A Welcome Step in a Useful Direction: A response to Changkeun Kim

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Abstract

This paper responds to Changkeun Kim's intervention in the debate between the dominant simultaneous dual-system interpretation of Marx's value theory (SDSI) and the temporal single-system interpretation (TSSI), a growing current that challenges the academic consensus. We discuss Kim's most significant contributions to the debate over the "Fundamental Marxian Theorem" (FMT), including his adherence to scholarly standards and his confirmation that the FMT is not a valid conclusion of the SDSI, while it is a valid conclusion of the TSSI. This key outcome of the decade-long debate undermines SDSI authors' claims that Marx's theory of exploitation does not work, but that their FMT can reproduce his essential insights. We also respond to Kim's argument that the TSSI is potentially circular and to his effort to remedy the apparent problem by arguing that the monetary expression of labor-time determined the nominal price of output when the gold standard prevailed. We argue that the circularity critique is inapplicable to the TSSI and put forward a contrary view of the relationship between these variables.

Keywords: Value Theory; Methodology; Marxian Economics; TSSI; Fundamental Marxian Theorem

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1. Introduction

This paper responds to Changkeun Kim's (2010) article, which intervenes in a long-running debate between two different interpretations of Marx's value theory: the *simultaneous dual-system interpretation* (SDSI), which dominates academic Marxist economics, and the *temporal single-system interpretation* (TSSI), a growing current that challenges the academic consensus.

According to the SDSI, Marx's theory is inconsistent: it can neither furnish explanations of economic reality, nor substantiate the conclusions that Marx draws from it. With respect to the issue upon which Kim's paper focuses, SDSI authors claim that Marx's theory of exploitation does not work, but that their own alternative, the "Fundamental Marxian Theorem" (FMT), can reproduce an essential idea behind Marx's theory: that all profit comes from workers' surplus labor, and thus from exploitation.

At stake is whether Marx's value theory constitutes a logically coherent basis for the main conclusions of his theory of the capitalist mode of production. SDSI authors' claim that his value theory is logically incoherent gives academic economics its principal rationale for excluding Marx's ideas from normal scholarly enquiry. The future of political economy is therefore itself at issue.

As Kim's careful survey of and commentary on the debate confirms, we have shown that the SDSI implies that profits may be negative when surplus labor is positive, and vice-versa, while the TSSI implies that this is not possible. Hence, the FMT is not a valid conclusion of the SDSI, but it is a valid conclusion of the TSSI.

Kim's welcome contribution to the debate on the FMT is threefold. He produces a *scientific exegesis* which adheres to scholarly standards that SDSI contributions to date have not adhered to. He introduces a new question into this debate, arguing that both the New Interpretation (a variant of the SDSI) and the TSSI are potentially circular because they fail to specify whether the nominal price of output determines the monetary expression of labor-time or vice-versa. And to help resolve the apparent circularity, he argues that the MELT determined the nominal price of output when the gold standard prevailed and that this position was implicitly Marx's as well.

The next section of this paper summarises what we consider most significant about Kim's contribution. In section 3 we assess it within the trajectory of the FMT debate. The subject of section 4 is a broad methodological issue that has dogged the debate and that warrants careful discussion in light of Kim's circularity critique: how scholarship can aspire to an *objective* or scientific choice between two contesting paradigms that lack a common methodological basis and assign different meanings to the terms they employ. In section 5, we take up Kim's arguments concerning the MELT and the nominal price of output and, for the first time, put forward our own views on these issues, which are the opposite of his. Section 6 concludes.

2. Kim's Contribution

The principal function of the current that has dominated discussion of Marx's value theory within economics, which we call "Marxism without Marx" (Freeman 2010a), has been to produce apologetics on behalf of capitalism. In contrast, Kim's paper marks a renewal of

scientific discussion on Marx's value theory.[1] Its significance therefore extends well beyond its specific content. For this reason, our response to his paper will deal not only with what it says, but also with the theoretical space that it has opened up.

In keeping with the refreshing impact of recent Korean Marx scholarship, Kim's paper is a milestone. The debate on the FMT had been rapidly degenerating, as a result of the increasingly pugilistic practices of, and the distortions and untruths put forward by, the TSSI's critics. In marked contrast, Kim—a new entrant into this debate and an independent voice—has shown that the debate can still move forward rather than backward. It can do so if it does what he does: return to normal scholarly standards and practices.

Instead of trying to achieve victory for his own position by any means necessary, he carefully and accurately reports what has actually being said, by both sides in the debate, before discussing his own views. He also accurately represents what is at stake in the debate, drawing out the conclusions of each main argument in order to arrive at judgments, for which he states his reasoning. In another context, this might not be a significant achievement, but in light of the degeneration of the debate on the FMT and of "Marxian economics" in general, it certainly is one. Given the intricacies of the FMT debate, the shifting positions, and the distortions that Kim had to sort out in order to provide us with an accurate summary of the trajectory and current state of the debate, it is a particularly hard-won achievement.

Another significant merit of Kim's paper is that it recognizes that different things are required of different kinds of theories, and that the TSSI has been subjected to unwarranted criticism of the TSSI because it "fails" to fulfill requirements that it in fact does not need to

[1] Subsequent references to Kim's paper will be indicated in the main text, by page number only.

fulfill. In section 3, we will argue that Kim's recognition of this problem does not extend far enough, but it is important that he recognized this little-appreciated problem at all.

Kim criticizes not only simultaneist contributions to the debate, but TSSI contributions as well. But whereas almost all of the simultaneist critics of the TSSI—Rieu (2009) being a notable exception—rule out the TSSI *a priori*, on methodological grounds, Kim treats both sides' theories and interpretations as admissible, i.e., as worthy of being tested. This is not only a refreshing change; it is important in a scientific sense, and in our view it is the greatest merit of his paper. It is through the testing of ideas that intellectual development takes place, while the *a priori* exclusion of some ideas on methodological grounds prevents them from being tested and thereby hinders intellectual development.

Kim argues that the simultaneist New Interpretation and the TSSI are both potentially circular because they fail to stipulate whether the aggregate price of output determines the monetary expression of labor-time (MELT), or whether the MELT determines the aggregate price. To rectify this apparent problem, he further argues that the MELT, along with the aggregate value of output, determined the aggregate price when the gold standard prevailed. The crux of his position is that the MELT was the reciprocal of the value of gold, which was exclusively determined by production conditions in the gold industry, independently of variations in aggregate price. Kim also argues and puts forward evidence that this was Marx's view as well.

Our prior writings have not discussed which variable is (or was) a determinant of the other because, as we shall explain in section 4, we do not think this issue has anything to do with the TSSI. And because the issue has nothing to do with the TSSI, we shall argue, *Kim's position and his interpretation of Marx are fully compatible with the TSSI, not a position and an*

interpretation contrary to it. This does not mean that we, personally, agree with his position or interpretation. As we noted above, we agree with neither. But that is an entirely different issue.

3. The Trajectory of the FMT Debate

A longstanding dispute

The underlying ground of the dispute over the FMT is a longstanding conflict in political economy (Freeman 2010b) between two entire alternative approaches which, following Kuhn (1970), we term *paradigms*.[2] These are simultaneism and temporalism. Simultaneist Marxian economics is just one simultaneist theory; a better-known one is neoclassical general equilibrium, while "bastard Keynesian[ism]" (Robinson 1962, p. 690) is yet another. Simultaneism is the natural refuge of apologetics, since it begins by supposing that capitalism reproduces itself perfectly. This eliminates *a priori* the possibility that reproduction might fail, which implies that Marx was wrong to argue that capitalism contains internal contradictions. This is why we characterized the simultaneist "Marxism without Marx" current as apologetic current at the start of section 1. Its models have substantial implications for political theory, not to mention humanity.

All versions of what we shall call the "Simultaneous Interpretation" (SI) of Marx define values, prices, and profits as solutions to simultaneous equations. SI is dominated by the "Simultaneous Dual-System Interpretation" (SDSI), which claims to represent Marx's ideas better than Marx did. Its crown jewel is the FMT. According to SDSI authors, its FMT

[2] Because Kuhn used this term to mean many different things, it led to confusion and so he stopped using it. We trust that its meaning as used below is clear.

reproduces Marx's conclusion that all profit comes from workers' surplus labor, and thus from exploitation. Moreover, it reproduces this conclusion from the "physical" structure of production, that is, the use-values consumed and produced, *without any reference to "labor values."* Thus, SDSI authors further claim that Marx's value theory is superfluous (and inconsistent, for other reasons). It therefore has to be abandoned.

Our prior writings on this issue have disproved these claims, while also showing that if the SDSI's alien imposition of a general equilibrium framework is rejected in favor of the TSSI, Marx's conclusions are a valid deduction from his own value theory, which is therefore not superfluous. Specifically, we have shown that:

(1) within any SI, positive profits can occur with negative surplus labor, and negative profits can occur although surplus labor is performed. Therefore, the FMT cannot be deduced from any SI.

(2) the FMT is a correct deduction within the TSSI. Therefore, Marx's theory, provided it is interpreted temporally, can and does provide a logically valid explanation of the origin of profit.[3]

Abandonment of scholarship

As this debate has "progressed," SI authors have abandoned even rudimentary standards of scholarship (Freeman and Kliman 2009), as part of a process that Kliman (2010) terms the

[3] The truth of a conclusion is guaranteed only if it is *both* logically valid and based on true premises.

"Disintegration of the Marxian School." Their practices have become increasingly pugilistic.[4] Their aim is not the scholarly aim of resolving the theoretical issues involved, but the rhetorical aim of discrediting their critics. They concentrate on minor technical objections, all of which have been refuted and most of which have been shown to flow from trivial errors of logic or willful ignorance of the basics of temporal mathematics. They misrepresent what has been said with growing and unacceptable frequency, and never acknowledge when one of their propositions has been clearly refuted. Their responses have come to resemble hermeneutic cattle-raids, in which they snatch any quotation they can brand in order to increase their stock, while fleeing from efforts to settle any substantive issue.[5]

Although Kim's paper is also critical of our prior writings, it stands poles apart. He takes care to accurately report the standard SDSI claim that surplus labor is necessary and sufficient for positive profit in their models, at least when no joint products are produced, and Duménil and Lévy's (2000, p. 142) claim that "the core of the explanatory power of the labor theory of value lies in the analysis of exploitation." All SDSI scholars accept these two claims, which lie at the heart of their project.[6] Kim also reports Kliman's (2001, p. 109) statement that "simultaneism

[4] "In place of disinterested inquirers there stepped hired prize-fighters; in place of genuine scientific research, the bad conscience and evil intent of apologetics" (Marx 1990, p. 97).

[5] See Sinha (2009) for a particularly scandalous example, and the ensuing open letter to the editorial board of the *Review of Radical Political Economics* that requests its retraction of Sinha's piece (Freeman, Wells et al. 2010).

[6] The SDSI's FMT was first proposed by Okishio (1993a, 1993b). Okishio's own views are systematically misrepresented in the English-language literature, which ignores the evolution of

and the exploitation theory of profit are incompatible," which accurately represents the core of the TSSI position. Kim thus takes us to the heart of the dispute.[7] Accurate reporting of what each side actually says matters a great deal, because *theory and interpretation* matter a great deal. By accurately reporting what has actually been said, Kim enables scholars to judge the specific claims made by the SDSI and TSSI, and their validity as a whole.

Validity and admissibility

Why did the debate on the FMT degenerate, prior to Kim's entrance into it? We believe that, in order to answer this question, it helps to understand the difference between and the relationship between two ways in which theories are assessed. They are assessed in terms of what we call their *validity*, and in terms of what we call their *admissibility*.

To exclude dogmatism, we offer a "tolerant" definition of validity: a body of theory is valid if it explains what it claims to explain. This allows a valid theory to contain contradictions, if they can be resolved by developing the theory further, and even to contain false theorems, if they can be dropped without damage to the theory's central ideas. By this definition, Galileo's theory of planetary motion was valid, although it lacked a developed concept of gravity and offered a defective theory of tides, because it established his main point: the planets move round the sun instead of the other way around.

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his thought after his early papers on the rate of profit and the FMT in the 1960s. Space does not allow us to address this here.

[7] The TSSI is the work of more than the one or two scholars that Kim discusses. In particular, the concept of the MELT was first formulated and developed by Ramos and Rodriguez (1996). As this discussion develops, we hope their work will receive the attention it deserves.

Even on this tolerant definition, we do not see how any serious scholar can now regard the SDSI as a valid theory. The SDSI *justifies* itself as an explanation of origin of profit under capitalism, with the FMT as evidence. But since, as we have shown, its FMT does not hold true in real-world capitalism, it is an invalid theory.

The validity of a theory must be tested by scholarly means: using evidence, argument and proof. *But it will be tested only if it is first accepted as admissible—sufficiently coherent to warrant being tested.*

For TSSI scholars, all SI theories are perfectly *admissible*. We believe that under test they have proven to be *invalid*, but this is no reason to dismiss them from scholarly discourse. The rhetorical strategy of the SI authors such as Veneziani, Mohun, Mongiovi, and Sinha, in contrast, is to declare the TSSI inadmissible. They look for imagined flaws in the TSSI, declare the whole idea ridiculous on that basis, and proceed as if it did not exist.

But why is it so important to them to argue that the TSSI is inadmissible? The SDSI was known from the get-go to contain serious internal flaws, such as predicting negative prices. But there seemed to be a limited case for using the SDSI, because no superior alternative existed. It seemed to be the best we could expect, and a theory which supplies at least some valid conclusions is better than no theory at all. Yet this case collapses if the Marx's theory, as understood by the TSSI, is valid, since this theory then supplies not only the limited conclusions that do follow from SDSI, but also those—above all, the FMT—which the SDSI claims to supply but in fact cannot. Thus *the SDSI's defenders employ the rhetorical strategy of declaring the TSSI inadmissible, in advance of any test, in an attempt to prevent the validity of Marx's theory from being tested.*

These old tactics have nothing to do with science. The Inquisition declared Galileo's theory "absurd, philosophically false, and formally heretical" (see Halsall 1998). This describes almost literally the way that the SDSI's defenders react to the TSSI. Similarly, as Freeman (2010b) notes, without Böhm-Bawerk's (1984) concerted onslaught on the admissibility of Marx's ideas, his shaky defense of marginalism could never have succeeded. In each case, the ploy of declaring a theory inadmissible has the suppressive aim of preventing it from being tested.

An adequate definition of validity must include a judgement as to whether a superior alternative exists. To arrive at such a judgement, alternative paradigms must be tested. The strategy of the SDSI's defenders, like the anti-Galilean Catholic scholars and Böhm-Bawerk before them, is to avoid this test by declaring the alternative inadmissible. Kim's article, like that of (2009), treats both the SI and the TSSI as admissible, thereby opening the door to genuine tests of validity. Therein, as we said, lies its great merit.

Zombie Marxism

The debate on the FMT has produced little of theoretical depth. Nevertheless, we believe that it has established, beyond any reasonable doubt, that the FMT *can* be deduced from Marx's theory (when it is understood in accordance with the TSSI). This means that Marx's own ideas are a logically valid basis for developing Marxist theory. Moreover, as Kim confirms, the debate has also established that the FMT *cannot* be deduced from any SI. To put it bluntly: the SDSI's main theorem has been proven false. Thus, by pronouncing the FMT the *sine qua non* of "Marxist" theory, SI authors have hoisted themselves on a petard of their own choosing.

Outside of the Sarah Palin School of Dispute Resolution, this would be regarded as grounds to question the underlying theory. The "Marxism without Marx" project no longer rests on any serious theoretical foundation. It is time to move on, and Kim's article shows how this can be done.

4. Simultaneism, Temporalism, and the Assessment of Theories

In this section, we first discuss the positive aspects as well as the limitations of the methods that Kim employs to assess theories and interpretations. One key limitation, we argue, is that his methods prove insufficient when different paradigms use the same terms to mean different things. We argue further that, owing to this limitation, his paper does not fully recognize that *determination* means different things to simultaneists and temporalists, and that this problem is the source of his conclusion that the TSSI is potentially circular because the magnitudes of its variables are not fully determined. We then explore the differences between simultaneist and temporalist concepts of determination in some detail, employing examples from physics as well as from the FMT debate. We argue that temporal theories result in knowledge even though some of their variables are left "indeterminate" and, indeed, that they advance knowledge by replacing determined variables with "indeterminate" ones.

How are judgments about theories arrived at?

We have some differences with the methods that Kim employs when assessing theories and interpretations. Let us first note, however, that since he excludes neither the SI nor the TSSI *a*

priori, he is able to pinpoint the fundamental defect in SI authors' responses to our demonstrations that their theories are incompatible with Marx's exploitation theory of profit.

In order to appreciate the fundamental defect that Kim identifies, some background is needed. Kliman showed that the SI ignores an important case in which the FMT does not hold. In real-world capitalism, there are always some "negative net products"— society produces less of some goods than it consumes. It is therefore logically possible that the simultaneously-determined aggregate price of the net product is also negative. In that case, all SI theories and interpretations imply that profit is negative even though workers are exploited. In response to this demonstration, Mohun and Veneziani defended the SIs' failure to consider the case of negative net products by arguing that realism is not a requirement of a valid theory.

As Kim (p. 291, emphasis added) notes, this response is a non sequitur:

> Mohun and Veneziani (2007: 140, 141) … asserted … that "no theory is entirely realistic" because "all theory make[s] assumptions. All theories abstract from empirical reality." *Yet their argument is not right because Kliman's claim is that [their FMT ...] "does not apply to the real world" with negative net products, so that TSSI is a superior interpretation .... Therefore, Mohun and Veneziani's argument [constitutes] an acknowledgement of Kliman's critique.*

In other words, Mohun and Veneziani's tacit acknowledgement implies that all SI theories are invalid, since they are incompatible with the principal theory they purport to vindicate. Any claim to the contrary is an affront to reason.

When there is general agreement across paradigms on the way to judge between contesting assertions, as in the case above, Kim's focus on identifying, accurately and precisely, what each side says, allows him to make sound judgments. However, this way of assessing

different paradigms is insufficient when they assign different meanings to apparently uncontroversial terms. In such cases, due attention to these different meanings is also needed in order to avoid making unsound judgments. Unfortunately, Kim's paper is not sufficiently attentive to the different ways in which the term *determination* is used by simultaneists and temporalists.

To some extent, he does recognize that a difference exist, when he criticizes Veneziani for imposing on the TSSI the requirement that its variables should be "determined"—by which Veneziani meant something rather specific and peculiar to the simultaneous method: that it should be possible to calculate the variables' exact magnitudes without any additional, external information. Kim (p. 301) rightly notes that this is a requirement of the simultaneous method, not of the temporal method: "because Veneziani assumed [a] steady-state equilibrium, his [critique of the system of equations on the grounds that it is underdetermined] can apply only to SSSI (Simultaneous Single-System Interpretation) …. [I]n the case of TSSI, where the stead[y] state condition cannot be imposed, there can be no underdetermination …."

The error that Kim has identified here is that Veneziani attempts to find fault with the TSSI because it does not satisfy *a requirement that it does not need to satisfy.* Because the TSSI is temporalist, not simultaneist, there is no need for all of its variables to be determinate.[8]

[8] Veneziani's objection reduces to the assertion that temporal determination is inadmissible because he has a different conception of determination. On this basis, anybody can reject or agree with anything, and authoritative knowledge is reduced to academic status. This may be acceptable for the purposes of securing publication or research funding, but is not a secure basis for a sustainable or just social order.

Elsewhere, however, Kim inadvertently commits the same kind of error when he tries to apply the simultaneist concept of "logical priority" to temporalist arguments. He argues, correctly, that either the MELT must be "determined *logically prior*" (p. 292, emphasis added) to output prices, or vice-versa, in Duncan Foley's New Interpretation—a simultaneist interpretation—and that this interpretation is potentially circular because it fails to stipulate which variable has logical priority (pp. 292–93). The error arises when he applies the same argument to the TSSI. "Kliman seems to fail to escape from Foley's circular reasoning despite … his temporalism. For in equation[s] (19) and (20), [the MELT] can be determined … only when [output prices are] determined beforehand" (p. 303). Yet there is no necessary order of determination in an algebraic identity. The equations in question express a relation between five magnitudes. If we know any four them, we can calculate the fifth. There is nothing inherent in the equation that tells us we *have* to start by knowing the MELT or by *knowing the output prices.* The phrase "logically prior" has no useful meaning in this context.

Consider one of the most well-known formulae in mathematics, Einstein's mass-energy equation:

$$E = mc^2 \qquad (1)$$

The interpretation of this identity depends on what we desire to know. c is a "parameter"—it is a constant, known as a result of experiment external to the equation. To find the energy released by a gram of matter in a nuclear reaction, we set m = 1 gram and calculate E. But we could just as easily set E equal to a specific quantity of energy and find the mass it would produce—for example the energy involved in accelerating a particle from rest. The "order" of movement from unknown to known quantities depends on the task at hand, not the positions of variables in the equation.

As regards the MELT, the task is "find how much labor-time a given amount of money represents, when it is used to purchase means of production or labor-power." Provided that we know the aggregate price of output, $P(t + 1)$, the used-up constant capital, $C(t)$, living labour, $L(t)$, and the temporalist MELT, $\tau(t)$, we can determine $\tau(t + 1)$. And we can do so; $\tau(t)$ is determined recursively, that is, temporally, from P(t), C(t—1), L(t—1), and $\tau(t$—1) —as Kim (p. 303) recognizes in the citation we have already given—and $P(t + 1)$, $C(t)$, and $L(t)$ are *data*; we simply go out and observe them. *Note that the SDSI obtains its "technical coefficients" in exactly the same way that the TSSI obtains* $P(t + 1)$, $C(t)$, and $L(t)$*, since no equation in the SDSI price system tells us what their magnitudes will be or how they are determined. The technical coefficients are therefore just as "indeterminate" as the TSSI variables.*

If, on the other hand, the task were "predict the labor-time value represented by the total price of output $P(t + 1)$," it is true that this could not be accomplished without prior knowledge of $\tau(t + 1)$. But the TSSI makes no attempt at such a prediction. There is therefore no need to determine or calculate τ externally; it has no "logical priority."

From where do "circularity" and "logical priority" arise? From the simultaneous method. Normal causation happens in time. If τ(t) "causes" $\tau(t + 1)$ in some sense, because τ(t) happens first, there is no circularity. A problem of circular causation arises only if we say that τ(t) must necessarily equal $\tau(t + 1)$, because then—that is, if we apply the simultaneous construction—there is no order in time. Simultaneism is thus inherently circular: it wants the past to cause the present, and the present to cause the past, all at once. *"Logical priority" is, quite simply, a substitute for chronological priority.*

Simultaneism substitutes its own distinct concept of causation: prediction. But since prediction implies knowledge in advance of time, which occupies no place in simultaneism, its

place is taken by *calculation*.[9] A simultaneist theory is valid (in its own terms) if it yields a calculation that predicts prices and profits, by which it means that it yields a numerically exact calculation of these magnitudes. A theory becomes inadmissible, for a simultaneist, if it yields two conflicting calculations, or fails to yield a calculation. Simultaneism's replacement of causal determination with calculation is what lies behind the abhorrence, which all simultaneists express, towards any hint of underdetermination, and also their peculiar obsession with the number of equations and the number of unknowns, a preoccupation which never fails to bewilder the uninitiated, for the simple reason that it is encountered in no other branch of science.

Cause and determination in the simultaneous and temporal paradigms

The TSSI state-transition equations link a series of variables at time t to the value of these same variables at time $t + 1$, so that $X = \{v, p, C, V, \ell, A, x, \pi, \tau\}$ includes, at least, the vector v of unit values, unit prices p, constant and variable capitals C and V, direct labour inputs ℓ, material inputs A and outputs x, a vector of profits π, and τ, the MELT. What does it deduce from these equations? Not the magnitudes, for all time, of v and p, but Marx's "universal laws" that the total price equals total value and that total profit equals total surplus-value. From these, we deduce the law of the tendency of the rate of profit to fall. These—and other—relations hold, quite regardless of the actual magnitudes of p or π.

Not least of these universal relations, as Kliman (2001) showed, is the Fundamental Marxian Theorem. It seems to have escaped all of the critics—who lay charges of theoretical vacuity and tautology at our door with equal felicitude—that, given the TSSI equations, the FMT cannot *but* be true. It is precisely a universal law of the nature of Kepler's laws or Maxwell's

[9] One of the earliest commentators to point this out was Shaikh (1984, pp. 50–51).

deduction of the wave nature of light, because it must apply regardless of what additional determinations are added.

A temporalist simply has a different notion of causation from a simultaneist. Temporalists have no need for the simultaneist conception of determinacy. The temporalist concept of cause is more or less identical with the commonsense Kantian intuition of the natural scientist or indeed, the common citizen. The latter requires refinement and is contested, but our point here is that it underlies a different way of thinking about the world from the simultaneist way, and, above all, an *admissible* way of thinking. The commonsense notion of cause is that A *is a cause* of B if B invariably happens *after* A *in time*. If, additionally, an explanation can be furnished for this observation, we have a temporal theory.

We can formalise this in the language of state-transition theory. Let X_t be a vector of all the state variables at time t. This "causes" a succeeding state of affairs at time X_{t+1} if we can specify a relation between X_{t+1} and X_t of the form

$$X_{t+1} = f(X_t) \tag{2}$$

Or, expressing the same thing in continuous time, as is normal, we have the differential equation

$$f(X, X', X'', ...) = 0 \tag{3}$$

This equation does not have to be fully specified to provide information about causation. Typically, differential or difference equations do not yield complete predictions; they yield families of solutions, dependent on the initial conditions. Some of the variables are separated out and designated as "parameters," which means that their magnitudes are given externally. Thus if X consists of the two vectors $\{a; x\}$ where a is a vector of parameters, then equation (2) becomes

$$x_{t+1} = f(x_t, a_t) \tag{2a}$$

$$a_{t+1} = g(t) \tag{2b}$$

where $g(t)$ is a function of time alone, so that the determination of the parameters is external to the system. (The parameters are often constants, but do not need to be.) In the context of Marx's theory, we may think of x as the vector of unit prices, values, quantities of use-values produced and consumed, profits, and the MELT. We may think of a as a vector of the "technical coefficients" of production and the consumption baskets of the workers and of the capitalists.[10] The interest, in a temporal framework, lies not in obtaining a fully specified solution, which arises only when the initial conditions or parameters are known. It lies in establishing *invariant laws of motion* which hold *whatever the parameters and initial conditions are*.

To anyone who has studied physics, this is very familiar. When one reads a textbook on Newton's law of gravity and the determination of planetary motion, one does not find tables of the future positions of all the planets from now until eternity or even a formula for calculating them. This one may safely leave to the astrologers.

One instead finds—and this suggests the reasons for physics' superiority over both astrology and economics—the deduction of Kepler's laws. For example, one finds the first law, "The orbit of every planet is an ellipse with the Sun at one of the two foci," mathematically expressed as

$$r = \frac{p}{1+\varepsilon \sin\theta} \tag{4}$$

[10] We will return soon to the possibility that the prices and profits may "react back" on the parameters; for example, if the wage falls, the consumption basket of the workers will change. The point is that theory can be valid without specifying the particular *way* in which this basket changes.

where (r, θ) are coordinates that tell us where the planet is, and p and ε are parameters that describe the size and shape of the ellipse that the planet moves along. *This relation is true regardless of the actual mass, velocity, or position of the planet in question.* It is a universal law, governing the causation of astronomical events, which does *not* require the variables which figure in the equation to be fully specified.

Thus, an equation system is perfectly capable of providing *knowledge* regardless of whether it allows us to *calculate* the magnitude of its variables. This is because the precise calculation is possible only when additional, case-specific or theory-specific restrictions are added. So, for example, if we specify that we are dealing with the planet Neptune, that its mass is x, its velocity at a particular date is y, and that it orbits a sun of mass z at distance w, then the equations tell us where Neptune will be on 1 December 2012.

This prediction could be wrong. For example, it could fail to take into account the disturbing effect of solar radiation, or the interaction of the solar system with distant galaxies or even our inadequate comprehension of the many-body problem. If we wished to make good this failing, we would need to provide *additional theoretical considerations*—a theory of the interaction between the gravitational and electromagnetic forces exerted by the sun, a theory of stellar evolution, a comprehensive solution of the many-body problem,[11] and so on. A *complete* theory—yielding a complete, concrete prediction—combines many abstract determinations, of which the theory of gravity is only one.

Thus, the theory of gravity, on its own, simply does not yield predictions. That is not what it is for. Its true utility is that it offers one element in a system of knowledge yet to be completed, which nevertheless *adds* to knowledge, by providing us with certain relations which

[11] Good luck, and don't hold your breath.

must be obeyed by any further determinations. It is an "open" system, in that it does not yield precise predictions, but specifies constraints on the relations in question, to which all concrete predictions must conform.

This is confirmed by a second example, arguably the most influential and beautiful temporal equation system of the modern world: James Clerk Maxwell's 1864 system, which showed that light was an electromagnetic phenomenon.[12] Maxwell's equations showed that light arises from the interaction of electrical and magnetic fields, something hitherto utterly unknown. Almost every invention depends on them in one way or another. They govern the "gamma rays" emitted by radioactive substances, the X-rays without which modern medicine would be a very different animal, the ultraviolet light that fuels the suntan industry and governs whether our planet will survive, the visible spectrum and the world of sight, the radiation that runs the modern microwave oven, all waves used by the wireless industry and its modern offshoots and, not least, the electricity industry. Without these equations, the modern world would not exist. Of them, Albert Einstein (1940, p. 489) wrote:

> The precise formulation of the time-space laws of those fields was the work of Maxwell. Imagine his feelings when the differential equations he had formulated proved to him that electromagnetic fields spread in the form of polarised waves and with the speed of light! To few men in the world has such an experience been vouchsafed ... [I]t took physicists some decades to grasp the full significance of Maxwell's discovery, so bold was the leap that his genius forced upon the conceptions of his fellow-workers.

[12] See, for example, Evans (2001).

This does not leave much room for doubt that these equations convey *knowledge*, by any definition of that word. *Yet no variable within them is determined.* Determination is given when additional, external information is supplied—external conditions, parameters, constants, the nature of the material through which the wave travels, whether it is boxed in or travelling through free space, and so on.

It is precisely because these laws are "indeterminate"—that is, unrestricted to any particular case—that they convey knowledge, because they describe what is generally true, instead of limiting their relevance to one particular case, as occurs when additional determinations are provided.

The requirement of complete determination, and the idea that calculation is simply a synonym for causation, is unique to the peculiar world of simultaneous determination, and appears nowhere else in scientific thinking. The basic facts about temporal mathematics which we have merely outlined above are routinely taught to undergraduate students of engineering and physics, and are common knowledge to almost entire community of natural scientists. The arrogance which proposes they should not merely be ignored, but pronounced inadmissible, is breathtaking, and to be found only within the community of economists. It has trapped their thinking in a prison entirely of their own making. The sooner a gateway is opened from the fantasy world of simultaneism to reality, the better.

The two examples we have given display the irredeemable confusion which the simultaneous approach has created in economics. For the economist and the simultaneist, knowledge is *equated to determination*. For the temporalist and the rest of the world of the sciences, knowledge arises when particular *determinations are replaced* by a more general set of relationships that do not themselves determine magnitudes.

Marx's value theory as understood by the TSSI conveys knowledge, even though it does not determine the magnitudes of all its variables, because it tells us things that the observed data themselves do not communicate directly. For instance, it tells us why and come profit originates; it tells us what the real (as distinct from the nominal) values of commodities' depend upon and in what manner; and it identifies how money prices and the amounts of labor-time they represent are related. It *explains* what is observed, revealing the essence that underlies the surface appearance. This is very purpose of theory. Calculation is not. People could successfully calculate the movements of the planets for millennia, in the absence of Newton's theory of gravitation, by means of careful observation. What his theory added was an explanation of *why* the calculations were successful.

5. Money, Value, and Marx

This section first discusses why we believe that Kim's position on how the MELT and the aggregate price of output were determined under the gold standard is fully compatible with the TSSI, even though it is not our position. We then spell out what the TSSI can say, and what it can't say, about the relationship between the MELT and aggregate price. We then discuss the textual evidence that Kim has produced in order to argue that his position was Marx's as well, a passage in which Marx appears to argue that gold exchanged at its value. Finally, we make an empirical argument that the MELT did not determine aggregate price under the gold standard, because aggregate price varied independently of commodities' values and the value of gold, an interpretive argument that Marx was aware of this independence, and a logical argument that this independence implies that gold could not have exchanged at its value.

What is compatible with Marx's value theory, and with the TSSI?

Kim seems to maintain that when a gold standard prevails, Marx's *value* theory requires a necessary, fixed, and inviolable relation between the value of gold and the nominal price level. He also seems to maintain that, if the TSSI fails to express this necessary, fixed relation, it is an invalid interpretation of the original theory. Below, we explain why we do not agree.

Let us begin by attempting to clear up a couple of confusions pertaining to the relationship between the TSSI, our position (which we will set out later) on how the nominal price level and the MELT were determined under the gold standard, and Kim's rather different position. Because Kim (pp. 303–04) does not distinguish between our writings and the TSSI, he contends not only that our writings are guilty of circular reasoning, but also that the TSSI itself is circular. Given this premise, his own position on how the nominal price level and the MELT were determined becomes a "non-TSSI" position. Although we do not agree with his position, we wish to make clear from the outset that our writings and positions are not the same thing as the TSSI, and that Kim's position is, in our view, fully compatible with the TSSI.

The TSSI attempts to represent Marx's system of reasoning about value, price, and profit within the capitalist mode of production. In doing so, it leaves unanswered many other questions, about capitalism and about Marx's work. Much confusion has arisen because the TSSI's critics sometimes seem to think that it is a theory of capitalism. But it is not a theory, much less a theory of capitalism. It is an exegetical interpretation of Marx's own value theory, an interpretation that renders that theory admissible.

The resulting value theory is applicable to capitalism in all times and places. This does not mean, however, that everything about the capitalism of a particular time and place, or even

everything about value, price, and profit in a particular time and place, can be deduced immediately from the value theory alone. Additional concrete determinations are needed.

Any complete theory of the capitalism of a particular time and place would need to specify much more than is to be found in the general value theory. It would have to state, for example, how we may expect capitalists to respond to a falling rate of profit—whether they will continue to invest or whether they will stop, divert into speculative activity, instigate fascism, go to war, resort to imperialism, or respond in some other as yet unknown way. It would have to specify how workers will react to the persistent and oppressive attempts to extend the working day and lower the wage. It would also have to specify the specific form that money takes, at any given stage in capitalist development—to what extent commodity money, fiat money, token money, or credit money can fulfil the contradictory requirements of measure of value, standard of price, means of circulation, means of payment, store of value, or world money, all of which Marx identified as functions that money is called on to perform at different and often historically specific points in the evolution of the capitalist mode of production.

Because different theorists' understandings of the relevant additional concrete determinations can differ, Marx's value theory as understood by the TSSI is in principle compatible with, and it can indeed be the basis of, many different theories about the capitalism of a particular time and place, including theories that are incompatible with one another. The TSSI thus creates a *theoretical space* to explore a wide variety of theories and to develop them on the basis of the value theory. In this sense, the TSSI is an open system like the theory of gravity,[13] the polar opposite of the stultifying world of simultaneist determinism—in reality, a poorly-

[13] See Chick and Dow (2005) for a discussion of the meaning of "open systems" and its applicability to economic thought.

disguised positivism—within which there is only one correct solution, one determination, one calculation, and one theory that can even be discussed, let alone tested against reality or against Marx's own ideas. The TSSI does not preclude any theorist from adding additional determinations, not even the supposition that prices remain constant over time, as the simultaneists assume.[14]

So, for example, if we wish to specify that gold directly performed all functions of "money" under the gold standard, as Kim seems to propose, we would need to supplement the TSSI equations with an additional equation or equations which state that paper money was constrained to function as a store of value, by virtue of the legal requirement that a unit of paper money must equal a fixed quantity of gold. This would be a valid theory or interpretation—to be tested as with any other valid theory or interpretation—but it would constitute an additional restriction, not an alternative to the TSSI.

None of the above implies that the concrete theories of a particular form of capitalism can *evade* the conclusions of the value theory. A theory that proposes that banks can create value, or that technological innovation can offset the falling rate of profit, is simply incompatible with the value theory. Such theories, while admissible in scholarly discourse, are not simple concretizations of, or additional determinations of, Marx's value theory. They are different theories, occupying a different theoretical space, as for example the notion of a perpetual motion machine occupies a different theoretical space from the theory of the conservation of energy.

[14] It would be wrong to declare this supposition inadmissible on *a priori* methodological grounds. It is equally wrong to declare the TSSI, or any other temporal theory, to be inadmissible because it does not include one's own, idiosyncratic, additional theoretical assumptions.

This illustrates the point that, in considering alternative theories of capitalism, we always have to be conscious about the value theory in which they are embedded. In terms of the mathematical formalism of equations (1)–(3) above, a theory of capitalism fleshes out equation (2b), and rewrites it as an "endogenous" equation of the capitalist system:

$$a_{t+1} = g\,(x_t,\, a_t,\; t) \qquad (2b')$$

Thus, if one of the parameters in a specified the wage-goods that workers are likely to buy, and if we developed a theory of workers' consumption that related their choice of wage-goods to the value of labor-power, we would introduce a dependency; something that was hitherto a parameter—the composition of the wage-basket—would now depend on a variable, the value of labor-power. Such a theory would not contradict equations (1)–(3) but would further specify them. In the language of mathematics, it would *restrict* them; in the language of economics, it would *endogenize* them.

To understand this point better, let us consider technical change in more detail. The TSSI says nothing about whether technical changes under capitalism tend to replace workers with machines or whether they tend to replace machines with workers. Instead, the TSSI says that, according to Marx's value theory, and given certain other conditions, replacement of workers with machines will tend to cause the rate of profit to fall while replacement of machines with workers will tend to cause the rate of profit to rise.

Of course, Marx's overall theory of capitalism, as distinct from his value theory, holds that technical changes under capitalism tend to replace workers with machines, and to the best of our knowledge all proponents of the TSSI agree that that they do so. Our point is simply that the TSSI itself, an exegetical interpretation of Marx's value theory, does not—and, owing to its limited character, cannot—say anything about the bias of technical change under capitalism. It is

therefore compatible both with a theory which holds that technical change tends to replace workers with machines and with a theory which holds that technical change tends to replace machines with workers.

Consider, for instance, a hypothetical theory which holds that (a) technical change in capitalism tends to replace machines with workers, (b) profit therefore tends to rise in relationship to advanced capital, and (c) the rate of profit therefore tends to rise. This theory clearly contradicts Marx's own theory *of capitalism*. Yet, according to the TSSI, the inferences it makes—the move from (a) to (b) and the move from (b) to (c)—are identical to those of Marx's value theory. Such a theory would therefore be completely compatible with Marx's *value* theory (and the TSSI). It would contradict his theory of capitalism because it rests on a factual claim, (a), that contradicts his theory of technical change under capitalism, not because there is any contradiction insofar as value theory is concerned.

The nominal price level and the MELT

The TSSI does not say anything about whether the aggregate price causally determines the MELT or whether the MELT causally determines the aggregate price. It is compatible with a theory in which the aggregate price is the causal variable, and it is equally compatible with a theory in which the MELT is the causal variable. It is also equally compatible with two *interpretations of Marx*, one of which contends that his theory of capitalism identifies variations in the aggregate price as the cause and variations in the MELT as the effect, and the other of which contends that Marx's theory says the opposite. Both interpretations cannot be correct, but if the TSSI is a correct interpretation of Marx's value theory and if both interpretations are compatible with the TSSI, the reason why one interpretation is incorrect (or both are) is that it

misinterprets (or they both misinterpret) some *other* aspect of his overall theory of capitalism, such as his theory of money.

What the TSSI does say, and what it can say, about the relationship between aggregate price and the MELT is quite limited. It interprets Marx's value theory as one in which the aggregate price of output in terms of money, *Pm*, equals the aggregate value of output in terms of money, *Vm*, which of course implies that the equality continues to hold when both variables are divided by the MELT, *M:*

$$\frac{Pm}{M} = \frac{Vm}{M} \tag{5}$$

According to the TSSI, it is also the case that, in Marx's theory, the magnitude of any price or value variable in terms of labor-time is *equal to* (not necessarily determined by) the magnitude of that variable divided by the MELT. Thus

$$V_\ell = \frac{Vm}{M} \tag{6}$$

$$P_\ell = \frac{Pm}{M} \tag{7}$$

where V_ℓ and P_ℓ are the aggregate value, and the aggregate price, of output in terms of labor-time. Substituting (6) and (7) into (5), we obtain

$$P_\ell = V_\ell \tag{8}$$

The TSSI further holds that, in Marx's theory, the total price of output in terms of labor-time is *also* causally determined by the total value of output in terms of labor-time. We can therefore write

$$P_\ell \Leftarrow\!\!= V_\ell \tag{8′}$$

where $\Leftarrow\!\!=$ stands for "is causally determined by and equal to."

Thus, according to the TSSI, when Marx argued that aggregate price is causally determined by and equal to aggregate value—i.e., that the aggregate value is the exclusive source of the aggregate price—he was referring to a relationship that obtains between labor-time variables, or equivalently, between variables adjusted for changes in the MELT, not to a relationship that obtains between variables measured in money terms. This interpretation is suggested by passages such as the following, which is contained in Marx's discussion of the transformation of values into prices of production in chapter 9 of *Capital*, Volume 3: "In all periods shorter than this …, a change in prices of production is always to be explained *prima facie* by an actual change in commodity values, i.e. by a change in the total sum of labour-time needed to produce the commodities. We are not referring here, of course, to a mere change in the monetary expression of these values" (Marx 1991a, p. 266). And earlier in the same volume, when discussing the relationship between the rate of surplus-value and the rate of profit, he wrote, "Firstly, the *value of money.* This we can take as constant throughout" (Marx 1991a, p. 142, emphasis in original).

Now, substituting equation (7) into (8′), we obtain

$$\frac{Pm}{M} \Leftarrow V_\ell \tag{9}$$

Thus, on this interpretation, what the aggregate value in terms of labor-time causally determines (and is equal to) is the ratio of the aggregate price in terms of money to the MELT. For instance, if V_ℓ = 1000, then whatever the values of *Pm* and *M* may be, *Pm* must be 1000 times as large at *M.*

But this ratio is the only thing that the aggregate value in terms of labor-time causally determines. Marx's *value* theory does not and cannot tell us what the "mere … monetary expression" of aggregate value is, and thus it cannot tell us what the "mere … monetary

expression" of aggregate price is. And this implies further that Marx's *value* theory does not and cannot say whether variations in the MELT are the cause of variations in the mere monetary expression of aggregate price, or whether variations in the mere monetary expression of aggregate price are the cause of variations in the MELT, or whether both variables are causally determined, simultaneously, by some third thing.

Because Marx's theory does not tell us what the monetary expressions of aggregate values and prices are, the TSSI need not and does not make any assumption about what actually serves as money. It is compatible with the assumption that cowrie shells, or silver, or gold, or fiat money, credit money, tax-credit money, or land-based *assignats* constitute the true or ideal foundation of the monetary system. The TSSI simply argues that *whatever* functions as money, its relation to value will be governed by equation (9).

Thus, the only function of money with which the TSSI deals is the function that Marx calls "standard of price." It is also known as the "unit of account" function. In this capacity, a unit of money is merely the unit in which prices are expressed.

This implies that debates about whether instruments that have no intrinsic value are "actually" money have no bearing on the TSSI. To serve as the standard of price, an instrument need not have intrinsic value; we can and do express the prices of things, including prices of produced commodities, in terms of other things—dollars, euros, yen, sterling—that lack intrinsic value. Moreover, in both Marx's own theory and the TSSI, the real values of commodities (as distinct from the nominal expressions of these values) are determined exclusively by the amounts of labor that are socially necessary for their production. This means that the real values remain unchanged when the relationship between the real values and the standard of price changes. So it

does not matter, insofar as the determination of any real value magnitude is concerned, whether the particular instrument that serves as the standard of price is "actually" money or not.

Does this mean that the intrinsic value of money has no bearing on Marx's theory of money or capitalism? Not at all. A whole series of relations in capitalism act to limit the number of instruments that perform functions of money. Capitalism is not free to use whatever it likes as money, as the present crisis makes only too clear. This is because money cannot function as a mere instrument of circulation or a mere standard of price (see Freeman 2004). It also has to function as means of payment, store of value, and world money. These are connected as follows: in a credit crunch, sellers demand payment. They are not content to accept a promise of future payment which may never happen; instead, they want "real" money. But what is real? The "soundness" of what was previously thought to be "sound" money rests on a pyramid of promises. So it becomes a matter of urgency to convert debts that could previously be settled in Argentinean pesos, Irish punds or Greek drachmae into "hard" money, world money—dollars, euros, yen, sterling.

But even these world currencies, in the last analysis, rest on political settlements that, in turn, are established on the basis of material realities. The United States has only a limited ability to make the world to trade in dollars. That ability rests on a fast-fading economic dominance. In consequence, sellers and their ultimate guarantors, the central banks, cast increasingly nervous glances at the composition of their reserves, the unstated question left hanging being "what if?": What if dollar debts begin to fall in value, compared to yen debts or sterling debts? What if they continue to fall in value compared to commodities? And what if they continue to fall, as they so catastrophically have in recent years, compared to gold, since the rise in gold prices is merely the inverse expression of the fall in the value of the dollar? Most critically of all, what if clients

emerge who are no longer prepared to accept dollars as payment? Non-Marxists such as Eichengreen (2004) have charted this process with considerable acumen and foresight.

All theories of "the age of electronic money" to the contrary, gold still functions as a reserve of banks and central banks. The world's current monetary system is, in effect, an inverted pyramid based on the exchangeability of all commodities for the dollar, which in turn is based in a complex way on the latter's exchangeability for gold, or for some basket of gold and other produced commodities. In the event of a full breakdown of the world monetary system, the ultimate commodity basis on which the system rests would re-emerge with great force. In the meantime, it lingers in the background— in the consciousness of bankers and, in a very complex and mediated way, in the actual rates at which monetary instruments trade in the worlds' currency and money markets.

A full understanding of this process requires a *further* determination, in addition to Marx's value theory, in order to describe the current, concrete conditions of capitalism. It does not require any modification of the value theory itself.

Kim's textual evidence

Kim argues that when a produced commodity such as gold serves as money, Marx's theory holds that the MELT causally determines aggregate price, not vice-versa. This is because the magnitude of the MELT depends exclusively upon production conditions in the industry that produces the money commodity, not upon prices and values in the economy as a whole. According to Kim, the physical quantity of the money commodity is its monetary *value.* For instance, if *x* ounces of gold is the total output of the gold-producing sector, then the monetary value produced in that sector is *x* ounces of gold (or its equivalent in terms of pounds sterling,

etc.). The MELT is thus equal to the reciprocal of the value of gold—the *x* ounces of gold divided by the total amount of past and living labor that was needed to produce the *x* ounces of gold. The aggregate monetary price of output is then causally determined by this already-determined MELT and the aggregate value of output in terms of labor-time; it equals the MELT times the aggregate value.

Kim's textual evidence in support of this interpretation consists of a paragraph in the *Theories of Surplus-Value* which states that it "is impossible" for the output of a gold mine to exchange at its price of production instead of at its value "because in this case the value is expressed in the product in kind [*in der Naturalform des Produkts*—in the product's natural form]" (Marx 1971, p. 404). This statement appears to confirm Kim's view that the physical quantity of the money commodity is its monetary value. In the same paragraph, Marx writes that the gold-mining workers' labor "must be expressed" in an amount of gold-money equal to the difference between the monetary value of the total output and the amount of gold-money that replaces the constant capital that was used up (Marx 1971, p. 404). This statement also appears to support Kim's interpretation, because it appears to confirm that the new monetary value added by gold-mining workers depends exclusively upon production conditions in that specific industry, in contrast to what occurs when a produced commodity does not serve as money.

However, we urge that great caution be exercised when interpreting this paragraph. It is unclear that Marx is stating his own view, much less that he is stating his definitive view. In the first place, the paragraph appears in the midst of a discussion of Richard Jones' theory of rent, and Marx may here have been working out the implications of Jones' theory, rather than his own theory. (Much of the *Theories of Surplus-Value*, which is a work in the history of economic thought, summarizes and interprets prior authors instead of developing Marx's own views.) It is

perhaps noteworthy that Marx placed this paragraph between brackets. The import of the brackets is unclear, but it is possible that he used them to distance his own view from the text or to indicate that the argument in the text is implied by what Jones wrote.

Secondly, not only is the *Theories of Surplus-Value* a manuscript that Marx himself did not publish, but the paragraph in question seems to have been written in haste and not subsequently revised by him. It contains a somewhat detailed but very simple numerical example, and in the version of the paragraph that is contained in the *Marx-Engels Collected Works* (Marx 1991b, p. 324), the numbers do not add up.[15]

Thirdly, the argument presented in this paragraph seems to be an "orphan." Marx does not explore its implications further in his discussion of Jones. Nor, to the best of our knowledge, does an argument like the one that Kim quotes appear anywhere else in Marx's works. In particular, no argument like this appears in volume 3 of *Capital,* which was written later and which contains a very long and detailed analysis of rent (including rent of mines) and of the relationship between values and prices of production when rent forms a part of the commodity's price.

[15] The numbers do add up in the version of the paragraph that Kim quotes and in the version contained in the *Marx-Engels Werke.* It is likely that Karl Kautsky, who first edited the *Theories of Surplus-Value,* altered Marx's numbers, and that these latter two versions of the paragraph are based on his redacted text. We have not yet had the opportunity to consult the authoritative new *Marx-Engels-Gesamtausgabe.*

Did the Value of Gold Determine Aggregate Price?

But let us assume for the sake of argument that the paragraph *does* state Marx's definitive view. Two problems still remain. The first is that it is far from obvious that the paragraph's crucial premise, the premise that "the value is expressed in the product in kind," is correct.

What emerges from production "in kind" is gold itself, its physical substance. And according to Marx's theory, if gold serves as the money commodity, it expresses value; it is the socially recognized measure, or expression, of value. Thus, in the gold-mining industry, the substance that expresses value emerges from production in kind. We could also say that the expression of value emerges in kind. However, it does not immediately follow from this that the specific *amount* of gold that has been produced is the expression, in kind, of the specific *amount* of value that has been produced in the gold-mining industry. (Why is this specific amount of gold not instead the expression in kind of, for instance, the specific amount of value that the mine owners appropriate, and which can differ from the specific amount of value produced in the mines?) In order to justify the claim that "the value is expressed in the product in kind," some argument must therefore be provided. But the paragraph provides no such argument.

Yet the paragraph's conclusion, that gold must exchange at its value, rests crucially upon the premise that "the value is expressed in the product in kind." According to the paragraph, it follows directly from this premise that it "is impossible" for the gold to exchange for more or less than its value. So if the specific amount of value that is produced in the gold mines is *not* expressed in the product in kind, the paragraph fails to show that the gold must exchange at its value.

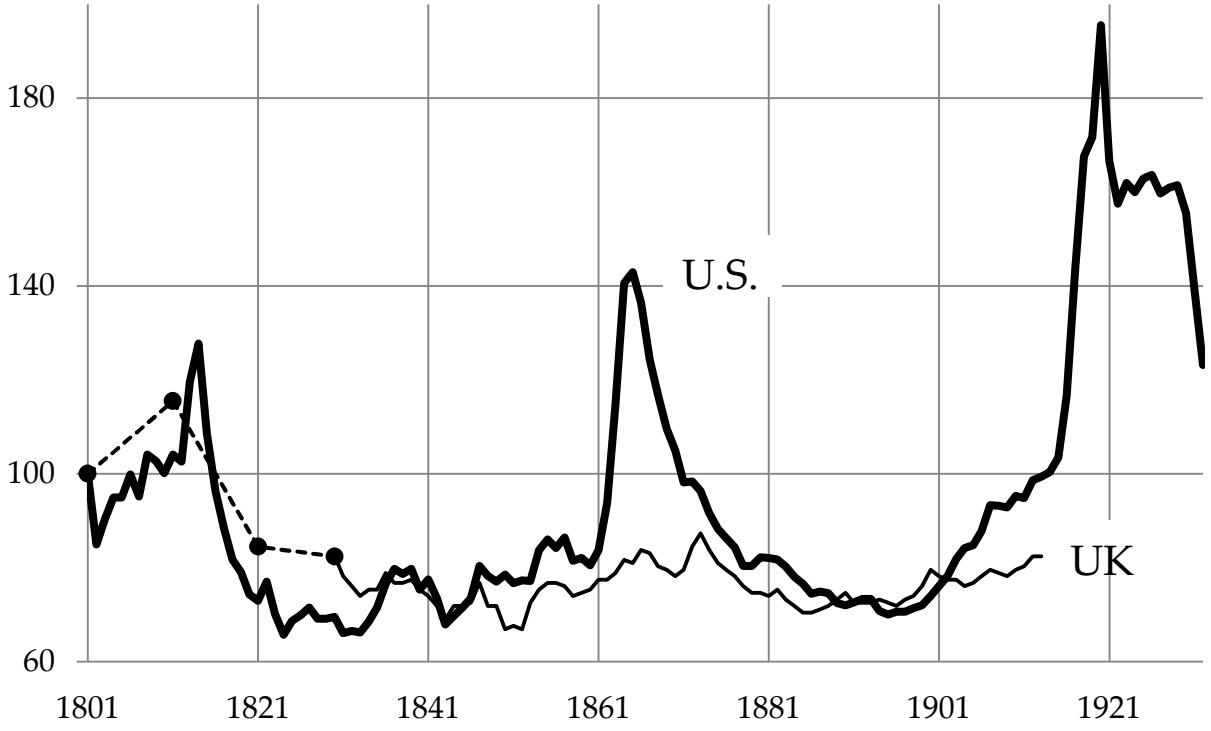
The other problem that remains has to do with how the MELT and the aggregate money price of output are determined when gold serves as the money commodity. It is important to note

that the paragraph in question does not explicitly discuss this issue. But Kim argues that it can be *inferred* from the paragraph that the MELT must equal the reciprocal of the value of gold in this case, and that the aggregate price must equal this MELT times the aggregate value of the output in terms of labor-time. However, we shall show presently that the aggregate price of output was not actually determined in this simple manner when gold served as a money commodity. This implies further that the MELT, which is the aggregate price of output divided by the aggregate value of output as measured in terms of labor-time, did not equal the reciprocal of the value of gold.

Historical data on the price of aggregate output are not available, so Figure 1 uses the Gross Domestic Product (GDP) price deflator, which is an index of the price of "a unit of GDP," as a proxy.[16] The data for the United States span the period between 1801 and 1932, after which the U.S. abandoned the gold standard domestically. The data for the United Kingdom span the period between 1801 and 1913, after which it went off the gold standard. In the years prior to 1830, estimates for the UK are available only for the years 1801, 1811, and 1921.

[16] GDP differs from the price of aggregate output because it excludes the portion of the latter that represents expenditures on "intermediate inputs." Our data come from Officer (2009) and Johnston and Williamson (2010).

Figure 1. GDP price deflator, 1801–1932



The value of gold changes only gradually, since technical changes in gold mining occur slowly and new sources of gold are rarely discovered. Some commodities' values, such as the values of agricultural products, change more rapidly, but if we take all commodities into account, changes in the value of "a unit of GDP" also occur gradually. Now if the value of gold and the value of "a unit of GDP" were the only causal determinants of the price of "a unit of GDP" when the gold standard prevails, as Kim suggests, then the latter would also change only gradually.

However, Figure 1 indicates that this was often not the case. In the U.S., the GDP price deflator rose by 50% between 1802 and 1814, and then fell by 49% during the next decade. During the Civil War period, 1860–65, it rose by 78%, and then fell by 44% between 1875 and 1878. Between 1915 and 1920, a period that includes most of World War I and during which Britain abandoned the gold standard, the GDP price deflator in the U.S. rose by 89%. And

between 1920 and 1932, it fell by 37%. Fluctuations in the UK's GDP price deflator were generally much more modest, but the 27% decline that occurred between 1811 and 1821 is far too large to be accounted for wholly in terms of changes in the value of gold and the value of "a unit of GDP."

The data also suggest that short-term changes in the GDP deflator were frequently too large to be accounted for wholly in terms of changes in these two factors. In the UK, the annual percentage change in the GDP deflator exceeded $\pm 4\%$ in 10 of the 83 years from 1831 to 1913. In the U.S. it exceeded $\pm 4\%$ in 24 of those years and in 49 of the 131 years from 1802 to 1932.

Marx on Aggregate Price and the Value of Gold

Marx was well aware that the aggregate price of output is not rigidly constrained by the value of the money commodity. A passage in "Notes on Wagner" that he wrote near the end of his life provides especially clear evidence of this fact. Responding to one of Wagner's criticisms of his value theory, Marx (1989, p. 537, emphases in original) considered a case in which grain is sold for more than its value:

> The *total value* remains the same, even if the expression of this *total value* in its entirety were to increase in money, …. This is the case if we assume that the *drop in price* of the total of the other commodities does not cover the *over-value price* (excess price) of the grain. But in this case, the exchange-value of money has fallen *pro tanto* [to the same degree] beneath its value ….

It is clear from the contrast between the "exchange-value of money" and "its value" in the last sentence that Marx is here assuming a commodity-money system. He also assumes that the price of grain rises, and that the prices of the other commodities fall, but to a smaller extent. The

aggregate price of commodities—"the expression of [their] total value … in money"—therefore increases, and this implies an equivalent fall in the exchange-value of money below "its value," i.e., below the value of the money commodity.

Now, the MELT is the aggregate price of the commodities output divided by their aggregate value. Since the aggregate price rises while the aggregate value remains the same in this example, the MELT rises. This rise in the MELT is not caused by a fall in the value of the money commodity, because no such fall occurs. What falls is rather the *exchange*-value of money. *Thus, even when a produced commodity serves as money, the MELT is the reciprocal of the exchange-value of money, not the reciprocal of the value of the money commodity.*

Since the aggregate price of the commodities rises even though the value of the money commodity and the aggregate value of commodities remain the same, aggregate price is not causally determined by these two factors alone. And Marx argues that the aggregate price is what causally determines the exchange-value of money and the MELT, not vice-versa, at least in this example.

Other passages in his works, passages based on real-world observations, also indicate that he was aware that aggregate price was not determined solely by aggregate value and the current value of the money commodity. One example is an often-ignored passage in chapter 3 of *Capital,* volume 1, in which Marx (1990, p. 214, emphases added) noted that

> when money begins to function as a measure of value, when it is used to determine prices, its value is presupposed. If that value falls, the fall first shows itself in a change in the prices of those commodities which are directly exchanged with the precious metals at their source. The greater part of all other commodities, especially at the less developed stages of bourgeois society, will continue *for a long time* to be estimated in

> terms of the former measure of value, which has now become antiquated and illusory. Nevertheless, … their prices, expressed in gold and silver, *gradually* settle down into the proportions determined by their comparative values, until *finally* the values of all commodities are estimated in terms of the new value of the monetary metal. [Marx 1990, p. 214, emphases added]

Another example is a passage in Marx's *Contribution to the Critique of Political Economy,* which he quotes in chapter 34 of volume 3 of *Capital.* He begins by noting that

> [t]he most common and conspicuous phenomenon accompanying commercial crises is a sudden fall in the general level of commodity prices occurring after a prolonged general rise of prices. A general fall of commodity prices may be expressed as a rise in the value of money relative to all other commodities, and, on the other hand, a general rise of prices may be defined as a fall in the relative value of money. [Marx 1987, p. 412; Marx 1991a, p. 681]

This passage refers, of course, to an era in which a commodity-money system prevailed. That fact notwithstanding, Marx states that the cause of the sudden fall in the general level of commodity prices is a commercial crisis, not a rise in the value of the money commodity. Also note that this passage explicitly states that what holds true by definition is an inverse relationship between the general price level and "the value of money relative to all other commodities"—i.e., the exchange-value of money—not the value of the money commodity.

Marx does not deserve any special credit for recognizing that the general price level varies independently of commodities' values and the value of gold. This phenomenon was well understood by Ricardo and other classical economists. As Marx discussed in the passage quoted

above, they sought to explain this phenomenon by appealing to the quantity theory of money, arguing that when too much (too little) money is in circulation, the relative value of money falls (rises) and the general price level consequently rises (falls). He rejected this explanation, but not the fact that the classicists sought to explain.

Did Gold Exchange at its Value?

As we discussed above, Kim seems to argue that gold always exchanged at its value when it served as a money commodity. However, if the value of gold and the aggregate value of output were not the only causal determinants of the aggregate price of output, this is not possible.

Assume that, as measured in terms of labor-time, the value of gold and the aggregate value of output (denoted as "value produced" in Table 1) remain unchanged, but that the amount of gold for which other commodities exchange suddenly increases. In terms of gold, the aggregate price of output (denoted as "value received" in Table 1), thus increases as well. Since the MELT is the aggregate price of output divided by the aggregate value of output in terms of labor-time, and the numerator of this ratio rises while the denominator remains constant, the MELT also increases.

Now, the value of any commodity in terms of gold is equal to the MELT times the value of that commodity in terms of labor-time. Since gold is a commodity, this relation applies to it no less than it applies to other commodities. So the value of gold in terms of gold—i.e., the monetary expression of the value of a unit of gold when gold serves as the money commodity—is equal to the MELT times the value of gold in terms of labor-time. Since we are assuming that the MELT increases while the value of gold in terms of labor-time remains unchanged, it follows that *the value of gold in terms of gold increases*.

But the value received for a unit of gold as expressed in gold—the exchange-value "price" of gold in terms of gold—does not and cannot increase. A unit of gold was a unit of exchange-value before prices rose, and a unit of gold remains a unit of exchange-value now. The exchange-value of gold has therefore fallen in relationship to its value. If gold exchanged at its value prior to the rise in prices, it now exchanges for less than its value.

Table 1. Effects of Changes in Rate of Exchange between Gold and Other Commodities

		MELT = 1		MELT = 2		MELT = 3	
industry	measure	value produced	value received	value produced	value received	value produced	value received
gold	gold	3	**6**	6	**6**	9	**6**
	labor-time	**3**	6	**3**	3	**3**	2
others	gold	27	24	54	54	81	84
	labor-time	**27**	24	**27**	27	**27**	28
total	gold	30	30	60	60	90	90
	labor-time	**30**	30	**30**	30	**30**	30

Note: The example assumes constant values of commodities in terms of labor-time, and a constant amount of gold produced, so the boldfaced figures are given.

We can also see that gold now exchanges for less than its value if we consider the changes in labor-time terms. The reciprocal of the MELT is the labor-time equivalent of the exchange-value of gold. In other words, it is the amount of labor a unit of gold commands. Since the MELT increases, a unit of gold *commands* less labor after the rise in prices than it did before. But the value of gold in terms of labor-time remains unchanged, which implies that the amount of labor needed to *produce* a unit of gold remains unchanged. Thus, if a unit of gold originally

commanded just as much labor as the amount of labor that is needed to produce it, it now commands less than that amount of labor. In other words, its exchange-value in terms of labor-time has suddenly fallen below its value in terms of labor-time.

6. Conclusion

In response to Changkeun Kim's argument that the TSSI is potentially circular because the magnitudes of some key variables are left undetermined, this paper has argued that the circularity critique is inapplicable to the TSSI because it is a temporal, not a simultaneist, interpretation. Employing examples from physics, we have argued that temporal theories typically leave the magnitudes of some variables undetermined, but that this does not make them circular. In fact they advance knowledge by replacing determined magntudes with "indeterminate" ones.
In response to Kim's attempt to resolve the apparently circularity by arguing that the MELT determined the aggregate price of output when the gold standard prevailed, this paper has offered an empirical argument that aggregate price was the indepnedent variable while the MELT was the dependent variable. And in response to Kim's argument that his position this matter, we have put forward a contrary interpretation.

These differences in no way detract from our appreciation of his contribution to the debate on the so-called Fundamental Marxian Theorem. In the context of this debate, they are decidedly secondary matters. As we emphasized at the start of the paper, Kim's contribution marks a renewal of scientific discussion on Marx's value theory. It does not try to win the debate by any means necessary. It accurately reports and represents what others have said. It does not seek to exclude any theory or interpretation on *a priori* methodological grounds. By accepting

that all of them are worthy of being tested, his paper helps further intellectual development instead of holding it back.

To an outsider, these may seem like small matters, but given the rapid degeneration of the debate on the FMT before Kim entered into it, they are not. His paper has shown that if normal scholarly standards and practices are adhered to, the debate, and discussion on Marx's value theory generally, can move forward rather than backward.

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