism is Creationist Economics.

THE VALUE CONCEPT: A UNIVERSAL ELEMENT OF ECONOMIC THEORY

We said above that because value is defined differently, so are all other things. Nowadays, when economists hear the word ‘value’, they assume a Marxist is speaking. The Marxists themselves react to this label defensively, even making value a point of special pride, as if value were a category which no-one else uses.

We assert to the contrary that all economics *implicitly* possesses a value concept. It is no more possible to do economics without value than physics without space. The very words 'value of money' demand that this value be defined. When any economist speaks of something that money buys, which is not itself money, she or he articulates a value concept.

Our problem is not, therefore, to defend the need for a value concept. It is, by logical examination, to force each branch of economic theory to examine the concept of value which it uses in any case, whether or not it admits it.

Consider the very idea of the price level. Without it, economics cannot even formulate the quantity of theory of money, let alone discuss if it is true.

But what *is* the price level? It must mean a ratio between some measure of output which is different from price, and price itself. In short, it is a measure of value. If economists say that the price level has risen by 10%, they must mean that \$1 buys 10% less of *something* – but hardly ever enquire into what that 'something' is, least of all question whether it can be rigorously defined. This is actually quite scandalous: it is as if physicists spoke of 'energy' or biologists of 'species' without any debate or enquiry into what these words meant.

The implicit measure of value used in economics is the macroeconomic magnitude called 'real output'. It is the nominal price of a thing, deflated by the GDP or some other deflator.

Whatever sophisticated microfoundation is offered for this measure, it is in fact a cardinal, linear, and non-marginal measure. If we add together two assets whose 'real' value is \$1 and \$1 we get another asset whose 'real' value is \$2, by the very nature of the price index calculation. That is, its value measure is a *money of account*. Of course, a value concept which is adequate and appropriate to a genuine science of economics is more than a mere quantitative measure: but it is in the form of a quantitative measure that we encounter it in economics as now practiced, and it is as such that we study it here.

Economics speaks as if there were only one such measure; the recent debate in the USA provoked by the Boskin commission shows that things are quite different. The Boskin commission proposed to modify the consumer price index downwards, in order to reduce government spending on indexed welfare payments such as pensions. It thus accused the BLS of *overstating inflation*. But it rapidly emerged that a lot more was at stake. For, if the BLS had overstated inflation, it had *understated real output*. But if it had understated real output, it had likewise understated productivity. It had moreover understated real profits, hence economic performance in general. Once the value concept changes, all other variables change with it. The nexus of economic relations involved is as follows:

- (1) From any concept of value, there follows a concept of price level, and vice versa. The price level is simply aggregate price divided by aggregate value, however this is defined,
- (2) But likewise from any concept of value, there follows a concept of *output*; since aggregate value produced per year is simply the definition of output, corrected for nominal changes in the price level.
- (3) However from this also follows a definition of *productivity*; productivity is simply the ratio between value output and value input.

- (4) There also follows the definition of surplus or 'value added' – and if the economists really believe the concept of value to be redundant, it is perhaps time they demanded we stop taxing it – this is equal to the difference between value output and the value of non-human inputs.
- (5) The definition of profit itself then follows from these definitions. 'Real' profit – that is, the value rate of profit – is equal to the value added, divided by capital advanced, measured in value terms.
- (6) Finally, since the rate of profit is a determinant of investment behaviour, all this directly determines the way that an economic theory is obliged to view the actual motion of a market economy.

Note that the six statements above did not in any way assume a *particular* theory of value. Least of all are they specific to Marx's theory of value. They are conceptual relations that apply to each and every economic theory, which it must adhere to more or less consciously, and more or less rigorously.

A chain of conceptual connections leads from an underlying value concept, through all the key concepts of economics, to an actual theory of economic behaviour. The value concept adopted by any theory, far from being redundant, is the key to understanding how any economic theory actually works.

Production, circulation, distribution and value: a single concept

The issue is even more profound. The concept of value determines where the dividing line is placed between production and circulation, a distinction fundamental to economics. When economics seek to make a distinction between these two activities, what it always seeks to convey is the idea that one type of human activity *creates* that which is consumed elsewhere, and that another type of activity *allocates* this product to the final consumers. This distinction is itself meaningless, if it turns out that the allocation process is itself creative; there is no point in the distinction in that case.

Precisely what we mean by value *is* that which is created in production, since obviously, price variation is a phenomenon of circulation. In consequence, if we find out that price variations can bring about an increase in value without any productive activity, we have an incoherent value concept.

This is the true force of the capital controversy. Why did it matter to economic theory, whether capital was a factor of production or not? Precisely because, unless capital is considered a factor of production, and if we use quantity or nominal price as our measure of value, we find that there is an increment in the value of the product that cannot be accounted for in production. Therefore, we are obliged to 'invent' a new factor to make up the discrepancy – the 'factor' of capital.

With every new complication encountered by modern theory, it responds by inventing another factor, be it human capital, quasi-rents, or what-have-you; the reason for this inventiveness is the desperate need, in the face of a defective value concept, to plug the growing hole in the dike between the torrent of production and the flood plain of circulation.

This spills directly over into political analysis. Without a firm division between production and circulation, with the origin of value firmly located in production, we cannot theorise the notion of *transfers* of value. We cannot express the concept of exploitation or class division. We cannot rigorously express the notions of unequal exchange, nor explain the ever-growing gap between nations. The very notion of *distribution*, and the idea that the price system is an allocative process that transfers from one person, or one class, or one nation, to another, cannot be expressed without an adequate value concept.

This, also, is what Keynesian theory seeks for when it (rightly, in our view) strives to establish that distribution is in some sense 'prior' to price formation. The essential idea that needs to be expressed is this: some 'thing', some 'substance' is created in production, and the price mechanism consists of no more than the allocation of this substance, without changing its size.

Marx's value concept in context

This allows us to place Marx's own value concept in its rightful context and clarify, first, why it is such an important achievement to locate *labour* as the source of value, and second the underlying qualitative significance of his celebrated equalities

The whole historical evolution of the value concept is an evolution *away from physiocracy*, for whom the basis of value was *natural*: the reproduction of nature unaided and unorganised by people. For the physiocrats, production consisted in the production of things by means of things. On this basis, as Marx notes because of the very narrowness of their value concept, they successfully identified the relation between value and distribution. What they could not do, is identify the relation between either of these things and human society.

Successive refinements by Smith, Ricardo and Marx freed this value concept from its naturalist heritage and located it in specifically human, social, that is, conscious activity.

The place of Marx's value concept in the history of economic thought is the completion of this evolution. In his work for the first and last time all production is rigorously and uniformly defined as a specifically human activity, and value is rigorously defined as its quantitative outcome. Economics since his death is not much more than an orchestrated media drive to prove it can't be done.

Labour, for Marx, is the universal substance of value because production consists, and only consists, of the application of labour. This is not just a definition of value but also of production. Labour is the conscious transformation of nature by humans for humans, and hence production *is* the application of labour both to nature and to past human products. It is not the unaided activity of nature, nor is it the passive self-motion of machines, and least of all is it mere existence.

As we have seen every body of economic thinking makes a distinction, vaguely or less vaguely, between production and circulation, and entertains the notion that in some sense production creates something new, and circulation only changes its ownership. What they do not realise, except in Marx's case, is that in making this distinction, they also determine a value concept. If, therefore, we define production so that non-human activities are included in it, then inevitably we find a non-human source of value; try as we might to measure value as a human activity, we will always find a place where it grows by itself.

For the physiocrats, nature was the explicit source of value. For Smith, 'stock' remained an independent source of value because he did not treat it as a product of labour. Ricardo's two great achievements were on the one hand to define stock rigorously as a product of labour, and on the other to define rent as a deduction from the product rather than an increment to it, finally freeing value from any natural basis. But he bequeathed a dual standard of value through which things as such were allowed to become again a source of value, though free of their natural origin. Value for Ricardo was on the one hand, the labour incorporated in a thing, and on the other hand, the amount of another thing for which it exchanged. When this second definition, the *use-value concept of value*, is insufficiently separated from the first definition, then economics ends up measuring things in terms of other things.

But these things are human constructions, alienated from their producers. The use-value concept of value therefore divides symmetrically into the physicalist and the utilitarian viewpoints; one conceives of value as if things existed independent of their use, and the other as if the use existed independent of the thing. In either case, the old naturalism of the physiocrats is restored in a new, fetishised form: the things which we ourselves create are endowed with the magical property of creating value out of themselves.

Finally from this viewpoint we can give a very mathematically precise, and non-mathematically sensible definition of exactly what is offered by Marx's value concept: it is a explanation of the substance and measure of economic activity with the unique mathematical property that, if all economic magnitudes are transformed by applying it, new output *always and only* arises in production, production being defined as the application of human labour to the production of commodities. It offers, therefore, a *universal measure of all economic magnitudes in terms of a universal productive capacity*.

No other value concept possesses this property.

NO VALUE WITHOUT DYNAMICS, NO DYNAMICS WITHOUT VALUE

Why dynamics matters

It is widely supposed, and even asserted as a rigorous result, that the rate of profit is independent of the measure of value, numéraire, or money in which prices are expressed. This is false. This is fundamental to understanding why an adequate value theory cannot rely on the assumption of stationarity.

A simple dynamic calculation illustrates this point. Intuitively, the argument is as follows: suppose the price of the good concerned is rising independently of production. An asset consisting of this good will then yield an *own profit rate* expressed in money. If we purchase it for \$1000 and, after a year, without engaging in production at all, it is worth \$1200 then in money terms we have made a profit of 20%. In *general* profit therefore depends on the money of account. If Reals are inflating relative to dollars, then profits measured in Reals will be greater than profits measured in dollars.

Using our notation we can show this very easily. Let us write the exchange rate of Reals for dollars as ${}^R\$e$ or, when no ambiguity is possible, simply e . Then given any dollar asset ${}^\$K$ we can write:

$${}^R\$K = {}^R\$e {}^\$K$$

and, differentiating, we get

$${}^R\$K' = e' {}^\$K + e {}^\$K'$$

to get the rate of profit, divide by ${}^R\$K (=e {}^\$K)$ and we get

$${}^R\$r = \frac{e' {}^\$K + e {}^\$K'}{e {}^\$K} = \frac{{}^\$K'}{{}^\$K} + \frac{e'}{e} = {}^\$r + \frac{e'}{e}$$

If we have more than one money of account then the money rate of profit, expressed in one money, is equal to the rate of profit in the other money *plus an additional term* which is given by the proportionate rate of change of the exchange rate. This is a straightforward path-dependent, purely dynamic factor which is omitted in any static analysis.

If, now, one of these moneys is a measure of value, we then have a simple formula for the relation between the value rate of profit and the price rate of profit, supposing \$ to be the money and h to be value:

$$(2.3) \quad s_r = h_r + \frac{e'}{e}$$

where e is now the ratio between value and money, a magnitude which Ramos terms the *monetary expression of labour* (MEL).

If status of the value concept, treated for now solely in its aspect as quantitative measure, is that it is canonical for all other measures; that is, every other measure yields a profit rate expressible in the form (2.3) as the sum of the value profit rate and the proportional rate of change of the MEL. Its canonical status arises because this, and only this measure, yields zero profit on the activities of pure circulation. It is a pure production measure of profit. There is no other.

This first of all makes nonsense of the conventional refutation of Marx's law of the tendency for the rate of profit to fall; this refutation identifies only *one* rate of profit and does not state in what monetary unit this profit rate is expressed. It is unconsciously supposed that money is a veil; but relation (2.3) shows this is false and money does matter. It is illegitimate to state that 'the' profit rate falls when there are as many profit rates as there are possible moneys of account.

Many other conclusions follow. For example

- (a) there is a perfectly rational basis for liquidity preference, that is, for holding stocks of a money which is appreciating. For, in terms of any measure of value, there will be a rate of inflation e' such that the value rate of profit on money is higher than on any productive asset
- (b) the neoclassical determination of price is indeterminate. For, the value of a money asset varies independently of its equilibrium magnitude. Therefore, money prices cannot be fixed in equilibrium.
- (c) the linear production determination of prices is likewise indeterminate, and for the same reason.

We can thus derive most of the key critical instruments which heterodox theory strives for, merely by assessing the dynamic relation between the value and the price of an asset. But we can only do this rigorously if our concept of value does not presuppose that dynamics have been abolished. Otherwise the relations we have just established appear, not as a *property* of our value concept, but as an *internal contradiction* of our value concept: and this is exactly what has befallen most of economics.

It is for this reason that value is the idea which orthodoxy most fears to discuss; it is for this reason also that heterodoxy must force this discussion on orthodoxy.

Why value matters

But it now, we hope, becomes clear why it is essential, in specifying any dynamic system, to identify the underlying value concept. As we will note, there are a large variety of temporal approaches to economics: Post-Keynesian and Kaleckian, neo-Austrian, non-equilibrium Walrasian, monetary circuit, and so on. However, all of these merely presume, or take over from equilibrium economics, an implicit notion of value. No matter how critical we are of the idea that agents can negotiate in real terms, we could not reasonably argue that the real-nominal distinction makes no difference.

Precisely because it does make a difference, we have to specify what the difference consists of. We have to specify what real output really is: that is, we have to specify a concept of value. All other theoretical conclusions follow from this.

A SHORT RESTATEMENT OF THE TSS APPROACH

We now move on to a more general statement of what we term the 'TSS' ('temporal single-system') view, which extends to a full conceptualisation of price and money without the presupposition of equilibrium,

We begin by noting that TSS is not the only temporal value theory.^{xiv} We combine temporalism with the single-system approach, a controversial innovation which bears a strong family relation to the 'New Interpretation'.^{xv} There are also simultaneous single-system approaches.^{xvi}

In the New Interpretation, variable capital is measured not by the value of wage-goods, but by the value expressed in the money wage itself. When functioning as capital a sum of money represents value not by virtue of the labour in it, but because in circulation it represents the value of other goods themselves containing labour. If £1000 represents 100 hours, as observed we may define a coefficient, the *Monetary Equivalent of Labour* or MEL: £10 per hour is the rate of exchange between value measured in hours, and value measured in money. In effect it is the inverse of the New Interpretation 'value of money'.^{xvii}

Single-system approaches extend the New Interpretation idea to constant capital, which is represented, not by the value of the goods consumed in production, but by the value expressed in the sum of money that pays for them.

The New Interpretation and SSS approaches define the MEL as the *flow* ratio of new money value added, divided by new labour. we define it as the ratio between the money price and labour content of the *stock* of social capital.^{xviii} Every sum of money then represents an aliquot part of the total value in existence and hence a definite number of past hours; if 100 hours are embodied in a total social capital priced at £1000 then each £1 represents, or expresses, (1/10) hour.

Determining the magnitude of value

We have not yet defined value quantitatively; we merely say it is measured in hours of labour-time and stated its relation to money. The difference between simultaneous and temporal approaches begins at this point.

Suppose a capitalist consumes £100 in constant capital (C), employing workers who add ^h10 of living labour (L) to the product. Suppose additionally the MEL is £_h10. From this and the single-system calculation, it follows that we can restate the production process in hours. The £100 in constant capital represents ^h10, and the workers add another ^h10. The value passing into the stock of social value is

$$(2.4) \quad {}^h10(C) + {}^h10(L) = {}^h20$$

This is determinate whether or not there are other producers of the same thing, or stocks of the same thing, or joint products. It simply says that L is added and C transferred to the whole of social value. We will shortly explain how this social value is fully determined.

Note that no particular time-period is indicated, and the calculation leads either to a discrete or a continuous formalisation. However, goods that appear in a long time-period as being consumed entirely during production, are in a shorter time-period consumed only partially. It is impossible to make an artificial distinction between fixed and circulation capital based on duration.

Temporal closure: total social value and the MEL

In section 0 we supposed the MEL to be given. But from any initial value it is defined at all subsequent points, so that the value transferred to every product is fully determinate. To show this suppose all capitals, taken together, consume over any period ${}^{\text{€}}C$ in constant capital and employ workers who add ${}^{\text{h}}L$ of living labour to the product. From the single-system calculation, we can similarly restate this in hours; the capitalists will pass value into the total stock of social capital equal to

$$(2.5) \quad {}^{\text{h}}C + {}^{\text{h}}L$$

This does not yield the money price of the social capital, but for us prices are data, to be observed. We can in principle add up, at any moment, the total price of all goods in society, including all forms of capital such as money, work-in-progress, machinery, and so on.

Given an initial MEL, we can also ascertain the value of this same stock in hours. We need only suppose that at some starting point this is known. Then equation (2.5) tells us the new value that is added to it. What is lost to it? In the same period value will be lost from this total stock as goods are consumed. This loss has three elements that we are interested in: ${}^{\text{€}}V$, the consumption of the workers, ${}^{\text{€}}B$, the consumption of the bourgeoisie, and ${}^{\text{€}}C$ which is just the used-up constant capital already referred to. But, as we have seen ${}^{\text{€}}C$ is exactly replaced in the product. Value consumption is therefore straightforwardly ${}^{\text{€}}(V + B)$, again known from price data.

Consequently we now know the total value in hours and in money of the new social stock. Dividing one by the other gives the new MEL. This closure renders all magnitudes so far defined determinate, without placing any equilibrium constraints on any of them.

Conservation in circulation

The Bortkiewicz-Sweezy-Seton definition of value supposes that Marx takes prices to equal values in Volume I, and derives its definition of value from this idea. It then supposes that Marx takes prices as equal to prices of production in Volume II and interprets the transformation problem as the definition of the static relation between the two quite distinct, and quite ideal, stationary economies concerned. Hence our designation *dualist*.^{xix} Marx is read this way by almost all of economics, and all the ‘inconsistencies’ in Marx are derived from this reading.

Chapter 5 of Volume I of *Capital* entitled “Contradictions in the General Formula of capital” is a great puzzle for this interpretation: here, Marx systematically investigates what happens when price diverges from value. Moreover he does not just consider price of production but general, market prices; he examines every conceivable source of their deviation from value: market fluctuations, nominal price increases, even thievery and military conquest. His central conclusion is that *value cannot arise in circulation*. As we have seen, this is central to the concept of what production, and labour, actually consist of

In order to achieve his result, Marx makes a decisive break with Ricardo and Smith for whom value is conceived of as *equal* to price, a concept to which simultaneism incessantly regresses. Value in Marx is the substance of price, but not equal to price; something that is expressed in money but is not itself money, just as the mass of a material body is something that manifests itself in its size, but is not itself size. In consequence, value is conserved in circulation; that is, the *total magnitude of value in existence cannot be altered by merely changing money prices, in any way whatsoever*. This distinguishes Marx’s

value concept from every other economy theory, each of which pays lip-service to this evident idea, but always violates it in practice.

This, in our view, really is the ‘fundamental Marxian theorem’. It logically precedes all further development, including the development of the categories of production, labour, and labour-power; it is historically general, in that it applies to all societies in which commodities exist, and it is an indispensable axiom for everything else in value theory.

A framework for analysing distribution, not a device for determining prices

The ‘first equality’ as specified above is tautological, but not trivial. Price-value deviations may exist within the product. The concept of value lets us quantify these deviations independent of the use-values involved. It allows us to theorise distribution as a process which *transfers value*. Without the notion of conservation, the very notion of a transfer is meaningless.

Moreover, it provides the answer to an insistent question in economics: *what is it* that gets redistributed when prices change? The answer is: socially necessary labour time. Any set of prices fixed by circulation, constitutes a distribution of hours of labour-time. The movement of money-prices is thereby revealed to be a disguised transfer of congealed labour-time. The analysis ‘de-fetishises’ exchange relations. ^{xx}

Thus, suppose a product whose value is h6 has a price of $^£5$, and that the MEL is $^£_h1$. The seller then receives h5 in return for h6 : that is, s/he loses h1 (or $^£1$, which is the same thing expressed in money) by converting the product into money. The buyer gains this lost hour, since by the definition of the MEL, the value of the total product in hours must equal its price in hours. Therefore

- (a) Price-value differences are precisely expressible as a relation between two forms of value.
- (b) Every set of market prices effects a system of transfers of pre-existing values, created in production, between the owners of these values.

Without the conservation of value in circulation, neither of these results hold.

The fundamental question concerning the logical coherency of value theory is then the following: does the definition of production contradict these results? When we proceed, by analysing the categories of labour, labour power, individual value, social value, to determine how value is produced, are we forced to abandon the axiom from which we started, that this value may *only* arise in production? TSS finds that no contradiction arises.^{xxi} Simultaneism does not.

Where the time comes in

The words ‘a capitalist consumes $^£100$ ’ were chosen with great care. It may of course be that between buying the capital and using it, the productive goods concerned rise or fall in price and/or value. What is the relation between the initial cost and the value $^£C$ transferred? Three views are known to me.

- (1) the view attributed to us by many is that $^£C$ equals what was spent to get C: its so-called ‘historical cost’. This is not to our knowledge the view of any TSS theorist.
- (2) The view of all simultaneist currents is that $^£C$ is equal to what it would cost in the future to buy the elements of C, if these could be purchased after C is used up.
- (3) The view we actually hold, as far as we know in common with other TSS thinkers, is that $^£C$ equals the value C possesses at the time it is consumed. In one special situation this reduces to case (1),

namely, a one-period circulating capital system and this has given rise to misunderstandings that we are happy to correct here.

The calculation is fully determinate. We take the price of the goods concerned at the time they are consumed, divide by the MEL, and this gives us the value transferred. As Marx concisely puts it:

The definition of constant capital by no means excludes the possibility of a change of value in its elements. Suppose the price of cotton to be one day sixpence a pound, and the next day, in consequence of a failure of the cotton crop, a shilling a pound. Each pound of cotton bought at sixpence, and worked up after the rise in value, transfers to the product a value of one shilling” (p209)

When measured in hours, the difference between the price at the time of purchase, and the price at the time of use, is the moral depreciation of the capital, of which more later.

The designation ‘historical cost’ as applied to the TSS calculation is thus misleading. The issue is not whether $^{\text{f}}\text{C}$ may be altered before it is consumed. The point is that it cannot be altered after it has been consumed, that is, when it no longer exists. Any rejection of such a notion perpetrates extreme ontological violence against all serviceable concepts of existence; it becomes hard to conduct any scientific discourse at all.

Value in, more value out; conservation in production

Because of this temporal definition, production cannot contribute any new value to society except L. Whatever $^{\text{f}}\text{C}$ happens to be when used is transferred to the product, and the same sum is removed by its use. Summing over all of society, the total value added to the stock of social capital in production *must* always exactly equal to the time worked over *any* period, because at each point in the trajectory, no matter what the value of the constant capital happens to be as a result of any external fluctuation, what goes in is what comes out. Always and inviolably, $^{\text{f}}\text{C}$ is removed by use, and $^{\text{f}}\text{C}$ is transferred back in by the labour process. The two can never separate, because they happen at the same time.

This is precisely what simultaneism violates, as our initial example shows: the product grows in value because it gets two valuations from two different periods at once. As the output of period 1 it has one value, and as the input to period 2 it has another. This circle is simply not squared, and so the value appears from nowhere.

Exploitation and the ‘second equality’

Marx’s ‘second equality’ arises as a genuine, non-tautological deduction from the analysis of production provided equation (2.5) is not contradicted by further development. The value which production adds to the total value in society over any period is exactly equal to the living labour. But the value consumed out of this by the workers is exactly $^{\text{f}}\text{V}$, the variable capital. Everything else falls to the capitalists *because* value cannot be created or destroyed in circulation. The conservation of value in circulation is therefore of immense social and political significance. Once we admit of a source of value other than labour, we also admit of a source of profit other than labour-power. But since labour is merely the human transformation of nature for other humans, we also admit of a source of profit other than humans.

Our (Marx’s) proof of the second equality applies not only in the case where profit rates equalise, but for every conceivable market price. The calculation is therefore fully general.

Neither production nor circulation: the world of phantom values

We have posed the issues as above to confront the core of the ambiguity in the simultaneist formulation, which is that it cannot identify whether the value lost through devaluation takes place in circulation or in production. Instead, value commutes, like Charon the boatman at the Styx, between the real world we live in and a phantom world of equations. *Why* is constant capital fixed? To this, temporalism gives an answer that simultaneism cannot. $^{\epsilon}C$ is fixed because it is in the past. This is what renders it objective.

For temporalism output arises after C has been consumed. Therefore, even those temporal formulations that do not respect the conservation of value (for example, Kristjansen) at least recognise that the difference lies in circulation. Simultaneous formulations cannot even make this distinction because for them, C is determined in the future, after the product emerges. If therefore there is any general change in the interim, whether this be technical change, inflation or even a change in relative prices, then this must therefore retrospectively modify the value incorporated in the product by the constant capital.

A great deal of the confusion in many discussions of moral depreciation and capital devaluation arises, in our opinion, because when the value of constant capital is retrospectively modified, it becomes quite indistinct whether this modification takes place in circulation or in production. The change therefore takes place in some hyperspace which value may commute from without challenge from the mortal world we live in. In effect, Charon becomes a banker; we do not merely pay him his obol on crossing from the real to the ideal world, but collect it back with interest when we return.

This leads to a redefinition of 'socially necessary labour time'. In Marx, this refers to the time needed to make something with the existing instruments of production, in the society that we live in. Simultaneous valuation defines it as the time which would hypothetically be needed if every new technique were already fully implemented. This society that will never exist since, while the new techniques are being implemented, yet other techniques will come into existence. The moment the first brick is laid for a factory that halves the price of computer chips, without waiting for the chips to arrive and indeed for the factory itself to be built, the price of all chips, of all computers, of all products in which these computers enter, and so ad infinitum, must all fall. This is not socially necessary but Platonically necessary labour time

WHAT CONSTITUTES SCIENTIFIC CONDUCT IN AN ANTI-SCIENTIFIC INSTITUTION?

The TSS value concept makes perfect logical and theoretical sense. It cannot be ruled out as a trick, a paradox, a different model or an elementary logical mistake. Of course, in and of itself, this neither proves that it is Marx's concept, nor that it describes reality.

If economics were a science, and functioned as a science applying genuinely scientific criteria, it would consider the TSS value concept on an equal footing with its own value concept. It does not do so, because as we have explained, it is organised as a dogma. Is it possible, then, to oblige economics to examine this value concept objectively? If not, what can or should be done?

In defence of rationalism, in defence of democracy

The answer we supply is drawn from the old, Galilean, rationalist agenda. Contrary to the normal tradition in economics, we do not dismiss our opponents by demonstrating faults in their logic. Nor do

we dismiss them by proving that they cannot claim the authority of great people – least of all Marx himself. Our question is: can they explain the world we live in? Our judgement is based on *evidence*.

In our view, the ‘Marxian heresy’ consists precisely in the fact that it explains the world we live in; and this is precisely what the profession of economics finds an anathema. The question that then arises is an obvious one. If the conceptual structure of the profession of economics does not serve the function of explaining reality, what function *does* it serve?

The emperor’s tailor may not judge the emperor’s clothes

However, we couple this to an unusual observation: economics, alone among the ‘sciences’ reserves to itself the right to judge its own conclusions. We are allowed to test what doctors do: we can see, with our own eyes, whether the patient dies or gets better. The economists, however, cure no-one and kill many people; yet ordinary people without economic qualifications are not presumed capable of telling the economists that they are wrong.

In our view, the entire point of the Galilean revolution in scientific method does not reduce to the use of experiments or to ‘falsification’. Galileo asserted something much more fundamental against the church: he asserted that people other than God’s appointed had the right to judge what God had done. This was, in fact, the basis of Bellarmine’s objection to Galileo which was, strangely enough, a kind of pluralist objection. He accused Galileo of presuming to determine *for himself* which of the two possible explanations of God’s work was valid; this, he argued, was blasphemy because only God knew his own reasons. He obliged the church to submit to the judgment of non-clergy, of the ordinary person.

This leads to an approach which we might term *critical pluralism*; no theory should be ruled out *a priori* but every theory should be tested against the evidence, and obliged to engage and debate the alternatives. Most important *the tests should not be the preserve of the economists*. Economics, if it is to play any useful role at all under a market economy, must be obliged to abandon all claim to authority. Its job is to make theories available for others to judge; not to stand judgment on others for the theories they hold.

Against the abuse of logic

The difficulty of debating across paradigms leads most simultaneists to treat temporal results as the product of some kind of simple mathematical trick or deceit, not worthy of considering as a true theory. Though we would not be so foolish as to claim no future error can be discovered, TSS ideas have been subjected to very intense debate and criticism for over five years and we think there are now sufficient ground for saying that they are not likely to be overturned by a purely logical argument.

Unlike Ian Steedman, and, to be fair to him, most of economics, we do not draw from this the conclusion that our opponents are wrong, or that we are right, simply because our argument is proven in logic. This is a method of debate which, in our opinion, we must all leave behind us.

In our view, the issue is an entirely different one. Most explicit theories of value contain an implicit logic that is consistent *if one adopts the conceptual structure that goes with the theory*. The questions we pose are threefold:

- (a) What really is this underlying conceptual structure? What *presuppositions*, what *axioms*, must we adopt, in order to think in such a way? This is the true application of logic.

- (b) What relation does this conceptual structure have to reality? Does it explain the observed facts which any educated person can verify: does it make sense of the world? This is the true application of science.
- (c) What relation does it have to the known work of any writers whose theories we are assessing? Does it make sense of their ideas and are we justified, therefore, in *attributing* this theory to them when we judge their work? This is the true application of honest debate.

All three of these are jointly required for a scientific endeavour.

Against dogma: for genuine pluralism

It is not our intention to found a new source of authority. We do not demand either that economics must agree with us, or that it must treat our reading of Marx as the only one possible. However, a scientific audience *is* required to accept that our argument is *legitimate*; that is, it is possible to think in the way that we propose, and that it is possible that Marx, too, thought in this way. We do therefore demand that economics cease presenting its own version of Marx as the only true version: this is the true dogma. We *do* demand that it cease suppressing alternative interpretations of Marx, and we do demand that it abandon its unfounded claim that Marx can be ignored or re-interpreted, because of errors which, in these alternative interpretations, do not exist.

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ⁱ Because they refrain from asserting any relationship between surplus-labor and profit (measured in terms of money or a numéraire), the interpretation of Wolff, Callari, and Roberts (1984) is an exception.

ii The analysis below pertains to the most general versions of the FMT, which do not postulate that profit rates are equal in every period. Those versions which rely on this postulate are likewise very restrictive. As the examples in Tables 1 and 2, below, show, even if profit rates are equalized over two "one-day" periods, the FMT does not hold.

iii $A = [a_{ij}]$ is a square matrix of input-output coefficients; a_{ij} is the amount of good i used to produce one unit of good j . b is a column vector of wage goods per unit of living labor, ℓ is a row vector of living labor requirements per unit of output, and x is a column vector of outputs. I is the identity matrix.

iv When no physical surpluses are negative, but some are zero, and some prices and/or values are zero, the aggregate worth of the physical surplus vector can be zero when valued at prices and positive when valued at values, or vice-versa.

v Note, however, Ramos's (1997) critique of simultaneism.

vi See Kliman (1997) for other criticisms of this concept.

vii Foley (1997:19, emphasis in original), in particular, has noted that his interpretation "is completely general, in that it is consistent with any theory of price formation"

viii I am indebted to Alan Freeman for emphasizing this crucial point.

ix Roemer (1981, p. 19) first notes that reproduction requires that no stock be run down to zero. He then points out that one way of "assuring" this — i.e., one sufficient condition for reproducibility — is to postulate that, in every period, all physical surpluses are non-negative. Immediately thereafter, however, he pronounces this postulate a "requirement" for reproducibility — i.e., a necessary condition — which it certainly is not!

x To keep the example simple, stocks have been excluded from the denominator of the profit rate, and prices have been measured in units of a third asset, not produced in this economy. Yet qualitatively identical results, including equalized two-day profit rates, can also be obtained if stocks are included and numéraire prices are used.

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- ^{xi} if the reader finds this uncomfortable, s/he may suppose that a fixed proportion of the input is used to feed the workers; the results are numerically the same.
- ^{xii} This point was first made by Townshend (1937)
- ^{xiii} according to the Federal reserve Bank in a schools handout we are happy to supply to enquirers. We have not yet traced the original citation.
- ^{xiv} Cf Kristjansen (1998), Naples(1989, 1996)
- ^{xv} See the references in DL's paper. The approach is variously termed the New Interpretation, the New Approach and the New Solution. I use DL's own term, which I also think is the best.
- ^{xvi} See Wolff, Roberts and Callari (1982), Moseley (1993), Ramos and Rodriguez (1996) and Lee(1993).
- ^{xvii} A number of authors claim a *dimensional* incompatibility between price and value, beginning with Abraham-Froix and Berrebi. As Rodriguez (1996) notes, value has two measures, its *intrinsic* (labour-time) measure and its *extrinsic* (money) measure. Both value and price may be expressed in either unit, at all times and in all forms.
- ^{xviii} In a one-period model this reduces to the ratio between the value and price (respectively) of the gross product; however here I will define the temporal approach without reference any definite period, to indicate its generality.
- ^{xix} The definition comes from Ramos and Rodriguez (1996).
- ^{xx} A common response is that "you have no theory of value, because you cannot determines price". This illustrates the importance of paradigmatic differences: for us, it is not the function of value theory as such to calculate prices before they happen but to explain what they are, once they have happened. Galilean theory, likewise, cannot tell us where moon must be; it can only tell us how it will subsequently move, once we know where it is from observation.
- ^{xxi} Not all temporal approaches reproduce conservation in circulation: for example, mark-up prices do not. This is why we have always insisted that temporalism has to be combined with the single-system approach.