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# MARXIAN DEBATES ON THE FALLING RATE OF PROFIT

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## ABSTRACT

The purpose of this paper is to examine the discussion among marxists about the rate of profit. This is done by the method of symptomatic reading, hence in a different way from what has become standard. Beginning from the fact that Marx and his critics draw diametrically opposite conclusions from the same premises – continuously rising productivity as a defining element of accumulation – I enquire into the presuppositions and necessary conclusions of the two opposed interpretations in order to lay bare the logical world-view which underlies them.

I show that the opposed conclusions which are drawn by scholars from the two main paradigms arise not from errors of logic but from their opposed value concepts. My aim is, without presupposing which is right, to investigate what each concept actually is.

This paper is non-mathematical but contains many numerical examples and a detailed textual exegesis. It is a good starting point for the new student of temporal approaches to value and their difference from the simultaneist (equilibrium) standpoint.

It contains a more or less complete non-mathematical exposition of the temporal calculation of the profit rate, and demonstrates that the simultaneist approach leads to the creation of value without labour.

This paper was presented at the International Symposium on 'Debates on value theory Since Marx', Greenwich, July 2000.

Keywords: value, TSSI, temporalism, rate of profit, Marx, MELT, Okishio

# MARXIAN DEBATES ON THE FALLING RATE OF PROFIT

Alan Freeman Sunday, June 26, 2000

For IWGVT/HM/C&C symposium on 'Debates on the theory of value since Marx'

## INTRODUCTION

The purpose of this paper is to examine the discussion among marxists about the rate of profit in a different way from what has become standard. Beginning from the fact that Marx and his critics draw diametrically opposite conclusions from the same premises – continuously rising productivity as a defining element of accumulation – I want to show that these opposed conclusions arise not from errors of logic but from diametrically-opposed value concepts. My aim is, without presupposing which is right, to investigate what each concept actually is.

This is not a relativist view. The concepts involved are not merely different ways of speaking but constitute definite theoretical approaches or 'paradigms' (Kuhn 1962), as opposed and as distinct as Ptolemaic and Copernican theories of what the sun does. They lead to opposed conclusions about the causal mechanisms at work in capitalism, about its actual movement, and about the way conscious political action by classes and institutions can limit or modify this movement.

However the differences cannot be presented as by Marx's critics, as if they arise from simple logical mistakes or failures. Not least, Marx's alleged errors do not exist; within his own value concept, all his contested conclusions are, I will show, rigorously true. Here, however, I want to focus on a different point, that the charge of logical error has become the cornerstone, the 'ontological proof' of economic dogma. Logic, I will argue, has been suborned to play an ideological function: to rule out an entire line of enquiry – Marx's – without either pursuing it in its own terms, or testing it against the facts.

Insofar as logical errors have been made – and Marx's critics have made some very fundamental ones – these concern not the differences themselves but the way they are presented. Each view is therefore coherent within its own conceptual structure. The task is not, therefore, to seal off debate by identifying so-called 'errors' in either view, without recourse to the normal investigative procedures of science. Rather, we should try first to understand what these opposed conceptual structures actually are.

Finally, such an approach represents an initial attempt to correct the abuse which economics has heaped on mathematics itself. Mathematical logic, to which the debate on Marx's economics has made more than enough reference, is no more nor less than a way of discovering the actual structure of an idea – not to determine its correctness, but to transcend its limits. The high points of rationalism remain those at which, by laying bare the presuppositions on which prejudice is founded, reason has opened our minds to possibilities we could never otherwise have conceived of. This has so far allowed each successive generation to shed its inherited preconceptions. This is why reason has expanded the human spirit. The discussion on the profit rate, I contend, has converted this into its opposite; it has erected logic as a *source of authority*; it has used it to close doors instead of opening them. It has used it to seal off, behind a veil of esoteric obfuscation masquerading as mathematics, the simplest, most revolutionary, most self-evident, most rigorously true and most relevantly modern of Marx's many ideas: *capital creates the barriers to itself*.

## MARX, PRODUCTIVITY, AND THE TENDENCY OF CAPITALISM

Marx (1976:774) makes a categorical assertion about the impact of accumulation on the value composition of capital, which as we will see is the foundation of his law of the tendential fall in the profit rate.<sup>1</sup> He asserts that the value of constant capital grows faster than the value of variable capital:

This change in the technical composition of capital, this growth in the mass of the means of production, as compared with the mass of the labour-power that vivifies them, is reflected in its value-composition by the increase of the constant constituent of capital at the expense of its variable constituent...(1976:774)

He is in no doubt that this is not offset by the cheapening of the means of production resulting from changes in productivity. He thus continues:

With the increasing productivity of labour, the mass of the means of production consumed by labour increases, but their value in comparison with their mass diminishes. Their value therefore rises, absolutely, but not in proportion to the increase in their mass.(1976:774)

And earlier forcefully asserts this rising value composition as a theoretical and empirical law:

This change in the technical composition of capital, this growth in the mass of means of production, as compared with the mass of the labour-power that vivifies them is reflected again in its value-composition, by the increase of the constant constituent of capital at the expense of its variable constituent...This *law* of the progressive increase in constant capital, in proportion to the variable, is confirmed at every step (as already shown) by the comparative analysis of the prices of commodities, whether we compare different economic epochs or different nations in the same epoch. (1976:773, my emphasis)

Passages in *Theories of Surplus Value* are even more categorical, for example:

Despite the cheapening of individual elements, the price of the whole aggregate increases enormously and the [increase in] productivity consists in the continuous expansion of the machinery...It is therefore *self-evident or a tautological proposition* that the increasing productivity of labour caused by machinery corresponds to increased value of the machinery relative to the amount of labour employed (consequently to the value of labour, the variable capital. (1972:366-367, my emphasis)

And later

The cheapening of raw materials, and of auxiliary materials, etc., checks but does not cancel the growth in the value of this part of capital. It checks it to the degree that it brings about a fall in profit.

This rubbish is herewith disposed of. (1972:368-9)

In the debate on the transformation problem, a claim of omission or oversight – that Marx forgot to transform inputs – can draw some comfort from his actual words. In the debate on the rate of profit there is no such support to be had. Marx did not ‘forget’ the cheapening of constant capital: his view, which he clearly states, and considers beyond question, is that it cannot offset its growth as a consequence of accumulation.

The normal approach to this argument is that Marx failed to justify it. Thus for example Laibman (1976:26)

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<sup>1</sup> The German ‘Gesetz des tendenziellen Falls der Profitrate’ is translated by Moore/Aveling in the earlier, Lawrence and Wishart/Progress Publishers edition as the ‘Law of the tendency of the rate of profit to fall’ and by Fernbach in the Penguin edition as the ‘Law of the tendential fall in the profit rate’. I adopt the second usage, in line with the use of the Penguin edition as the standard translation throughout this article

The capitalist social relationship thus contains a powerful stimulus towards the increase in *physical* capital per man employed; but here is the logical gap: the increase in physical capital per man – Marx’s technical composition of capital – is necessary but not sufficient for a rise in the value of that capital. . . There appears to be no reason, technical or social, for the growth rate of physical capital per man to outstrip that of labour productivity; the rising composition of capital remains, therefore, a mere unsubstantiated assertion.

Our first task is to confront Marx’s clearly-stated views openly and, instead of dismissing them as implausible or unsubstantiated, to try to understand from what concept his conclusions might actually arise.

## **Rising productivity as a precondition for unfettered physical accumulation**

First, it is worth reviewing why Marx held that, regardless of their value or price, the mass of use-value employed as capital necessarily rises with productivity, and understanding the connection between this and technical progress. The central argument is that productivity revolutions, far from offsetting the growth of constant capital relative to labour, are indispensable to it. This is evident from the section headings of chapter 24, the first being entitled ‘A growing demand for labour-power accompanies accumulation if the composition of capital remains the same’ and the second ‘A relative diminution of the variable part of capital occurs in the course of the further progress of accumulation and of the concentration accompanying it.’ Marx then immediately notes that

So far, we have considered only one special phase of this process, that in which the increase of capital occurs while the technical composition of capital remains constant. But the process goes beyond this phase.(p772)

What this means is spelled out in the next paragraph:

Given the general basis of the capitalist system, a point is reached in the course of accumulation at which the development of the productivity of social labour becomes the most powerful lever of accumulation. (1976:772)

Thus two logical stages are distinguished which are also historical;<sup>2</sup>

First, a constant composition of capital is associated with relatively fixed productivity, which maintains a more or less fixed ratio of labour to means of production, so that in order to accumulate, the capitalists must expand both constant capital and the employment of labour, rapaciously converting non-proletarians into proletarians. This ‘primitive accumulation’ is the ‘historical basis, instead of the historical result, of specifically capitalist production.’ (1976:p775)

In the second stage (which coincides with relative surplus value), technology frees constant capital from all such technical constraints. This leads to a rising composition of capital, the value of the employed means of production growing independently of, and faster than, the employment of labour.<sup>3</sup>

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<sup>2</sup> In parenthesis, I don’t think this supports the argument, which Chris Arthur has in my view rightly criticised, that Marx supposed a ‘historical-logical’ stage of capitalism characterised as ‘simple commodity production’ in which goods exchange at their value between independent producers. To the contrary Marx here presents a historical progression not from petty commodity to capitalist production but between two phases of specifically capitalist production, the dividing line being not the relation of the direct producers to the means of production but the intervention of technology.

<sup>3</sup> incidentally creating the reserve army of labour and cyclic fluctuations in employment.

The continual reconversion of surplus-value into capital now appears in the shape of the increasing magnitude of capital that enters into the production process. This is in turn the basis of an extended scale of production if the methods for raising the productivity of labour that accompany it, and of an accelerated production of surplus-value...With the accumulation of capital, therefore, the specifically capitalist mode of production develops and, with the capitalist mode of production, the accumulation of capital. These two economic factors bring about, in the compound ratio of the impulses they give to each other, that change in the technical composition of capital by which the variable component becomes smaller and smaller as compared with the constant component. (976:775-776)

For Marx, therefore, far from offsetting a rise in the organic composition of capital, productivity revolutions are the historical and logical precondition of it.

The question to address is thus: why and how does Marx suppose that revolutions in productivity necessarily impose a pattern of accumulation in which the value of constant capital grows independent of, and faster than, the employment of labour? That is what we will address first.

## **MARX'S CONCEPT OF PRODUCTIVITY: A RELATION OF LABOUR TO USE-VALUE**

As we shall see, Marx's critics generally represent changes in productivity as a change in the ratio between use-value and use-value, as a rise in the volume of produced material compared with the volume of consumed material, and this corresponds to the nature of their value concept, a modern equivalent of the physiocratic notion of production as the production of use-value by means of use-value. We will refer to this doctrine as *physicalism*.

Marx's concept of productivity corresponds to his value concept, and treats a rise in productivity as a rise in the volume of produced material compared with the quantity of *labour employed*:

The mass of the products in which a certain value, and therefore a surplus-value of a given magnitude is embodied, increases along with the productivity of labour. (1976:752)

This difference does not explain the different results obtained by Marx and his critics. These do not, we will argue, arise from any difference in the *type* of productivity change investigated or the *manner* in which capitalists innovate, as is claimed by many who seek to rescue Marx's conclusions from the physicalist critique without transcending the physicalist value concept. On the contrary, we will show that all cases considered by the critics as refuting Marx's conclusions, although expressed in physicalist terms, are also governed by Marx's law of the tendential fall in the rate of profit.

However our aim is follow Marx's argument in the way it is presented. He does not suppose that productivity changes in a different or special way but he does *think* about it in a different way; as a relation, not between use-value and use-value, but between labour and use-value.

The rising output of labour is also expressed in an increase in inputs, and this is why the 'technical composition of labour' – the ratio between labour and capital employed, again conceived of as a relation between labour and use-value, rises.

### **A short note on the empirical tendency of the technical composition of capital**

In parenthesis this analysis is tied to empirical reality, in which the volume of use-values employed in production itself grows.

The degree of productivity of labour, in a given society, is expressed in the relative extent of the means of production that one labourer, during a given time, with the same degree of intensity of labour-power, turns into products. The mass of the means of production which he functions in this way increases with the productivity of his labour. (1976:773)

Although not a precondition for his conclusions, it should be pointed out that matters could scarcely be otherwise. If everything is cheapening, and capital is constant or rising year on year, then this capital must *ceteris paribus* consist of more things. If prices are falling then the use-value employed in production can only diminish when the capital employed is falling faster. This corresponds to a period of stagnation and crisis, that is, to a suspension of accumulation. This really does occur in slumps, and on a more prolonged (though as always, cyclically interrupted) basis during phases of generalised capitalist crisis such as the present one, the inter-war period, and the 'Great Depression' of 1873-1893.

But the idea that a suspension of capitalist accumulation could be the 'normal' state of the capitalist mode of production or, to be more precise, could provide the conditions under which capitalist production is its own self-sufficient basis, runs counter to the whole trend of modern capitalist development which has, to the contrary, seen an ever-increasing ratio between investment and output.<sup>4</sup>

This empirical reality remains true today although it is obscured by the outward form of the use-values, which, because of miniaturisation, embody growing use-value in a smaller physical form.

In miniaturisation the size of the machine decreases while its capability increases. On a crude physical measure therefore, it might seem that the use-value of inputs is decreasing while the use-value of outputs is increasing. A little thought – confirmed by the literature on 'hedonistic' indexes' – reveals that use-value is still increasing. If I replace a 486 computer that carries out 10 million operations per second by a Pentium III that carries out 1000 million operations per second, then although the Pentium is smaller, it is 100 times more useful; it is the *equivalent* of 100 486 computers.

Nor is this different for modern industries such as information which deal with inputs and outputs that have no physical size at all. If we adopt, as a measure of information, even the crudest measure such as bytes, then by any reasonable standard the quantity of information serving as inputs to production is growing at a faster rate than any input has ever increased in history; contemporary estimates on the volume of web traffic, according to the *Observer* for 19 June, show it doubling every 100 days.

### **Rising productivity as the precondition for unfettered value accumulation**

For Marx, in conclusion, the rise in the organic composition of capital accompanies a rise in productivity, which in turn changes the mode of accumulation. The importance of this is that it removes all limits on the accumulation of means of production. Once revolutions in productivity become the principal means by which individual capitalists can increase their profits, the accumulation of capital proceeds *independently* of the growth of the labour force:

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<sup>4</sup> *Socialist Economic Bulletin* #3 contains an exhaustive empirical analysis of this trend. It has manifested itself through regular changes, however, in the *geographical locus* of high rates of accumulation. Until the late 19<sup>th</sup> Century the highest investment rate was in the UK. Germany and the US then replaced the UK and remained in the lead until after WWII. Japan then replaced both Germany and the US, and was then itself displaced (as the location for the highest investment rates) by the south-east Asian tigers. This rise in investment in proportion to output is ratcheted; the US and Germany at 20% were higher than the UK at about 12%, Japan in turn was higher at about 25% and countries such as South Korea reached 40-50% of GDP.

[TBA Marx actually says that accumulation becomes the independent variable].

Therefore the availability of labour ceases to be a brake on the accumulation of constant capital. This, Marx asserts, can now proceed by simply converting surplus value into capital; this capital therefore necessarily grows, because more and more living labour is converted into dead labour.

The specifically capitalist mode of production, the development of the productivity of labour which corresponds to it, are things which do not merely keep pace with the progress of accumulation, or the growth of social wealth. They develop at a much quicker rate...With the progress of accumulation, therefore, the proportion of constant to variable capital changes. If it was originally, say 1:1, it now becomes successively 2:1, 3:1, 4:1, 5:1, 7:1 etc so that as the capital grows, instead of 1/2 its social value, only 1/3, 1/4, 1/5, 1/6, 1/8 etc is turned into labour power...Since the demand for labour is determined not by the extent of the total capital but by its variable constituent alone, that demand falls progressively with the growth of the total capital, instead of rising in proportion to it, as was previously assumed. (1976:781)

We can foreshadow the later more detailed discussion of the physicalist critique at this point by noting that the two different concepts lead to a very different ‘intuition’ of what is going on. From the physicalist standpoint, a larger and larger volume of material outputs or being created by the same amount of *material inputs*. Capital is essentially getting more for less. Surely, therefore, the rate of profit *must* intuitively rise. Robinson puts this ‘naïve physicalist’ view with forceful clarity:

Hours of work may be lengthened (with a constant real wage) and the intensity of work may be increased...To these tendencies, there are obvious limits...The rise in the rate of exploitation which comes about through a rise in productivity, with constant hours and intensity of work, and constant real wages, is not limited in the same way. Productivity may rise without limit and, if real wages are constant, the rate of exploitation rises with it. Marx appears to have been in some confusion upon this point.(Robinson 1942:39)

But Marx simply recognises that the labour embodied in output, and the output itself, are two different things. Any confusion arises only when these two distinct things are treated as if they were identical or interchangeable, a crime for which it is hard to find Marx guilty. Thus when productivity rises, the same labour creates more material outputs. But these material outputs have a value distinct from their use-value, and it is value that the capitalists accumulate; it is value, in the form of price, that appears on their balance sheets and in their profit and loss accounts.

Marx’s straightforward idea is that with a relatively fixed or slowly increasing labour force, there is a relatively fixed or stable surplus value. This relatively stable magnitude is continuously ‘converted into capital’ and with universal revolutions in productivity, there is no technical restraint on this conversion. The way is then clear for *value* to accumulate without limit:

We arrive, therefore, at this general result: by incorporating with itself the two primary creators of wealth, labour-power and land, capital acquires a power of expansion that permits it to augment the elements of its accumulation *beyond the limits apparently fixed by its own magnitude*, or by the value and the mass of the means of production which have already been produced, and in which it has its being (1976:752, my emphasis)

All available surplus, unless consumed unproductively, is re-invested in production and becomes capital: ‘Accumulate, accumulate; That is Moses and the prophets’(1976:742) Capital, *measured in value terms*, then grows without limit: ‘in so far as he is capital personified, his [the capitalist’s] motivating force is not the acquisition and enjoyment of use-values, but the acquisition and augmentation of exchange-values.’ (1976:738)

Why, then, did Marx not proceed directly to this point – the accumulation of value – without the intermediary of its physical form? Would this not have made the entire argument beyond the reach of the physicalists? It probably would. But it would have failed to address the

primary question of accumulation, which is how is it *possible* that value can accumulate without limit? With a fixed ratio of labour to means of production, this can be achieved only by expanding the labour force, setting a biological limit on accumulation. Productivity frees capital of this biological constraint and hence without it, the unfettered accumulation of value is not even historically possible; this logical demonstration is the function of the Volume I argument. Subsequent interpretations have therefore missed the point, in that they have read the text as if the growth in use-value was the *reason* for the growth in value, in some sense the cause of it. No; the reason for the growth in value is, as we shall see, the law of value itself, quite independent of its physical expression.

## MARX'S LAW OF THE TENDENTIAL FALL IN THE RATE OF PROFIT

Volume III, chapter 13, opens with a numerical example. It is expressed in money. It is evident, though we will return to this point, that throughout his argument £1 represents 1 week, a relation I will describe by saying that the *monetary expression of labour-time*<sup>5</sup> is £1 per week. He supposes 100 workers paid £1 per week each at a rate of surplus-value of 100%; their 'total value product' is thus £200. He then argues as follows:

As we have seen, this rate of surplus value [100 %] will be expressed in very different rates of profit, according to the differing scale of the constant capital  $c$  and hence the total capital  $C$ , since the rate of profit is  $s/C$ . If the rate of surplus-value is 100 per cent, we have:

If  $c = 50$  and  $v = 100$ , then  $p' = 100/150 = 66\frac{2}{3}$  per cent;

If  $c = 100$  and  $v = 100$ , then  $p' = 100/200 = 50$  per cent;

If  $c = 200$  and  $v = 100$ , then  $p' = 100/300 = 33\frac{1}{3}$  per cent;

If  $c = 300$  and  $v = 100$ , then  $p' = 100/400 = 25$  per cent;

If  $c = 400$  and  $v = 100$ , then  $p' = 100/500 = 20$  per cent;

The same rate of surplus-value, therefore, and an unchanged level of exploitation of labour, is expressed in a falling rate of profit, as the value of the constant capital and hence the total capital grows with the constant capital's material volume.

If we further assume now that this gradual change in the composition of capital does not just characterise certain individual spheres of production, but occurs in more or less all spheres...then this gradual growth in the constant capital, in relation to the variable, must necessarily result in a *gradual fall in the general rate of profit*, given that the rate of surplus-value...remains the same. (1981:318)

Of course, the argument that this sequence of profits constitutes the actual movement of capitalism depends on the proposition that  $c$  and  $v$  actually move in this, or a similar manner; it depends in fact on the proposition that  $C$  grows faster than  $s$ . But since Marx assumes a constant rate of exploitation, this is no different to the proposition that  $C$  grows faster than  $v$ , variable capital. And in fact the underlying idea, as Steindl (1952) notes, is simply that  $C$ , objectified or dead labour, grows faster than  $s+v$ , living labour.

TBA: quote from TSV II where M actually says this.

As we have seen, Marx in Volume I claims to prove, to the extent that he considers it a 'law' of accumulation, that this proposition is the actual movement of capitalism, suspended only by crisis. Henceforth unless otherwise stated, we shall treat the 'law of accumulation' as this proposition.

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<sup>5</sup> See Ramos (1995), Ramos and Rodriguez (1995) for a discussion of this term.

Thus the law of the tendential fall in the rate of profit is, for Marx, a direct deduction from the ‘General law of capitalist accumulation’ established in Volume I. Indeed, this is exactly how he himself refers to the matter:

It has been shown to be a law of the capitalist mode of production that its development does in fact involve a relative decline in the relation of variable capital to constant, and hence also to the total capital set in motion. (1981:318)...

The hypothetical series we constructed at the opening of this chapter therefore expresses the actual tendency of capitalist production.

This is amplified. The tendency being a consequence of the process of accumulation itself, it is innate to the capitalist mode of production and is not the product of incidental, secondary or external factors:

This does not mean that the rate of profit may not fall temporarily for other reasons as well, but it does prove that it is a self-evident necessity, deriving from the nature of the capitalist mode of production itself, that as it advances the general average rate of surplus-value must be expressed in a falling general rate of profit.

By the same token this tendency may be offset or overridden by counteracting influences. The nature of these influences are generally, however, external or incidental to the actual innate logic of capitalist accumulation as such.<sup>6</sup>

The tendential law of the rate of profit given in Volume III being a deduction from the law of accumulation given in volume I, the substance of disputes about the profit rate becomes clear if we directly study differences about this law itself. I will therefore concentrate on Marx’s assertion that the value of constant capital expands faster than the employment of labour.

## **WHY IS IT OBVIOUS? VALUE CONSERVATION, MORAL DEPRECIATION, VALUE TRANSFERS AND THE VALUE OF MONEY**

G. H. Hardy, the mathematician, was once demonstrating a theorem to an undergraduate class. Every line of a mathematical proof must have a justification; *modus ponens, reductio ad absurdum*, whatever. But sometimes even the best mathematicians become impatient. At a certain point, the story goes, he wrote against one of the steps in the deduction the word ‘obvious’.

Then he stopped, clearly absorbed in thought, turned to the class and asked: ‘is it obvious?’ With no answer forthcoming, he retired to his room. An hour later he emerged. ‘Yes, it is obvious,’ he said, and continued the proof where he left off.

For Marx, the proposition that constant capital increases faster than labour is clearly, from the citations we have just given, obvious. It is not, therefore, a deduction from the argument about productivity but an externally given, evident consequence of the law of value. Why?

The normal explanation is that Marx was one bit short of a parity check. Dazzled by modernism triumphant, mesmerised by Victorian gigantism, he simply set aside, without even considering it, the elementary possibility that the price of the mammoth edifices of the Industrial Revolution might fall faster than their material was growing.

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<sup>6</sup> This does not lead in my view to the conclusion that capitalism must fall apart under its own internal logic. Rather, it should be expressed as follows; a recovery from a prolonged phase of declining profit rates requires an intervention external to the internal evolution of capital itself (war, barbarism, etc). To develop this may be beyond the scope of this article. See Freeman (2000) [HM article]

There is, however, another way of looking at it which, we will see, makes perfect sense, is entirely coherent, and scientifically superior. Marx, in my reading, conceived of capital like a deposit account; what is placed in it remains in it, until it is withdrawn. Therefore, as long as the capitalists convert their surplus-value into capital, the capital grows. This capital is diminished only when the capitalists invert this process, and convert capital into revenue.

The critical point about Marx's reasoning is that use-value and value are independently determined, this distinction being exactly that which the modern interpretation denies.<sup>7</sup> Being a distinct aspect of the commodity from use-value, the accumulation of value is governed by processes that do not reduce to the production and accumulation of use-value. This is not a metaphysical distinction but a real, quantitative separation between the two aspects of the commodity which, therefore, obey distinct quantitative laws notwithstanding their relation, just as the weight and the volume of any material body are independent magnitudes connected through the relation of density.

The accumulation of value can be directly deduced, without reference to the use-values of the commodities in which this value is embodied, by considering that moment of the labour-process which concerns the production and reproduction of value as such.

Consider a capitalist that begins with £100 of materials and machinery, employs labour that adds £200, and pays wages of £100. The initial capital is hence £200 and the product is £300, a profit of £100. What can this capitalist *do* with this £100 profits? Only two things; s/he can either consume it, or invest it.

Let us suppose that s/he invests it, that is, s/he accumulates it. In that case the former capital of £200 becomes not £200, but £200 plus £100, the original capital (which is replaced out of the product of £300) *plus* the re-invested profit.

The capitalist then starts the next circuit of capital with £300, not with £200 as before. Constant capital has grown.

If we are in Marx's first stage of capitalist development, this £300 would then have to be divided in the same proportions as before, so that £150 would become constant capital, and £150 variable capital. In the second stage of capitalist development, however, revolutions in productivity would see to it that for the same variable capital, £100, the entire surplus-value of £100 could be converted into constant capital.

In the next period, therefore, £200 in constant capital would, vivified by £100 in variable capital, create £400 in product of which £200 would replace the constant capital, £100 the wages, and if the £100 profit were re-invested, as before solely in increasing constant capital, it would become £300.

It can be seen that *provided only the value in the constant capital is not diminished by any other means than the application of living labour in the labour process* it must increase for as long as the capitalists convert surplus-value into capital.

This is the actual sequence given by Marx (1981:318) as already cited, at the start of the chapter on the tendential law, except for the first circuit:<sup>8</sup>

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<sup>7</sup> See Kliman's contribution in this same symposium for a detailed account.

<sup>8</sup> It is *precisely* the same since Marx supposes a rate of exploitation of 100%, so that  $s = 100$ ; the entire sequence except for the first circuit thus corresponds to the simple idea that the capitalists convert their entire surplus-value into capital.

$c = 50$  and  $v = 100$ ,

$c = 100$  and  $v = 100$ ,

$c = 200$  and  $v = 100$

$c = 300$  and  $v = 100$

$c = 400$  and  $v = 100$

and this is the same sequence cited in volume I except for the last circuit(1976:781):

If [the ratio of  $v$  to  $C$ ] was originally, say 1:1, it now becomes successively 2:1, 3:1,4:1,5:1,7:1 etc so that as the capital grows, instead of 1/2 its social value, only 1/3, 1/4,1/5,1/6,1/8 etc is turned into labour power

If this is indeed the concept that Marx was operating with, in deducing the laws both of accumulation and of the tendential fall in the rate of profit, then it is indeed obvious that, no matter what the actual course of technical progress, provided only that it permits the capitalists to spend their money on constant capital without having to modify the labour they employ to work it, these laws must necessarily hold.

Is this such an absurd way to think? In what sense is it obvious? The key point is that it makes absolute and total sense if one accepts only one proposition: that value *when exchanged* behaves like money or, to put it another way, price is a form of value. This, in my view, is one of the two actual central presuppositions of Marx's theory of accumulation. As we shall see, it is this proposition that Marx's modern interpreters must deny.

If value behaves in exchange like money then its accumulation is governed by normal accounting practice. If a company that is worth £200 acquires an extra £100 through its activities then its balance sheet must show it is as worth £300; and if I present a balance sheet that shows it as worth only £250, the accountants will not let me leave the building until I have shown where the extra £50 has gone.<sup>9</sup> For accountants at least, Marx's proposition *is* obvious.

Nor is it any different for those non-Marxist economists (nearly all) that treat accumulation directly as monetary accumulation; thus Harrod (1937) presents his famous equation of growth as simply:

$$K' = I;$$

the rate of growth of capital is equal to investment. Not, we should not, to investment *minus* some part of the capital that has been magically spirited away. Kalecki's falling profit rate explanation for the business cycle (see Toporowski 1999) is constructed on exactly the same principle. All I am really asserting is that Marx had exactly the same idea about value as the accountants have about balance sheets, and the economists have about money: when you add it to your stock, this stock increases by exactly the amount of value that you add. Thus, far from Marx's concept being outrageous or exceptional, in fact the *only* economists that deny this simple relation are the 'marxist' economists.

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<sup>9</sup> And if, therefore, I wish to show that the £300 has depreciated then I cannot, *pace* Samuelson, simply erase the £300 and write £250 in its place. I must show the £50 loss as a deduction from profits, as an act of consumption out of revenue. This is moreover a real act, not just a book-keeping transaction; I am legally obliged to set aside the funds to cover it. I must maintain the company's capital by setting aside the equivalent in money, and I fail in my duty to the shareholders if I spend this money. Indeed, if I falsely claim it as profit, I can even be jailed for spending it, since it amounts to robbing the company. Consequently, it is no longer true that I have invested £100. My net investment is investment less depreciation, or £50. If my capital were to decline as Marx's critics claim, then the books would show negative net investment – consumption out of capital or, as Marx described it, the conversion of capital into revenue or, elsewhere, as the release of capital. See Maldonado-Filho (1997)

## The principle of value conservation in circulation

The modern interpreters of Marx, as we shall see, adopt a value concept according to which, when existing goods become cheaper through technical progress, the value in them simply disappears. Hence Duménil and Lévy (2000):

the extra labour embodied in the past is no longer acknowledged as socially necessary labour time, and vanishes.

Vanishes *where*? That is the point. For some reason that is not altogether clear, the modern interpretation of Marx's value theory has never encountered any conceptual problem with the idea that value simply vanishes. We will shortly see that the same reasoning leads to the much more alarming conclusion that value can also simply appear. But let us confine ourselves for now to the point in the magic act where the conjurers open the empty cabinet. At what point in the circuit of reproduction did this value disappear? When was our attention distracted? Suppose that to £200 of existing capital, £100 is added and that the cheapening of stock knocks £50 of the value. *When*, in the circuit

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

does the £50 actually disappear? If it vanishes before the produced goods are circulated, then production does not in fact add £200 to the product and value added is not in fact determined by the time worked. Marx's theory of the labour process itself is then false. But if it vanishes in circulation, this violates a very important principle established in Chapter 5 of Volume I; that circulation itself *cannot* modify the total amount of value in society; it can only redistribute it. Value, as I have put it elsewhere, is *conserved* in circulation.

It should be remembered that production is not merely that part of the circuit in which value is created – the only part where this happens – it is also that part of the circuit in which value is consumed. In my view, it is also the only part where this happens. Production is a combination of a material and a value process. It converts on the one hand use-values into different use-values; on the other hand, in destroying these use-values, it either transfers their value to the product (constant capital) or destroys their value in unproductive consumption (variable capital, and also I would argue bourgeois consumption). *Consumption* is not a part of circulation. It belongs to the sphere of production. It is a part of the process whereby the commodity labour-power, and the class of capitalists, are themselves reproduced (hence produced) and although it takes place outside of the sphere of capital as such, it does not take place outside of production.

We can see this from the amplified form of the circuit presented by Marx in Volume II describing the circuit of productive capital (1978:155)

$$P \dots C' \left\{ \begin{array}{l} C \\ + \\ c \end{array} \right\} - \left\{ \begin{array}{l} M \\ + \\ m \end{array} \right\} - C_{mp} \overset{L}{\dots} P$$

The surplus arises from production as *c*, is converted in circulation into *m* and reconverted into *c*, the same product in different hands. The capital purchases means of production and labour-power which enters production; it is at this point that any consumption takes place. In circulation itself, everything is preserved intact; it merely changes hands.

It is undoubtedly the case, and Marx is quite categorical about this, that already-existing goods do indeed decline in value when new goods of the same type come on the market at a lower value. This is the moral depreciation of the goods, a loss in value arising from outside the labour-process which originally produced them and hence independent of the living labour incorporated in them. The literature, as we have seen, supposes that this lost value

simply vanishes. However there is another possibility, which is the view I take, and which makes the whole of Marx's value theory rigorous; that is, this 'lost' value is *transferred* to other capitals in circulation, by the same process that forms social or market values as the average of individual values.

Where does this 'lost' value appear? In my view it is transferred to the new products arriving on the market. Moral depreciation is in fact to be understood as a value transfer. Whenever Intel introduces a new processor, or indeed when any technically more advanced product arrives on the market, or when the same product is produced by a new process, it never falls immediately to its eventual price. The price declines gradually as the new product fills the market and displaces the mass of existing goods already in existence.

This is not merely a price but a value phenomenon; the value of the product is formed as the average of the values of existing, more valuable stocks that were produced with the old technology, and the newly produced, less valuable stocks. There is thus a continual transfer of value from the owners of means of production to those producers which are innovating; the more rapidly they innovate, the greater the value transfer. This is empirically borne out by the high profits of hi-tech companies such as Microsoft, Intel, pharmacy companies, and so on; essentially the source of their superprofits is the (dynamical) impact of the fact that they are innovating faster than the rest of society.

This *same* phenomenon also goes a long way to explaining the division of the world into rich and poor nations, into North and South. This division is in its essence a division between a small group that has acquired an effective monopoly of the means of innovation, of technology as such.<sup>10</sup>

This perhaps controversial idea completely squares with Marx's texts; notably the Volume III chapter 6 texts on the impact of stocks on value:

If an increase in the price of raw material takes place with a significant amount of finished goods already present on the market, at whatever stage of completion, then the value of these commodities rises and there is a corresponding increase in the value of the capital involved. The same applies to stocks of raw material, etc. in the hands of the producers. This revaluation can compensate the *individual* capitalist...for the fall in the rate of profit that follows from the raw material's rise in price. Without going into the detailed effects of competition here, we may remark that for the sake of completeness that. (1) if there are substantial stocks of raw material in the warehouse, they counteract the price increase arising from the conditions of their production; (2) if the semi-finished or finished goods on the market press heavily on the supply, they may prevent the price of these goods from rising in proportion to the price of their raw material.

The reverse is the case with a fall in the price of raw material which would otherwise increase the rate of profit, if all other circumstances were the same...the smaller the amount of stock to be found *in the production sphere* and on the market at the end of the business year, at the time when raw materials are supplied afresh on a massive scale (or, in the case of agricultural production, after the harvest), the more visible the effect of a change in raw material prices.(1978:208)

Lest it be argued that Marx is discussing only market fluctuations, his next remark is highly significant and has received less attention than it deserves:

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<sup>10</sup> According to Mihevc(1995) the proportion of patents owned by third-world residents is 0.16%

Our whole investigation has proceeded from the assumption that any rise or fall in prices is an expression of real fluctuations in value. But since we are dealing here with the effect that these price fluctuations have on the profit rate, it is actually a matter of indifference what their basis might be.

This makes it clear that in the above passages Marx is indeed dealing with the formation of value, and asserts that the cheapening of stocks *depends on the relative proportions of finished and new goods on the market*. Parenthetically, the fact that it is in any case ‘a matter of indifference’ whether the source of variation is a fluctuation of the value of capital or its price lends great weight to the single-system idea that the value transferred to the product by constant capital is given, not by the value of the elements of this capital as such, but by the value of the money that is used to pay for them.

Finally, any other idea leads to some very uncomfortable conclusions. If value can vanish without explanation anywhere outside of production then by the same reasoning, under different circumstances, it can appear outside of production. If the consequence of technical progress is to destroy value outside of production, then any technical regress must create value outside of production. Thus, for example if there is a harvest failure or crop shortage, or a shortage of any mineral (which raises their value, since more labour time is now required to produce them), and if stocks of the now more expensive products are already in existence, then by the same reasoning that says these products would lose value in the event of a rise in productivity, they would now have to *acquire* value as a consequence of the fall. Unless this rise in value is recognised to be a transfer from the now more expensive product, we would have to conclude that value has been created by shortage; we are driven back to an entirely neo-classical conclusion, the very reverse of the determination of the magnitude of value by labour time.

We will shortly see that this is indeed the conclusion of the twentieth-century interpretation of Marx as a general equilibrium value theorist, when we assess the twentieth-century criticism of Marx’s tendential law.

## **THE TWENTIETH CENTURY CRITIQUE OF MARX’S TENDENTIAL LAW**

Moszkowska (1929:37-8) gives one of the earliest and simplest completely coherent physicalist presentation of the opposition to Marx. We will concentrate initially on this presentation, first because subsequent developments have not changed her central idea, and second because her examples are a special case of the more sophisticated critiques that follow.

To simplify matters she supposes that a single product that produces itself with the aid of labour, for example corn. Suppose, she says, that at one point it is employed in the following proportions:

Stage 1:  $170 \text{ corn} + 340 \text{ labour} \rightarrow 510 \text{ corn}$

Suppose moreover that the labour consumes  $1/2$  unit of corn per unit of labour.

She then supposes a technical innovation that results in the following:

Stage 2:  $340 \text{ corn} + 340 \text{ labour} \rightarrow 765 \text{ corn}$

Corn inputs have doubled but outputs have increased by 150%, with no increase in labour time. This reproduces Marx’s assumptions, making the example especially useful to study, in order to grasp the origin of the diametrically opposed conclusions, arising from the diametrically opposed value concepts. The means of production have indeed increased relative to labour, labour has indeed stayed constant, and the rate of exploitation has not changed.

Moszkowska claims, as do all his twentieth-century critics, that to Marx's value concept there applies the following determination; we must suppose that the corn leaves production with the same price – that is, possesses the same value – as the price (value) at which it enters production. She deduces the error in Marx's reasoning by applying the same construction

However before examining this construction in more detail, in order to clarify the underlying value concept, I am going to present her argument in a slightly different manner, by supposing that 1 unit of corn costs £1. We can see that to produce 510 units of corn, the capitalists must expend £340, and they will make £510, a profit of £170.

The rate of profit is then the ratio between this profit and the original £340, that is

$$\frac{170}{340} = 0.5 \text{ or } 50\%$$

We can now apply the same reasoning to the second stage: if, as before, 1 unit of corn costs £1 the capitalists must advance £340 in corn and £170 on wages, a total of £510. The mass of profit is now £765 – £510 = £255. The capital advanced being £510, the rate of profit is

$$\frac{255}{510} = 0.5 \text{ or } 50\%$$

that is, the rate of profit has not changed, though Marx says it should fall. Moreover had 'productivity' risen any more – that is, if more than 765 units of corn had been produced with the same inputs, then the rate of profit would actually have risen.

At first sight Moszkowska's example does not refute Marx's general law of accumulation. In the first case  $C = £340$  and  $v = £170$ ; in the second case  $C = £510$  and  $v$  is still £170. So stock has indeed increased in 'value' relative to 'labour', considered as variable capital. However, her difference with Marx is that the value of *output*, that is, the value added by labour-power – not the value of this labour-power – has grown to such an extent that it outweighs this growth of constant capital. Since  $C$  increased and  $v$  did not, why didn't the profit rate fall? Because  $s$ , in money terms, increased. In the first case it was £170 and in the second, £255.

Thus, in order to understand how Moszkowska's reasoning contradicts Marx's law of the tendential fall in the rate of profit, we have to grasp that this occurs *because* it contradicts Marx's general law of accumulation. The rate of profit rises because labour – specifically the value *added* by labour – is increasing faster than constant capital, in contradiction to Marx's Volume I argument.

This gives us a first clue to what is going on. The labour employed is no different than before. It is paid the same wage in money (and material) terms. Yet the surplus-'value' it produces is 50% bigger. Why? Because the value added by labour is larger in the second case than in the first. In the first case, 340 hours of labour produced, or was represented in, a total value-product of £340. In the second, however, the same 340 hours of labour produced a value-product of £435.

The additional surplus *arises because the price of corn has inflated relative to labour*. This violates one of Marx's principal assumptions that the value of money or what we have termed the 'monetary expression of labour-time' remains constant. £1 now buys less value than before. If we use this 'corn money' as the measure of value, it makes it appear that an hour of labour creates a different amount of value, depending on the technology of society. But this is simply to say that the magnitude of value is not determined by labour-time or, which is the same thing, the concept of value being applied is no longer Marx's. To put it

another way, the reason that the profit rate is higher than Marx's, is that the mass of profit itself is reported as larger than the (monetary equivalent of the) labour-time in it.

What concept of value is actually being applied? Actually, we demonstrated the concept by introducing it as an assumption, when we stated that we will suppose the price of corn remains constant at £1 per unit. We will shortly show that this is the only assumption on which Moszkowska's examples are compatible with a market – that is, a commodity – economy. On this assumption value has actually been measured in terms of *use-value*, in terms of the quantity of corn. This is a physicalist, not a labour-time, concept of value.

Not only is this not Marx's value-concept, Marx said so and warned against what Moszkowska, and all subsequent interpreters, have done. In Volume III the law is clearly framed in terms of value. Marx clearly excludes a use-value interpretation:

We entirely leave aside here the fact that the same amount of value represents a progressively rising mass of use-values and satisfactions, with the progress of capitalist production and with the corresponding development of the productivity of social labour. (219 LW, Penguin 0000).

In Marx's discussion of Cherbuliez in *Theories of Surplus Value* the matter is dealt with even more curtly:

Cherbuliez first states correctly that profit is determined by the *value* of the product in relation to the 'different elements' of productive capital. Then he flies off suddenly to the product itself, to the total amount of products. But the amount of products may increase without its value increasing. Secondly, a comparison between the amount of the product and the quantity of products of which the capital – used up and not used up – consisted, can at best only be made in the way Ramsay does, by comparing the aggregate national product with the constituent elements expanded in kind during its production... why does Cherbuliez stray on to this *false path*? Because...he has not shown how surplus-value arises and therefore has recourse to *surplus product*, i.e. to *use-value*. (1972:370)

## **THE RELATION BETWEEN THE USE-VALUE CONCEPT AND THE SIMULTANEIST PRESENTATION OF MARX'S VALUE CONCEPT**

Moszkowska herself does not present her results in the manner we have presented them. Instead she purports to report all magnitudes in value terms. We shall shortly present it in this way, in order to decipher her own argument, but before doing so we draw the reader's attention to an obvious point. Since her own reasoning, in terms of her own concept of value, leads to a rate of profit that is *identical* to the physical rate of profit, something very peculiar *must* be going on with the concept of value being applied. If it leads to the same results as the assumption that value is measured in terms of use-value there are really only two possibilities:

- (a) Moszkowska's concept is actually a use-value concept disguised as a labour-time concept.
- (b) the project of determining the magnitude of value as Marx conceived it is *itself* internally contradictory and actually, Moszkowska's manner of calculating value is the only one possible.

The second conclusion is the tacit approach of the critics and was Bortkiewicz's explicit starting point. Bortkiewicz begin by supposing that labour values cannot be calculated as Marx did. Re-interpreting Marx's theory as a general equilibrium concept of value, he and his successors imposed the 'corrected' value calculation that supposes input and output prices to be equal. Finally, applying this 'corrected' value concept, the critics deduce a contradiction in Marx's own conclusions concerning the profit rate.

The enquiry has thus from the outset excluded, as logically inconceivable, the possibility that Marx's value concept could be rigorous in its own right, that it is possible to conceive

of, and hence quantitatively measure, value in such a way that the amount of value added by a given magnitude of undifferentiated living labour is always and everywhere the same.<sup>11</sup>

We will develop this point by asking a simple question, which is nevertheless the key question in the whole debate: between stage 1 and stage 2, what happens to the money that the capitalists were paid for selling their 510 units of corn? Or, which is the same question where do the capitalists in stage 2 purchase their 510 units of corn, and at what prices?

Moszkowska's assumption corresponds to the method which we term 'simultaneist'; she supposes that the capitalists in each stage purchase their inputs from their own outputs, under the same technological conditions. She supposes that the price for which the corn is sold is the same as the price for which it is purchased, that 'input prices must equal output prices'. A diagram may help. Below, we have laid out the two stages of technological change as they must actually occur, one after the other, in the order and manner that corresponds to the circuit of capital as Marx conceives it. We have laid out the use-value aspect, and the exchange-value aspect, one under the other with the exchange-value in italics. And we have used expressions like <sup>c</sup>170 to mean '170 units of corn'. The value of the corn that serves as wages (column 2) is enclosed in brackets because this is not transmitted to the product; it is instead replaced by the £340 created by the labour-power that it purchases.

	C		...P...	C' - M - C		...P...	C'
Stage 1	<sup>c</sup> 170 <i>£170</i>	<sup>c</sup> 170 <i>(£170)</i>	→ <i>£340</i>	<sup>c</sup> 510 <i>£510</i>			
Stage 2				<sup>c</sup> 340 <i>£340</i>	<sup>c</sup> 170 <i>(£170)</i>	→ <i>£340</i>	<sup>c</sup> 765 <i>£765</i>

**Table 1: Moszkowska's example with corn valued at £1 per unit**

With this monetary unit, the C' - M - C stage, circulation, is compatible with monetary exchange; the money that the capitalists *receive* at the end of stage 1 (£510) is the same as that which they pay, in order to start stage 2.

This is as it should be. The capitalists cannot possibly sell their corn for £510 at the end of stage 2, and then buy the same amount of corn for, say, £408. If they did, they would actually make an *extra* £102 in profit that would not be attributable to the expenditure of labour. This would not even be possible in a normal commodity exchange since the same barrowloads of corn would be sold for £510 and purchased for £408; money would have to appear magically while passing from the hand of the purchaser to the hand of the seller, a veritable horn of plenty: value from nowhere.

If the capitalists are paid the monetary equivalent of 510 units of corn (whatever that may be, whether £510 or £1020 or RM 20bn), at the end of period 1 then normal monetary exchange is only possible if this same sum of money is spent on the inputs to stage 2, that is, if these 510 units of seed corn plus wages are purchased at the *same price* as they were sold.

<sup>11</sup> Without any loss of generality we leave out of account (as does Marx) the variations induced by intensity or skill of living labour. If Moszkowska's critique and the physicalist critique in general is valid, it must be valid for undifferentiated labour; their thesis, and nearly all subsequent debates, can therefore be assessed without introducing this complication. What we lose by this simplification is the following: we have not proved that Marx's law remains valid when labour is not all simple labour. This is a separate debate and beyond the scope of this piece, but one from which Marx's law also emerges unscathed.



To this it might, and has been, objected that a theory of value is not a theory of price; that value deals with hours and price deals with money; that value, essentially, is not a monetary category.

In the first place, even if this were so, it comes as something as a jolt to recognise that in a society with a single commodity such as Moszkowska envisages, where according to all the usual twentieth-century conceptions goods should indeed exchange at their values, they actually *cannot possibly* exchange at their values, if values are defined in the usual twentieth-century manner. Such a problem cannot be lightly dismissed.

But in the second place, it isn't so.

Marx's assertion that the magnitude of value is determined by labour time does not reduce to the notion that these magnitudes must be measured in hours. To the contrary, as we have seen, he presents the law in terms of *money*, and throughout the whole of his work freely uses money and labour-time interchangeably.<sup>13</sup> To explain why this is so it is useful to deal with a confusion expressed explicitly by Abraham-Froix and Berrebi (0000) which supposes that the distinction between value and price is *dimensional*; that the substance of value is time and the substance of price is money, and that consequently values are magnitudes of labour hours and prices are magnitudes of money. Rodriguez (1995) very thoroughly analyses this confusion. For Marx, price is the *monetary expression of value*. Every value magnitude has two measures, intrinsic and extrinsic, time and money. Thus if the value of money is £2 per hour then to say a commodity has a value of £10 is the same as to say it has a value of 5 hours. Marx occasionally expresses this by referring to £10 as its 'value-price'.

This is in no way modified by the fact that market price may deviate from value-price. If a good, whose value is £10, actually sells on the market for £8, then if the monetary expression of value is £2 per hour, we can equally say that this good has a value of 5 hours and a market price of 4 hours. In popular language we would say that it is worth £10 but sells for £8.

However the law of value does not reduce to the idea that every price is also a number of hours. Otherwise, we could dispense with labour-time and just use money. What does define a value magnitude, as opposed to any other? On this Marx is quite clear; his theory is a theory of the 'determination of the magnitude of value by labour-time'. It is the way in which the *magnitude* of value is determined, whether this magnitude be expressed in money or in hours, which distinguishes Marx's theory from any other.

Most specifically, the core of Marx's determination of the magnitude of value is the idea that it arises only from the application of living labour and, specifically that the magnitude of the value added to the wealth of society by living labour is equal to the total time worked by this labour.

This is equivalent to, and in many senses derived from, the reasoning in Chapter 5 of Volume I which we have already discussed; that circulation cannot modify the amount of value in existence, but merely changes its owners. In mathematical terms, the total value in society is an invariant of circulation.

Marx thus divides capitalist reproduction into two utterly distinct spheres; production, in which value is created (and destroyed) and circulation, in which this produced value is distributed and re-distributed, through exchange, to people other than its direct producers. The idea that value arises only from the application of living labour is *the same as* the idea

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<sup>13</sup> Asserting however, in many cases explicitly, a *constant value of money*, usually £1=1hour or occasionally 1 week; the units are thus genuinely interchangeable and Marx's usage involves neither quantitative nor qualitative carelessness.

that circulation neither creates nor destroys value. It constitutes, in this sense, a definition of production, which constitutes the creation of commodities by the application of living labour. Marx's delineation of reproduction into circulation and production is co-terminous with, mathematically equivalent to, the determination of the magnitude of value by labour time.

### The determination of the magnitude of value by what? Marx versus the 'Labour theory of value'

Why does this matter? In Moszkowska's example, as in the whole literature on 'Marx's' theory of value since Bortkiewicz, it is systematically claimed that simultaneously-determined labour values are simply a logical 'touching up' of Marx's own values; that they capture the essence of what Marx was saying and if anything make it more rigorous. This claim is given verisimilitude because it appears to be Marxian since it calculates values in hours. The simultaneous value concept is thus given a false pedigree; it is part of the family of 'labour theories', and why? Because it deals with hours. It is a 'labour theory of value' and therefore it must be Marx's.

Marx *never* employed the term 'labour theory of value'. The term was introduced by Kautsky (0000). Upon its adoption by Lenin, it acquired universal use in the popular language of Communism, which is why it is now so widespread. But Marx himself refers either to the *law of value*, to the *theory of value*, or when he needs to be specific, to the *determination of the magnitude of value by labour time*.

What therefore distinguishes Marx's theory of value – and incidentally Ricardo's – from those of his critics and interpreters is precisely this point, the insistence on *magnitude*. Well, in Moszkowska's example, *is* value determined by labour time? This time let us present the entire tableau again, substituting hours for pounds, to make the point clear.

	C		...P...	C' – M – C	...P...	C'	
Stage 1	<sup>c</sup> 170 <i><sup>h</sup>170</i>	<sup>c</sup> 170 <i>(<sup>h</sup>170)</i>	→ <i><sup>h</sup>340</i>	<sup>c</sup> 510 <i><sup>h</sup>510</i>			
Stage 2				<sup>c</sup> 340 <i><sup>h</sup>272</i>	<sup>c</sup> 170 <i>(<sup>h</sup>136)</i>	→ <i><sup>h</sup>340</i>	<sup>c</sup> 765 <i><sup>h</sup>612</i>

**Table 3: Moszkowska's example with corn valued in simultaneous 'labour-time' hours**

Now we have a further problem. Consider the total labour-time worked over the whole two periods. The capitalists began with <sup>h</sup>170 in constant capital. To this they added 340 labour hours in stage 1 and a further 340 in stage 2, a total of 680. They fed <sup>h</sup>170 of this to the workers in stage 1 and <sup>h</sup>136 in stage 2, a total of <sup>h</sup>306 variable capital. The final product should therefore be worth

$$340(\text{initial capital}) + 680 (\text{labour time worked}) - 306 (\text{value consumed}) = 714 \text{ hours.}$$

But it isn't. It's worth 612 hours. 102 hours have simply vanished. They vanished in the stage of circulation in the middle, when 510 hours of corn, overnight, simply turned into 408 hours.

This contradiction becomes particularly acute once we abandon agricultural metaphors and consider modern production, which is continuous. Suppose the above process were a continuous one lasting, say, two weeks, with the change occurring between week 1 and week 2. In that case the *whole* process would be as follows in material terms:

$$510_C + 680_{S+V} \rightarrow 1275$$

What 'value' could correspond to such a material process? A quick calculation shows it to be  $680/765 = \frac{8}{9}$ . This is neither 1 nor 0.8. Moreover the values it assigns to the process are

$$453\frac{1}{3} C + 302\frac{2}{9} V + 377\frac{7}{9} S = 1133\frac{1}{3}$$

But these values are neither those of Moszkowska's stage 1, nor those of stage 2. Nor is the amount of value that vanishes the same. It is a wholly different determination of value.

Hence the determination of value is, we find, depending on the arbitrary accounting decision that we make as to how long the period is. It is in effect *indeterminate*; it is rendered determinate only by this arbitrary accounting choice. But in that case, how can value possibly be determined by labour time, since it depends also on the accountant's pen?

To finish enumerating the problems of this approach we should note, meticulously, the consequence of a *fall* in productivity. This is by no means unusual; it will occur through resource exhaustion in the production of any primary material, for example. Suppose then that instead of 765 units of corn, in stage 2 only 544 units of corn are produced. The new value is then substantially higher at 5 hours per unit and the tableau reads

	C		...P...	C' - M - C	...P...	C'	
Stage 1	<sup>c</sup> 170 <i><sup>h</sup>170</i>	<sup>c</sup> 170 <i>(<sup>h</sup>170)</i>	→ <i><sup>h</sup>340</i>	<sup>c</sup> 510 <i><sup>h</sup>510</i>			
Stage 2				<sup>c</sup> 340 <i><sup>h</sup>1700</i>	<sup>c</sup> 170 <i>(<sup>h</sup>850)</i>	→ <i><sup>h</sup>340</i>	<sup>c</sup> 765 <i><sup>h</sup>2040</i>

**Table 4: value from nowhere**



The net effect of the whole change is to create 2040 hours of labour from an initial capital of 170, applying 680 hours of labour and consuming 1020 of them; 170 hours have appeared from nowhere.

And indeed, the less productive the labour the greater the increment in value, so that if the workers create no new product at all and merely reproduce the corn, its value becomes infinite. Value created is *inversely* related to the productivity of labour, a completely nonsensical consequence of this theory.

## TEMPORAL VALUES; A RIGOROUS REFORMULATION

If, of course, there were no alternative interpretation of Marx's theory or of the determination of value by means of labour time, then we should simply add the above difficulties to the already large list of contradictions in the simultaneist theory of value. They would add yet more substance to the argument that the whole idea should be dropped.

But there is an alternative. Let us explore it.

We have to begin by understanding how the process of technical change actually takes place and eliminate, as temporally absurd, the notion that *new technology is produced by means of new technology*, an idea at the core of the simultaneist presentation. When society begins producing Pentium computers, it does not produce them by means of Pentium computers. It produces them with the technology to hand at the time, namely 486 computers and their antecedents. Railways are not built by means of trains. Each successive generation of machinery and raw materials is produced using the preceding generation of machinery and raw materials.

Marx conceived of technical change exactly as it occurs; new technology is built by means of old technology. The mythical society of comparative statics, in which each technology

produces itself, does not and cannot exist. In actual fact, therefore, the farmers would have to begin stage 2, to be faithful to Marx's approach (not to mention the reality of the capitalist market) by *purchasing the outputs of stage 1 at the prices and values of stage 1*.

On this basis there is a rational alternative way to assign value magnitudes to the inputs and outputs of both stages which proceeds as follows: at each stage we suppose that the inputs to production were produced using the technology of the previous stage. In mathematical terms we suppose that prices at the start of period  $t+1$  were not, as Moszkowska supposes, equal to prices at the end of this same period, but instead to the prices at the end of the previous period, of period  $t$ .

This approach we term *temporal*, in distinction to the dominant means of determining value and price which we term *simultaneist*.

For this to work mathematically, at the outset we must suppose that the values of the very first purchase of corn is already given. This is known in mathematics as an 'initial condition'; a value with which one starts solving a dynamical equation.<sup>14</sup>

It is easiest to compare the solution with Moszkowska's if we suppose an initial corn value of 1, the same as hers. The difference in the calculation then arises when we start stage 2. Instead of supposing, as does Moszkowska, that the seed corn of this stage has a value equal to the product of the same stage (a product that does not yet even exist) we suppose it has the same value with which it left production; 1 hour per unit. The constant capital of stage 2 is therefore 340, and the variable capital is 170, not 272 and 136 as Moszkowska has it. Consequently, the value of the product itself is

$$340c + 340_{s+v} = 680$$

and, there being 765 units of corn, each is worth  $\frac{8}{9}$  of an hour. This decline in value will not communicate itself to a cheapening of wages until the *next* (third) period.<sup>15</sup> This leads to the following tableau:

	C		...P...	C' - M - C	...P...	C'
Stage 1	$c_{170}$ $h_{170}$	$c_{170}$ $(h_{170})$	$\rightarrow$ $h_{340}$	$c_{510}$ $h_{510}$		
Stage 2				$c_{340}$ $h_{340}$	$\rightarrow$ $h_{340}$	$c_{765}$ $h_{680}$

**Table 5: Value conservation with temporal labour-time values**

The constant capital grows, from stage 1 to stage 2, by exactly the amount of surplus-value converted into capital, 170. The profit rate changes from 50% in stage 1 to  $170/(510) = 33.3\%$  in stage 2.

This value concept is rigorous and well-defined. It provides for the conservation of labour in circulation. It is immune to variations arising from changes in the accounting period.

<sup>14</sup> Stamatis (1999) echoing Robinson (1953) objects that an initial condition implies an exogenous determination, or renders the temporal determination indeterminate through infinite regress. This is not so; it can be demonstrated that differences in values so calculated arising from different choices of initial condition decay exponentially. There is no butterfly effect. The solutions arising from different choices of initial value converge within a small number of periods. See Freeman (1997)

<sup>15</sup> Note that this has nothing to do with a question that exercises Sraffa (1962) and the post-Sraffians, which is when wages are paid. Whether wages are paid before or after the work is done, the workers must eat before they work. The corn that they eat is the corn that exists before they have grown it, not the corn they are about to grow.

Constant capital accumulates in a rising proportion to living labour, and the profit rate falls exactly as Marx suggests.

## **THE IDEOLOGICAL FUNCTION OF THE SIMULTANEIST PARADIGM AND THE PRACTICAL DISTINCTION BETWEEN VALUE CONCEPTS**

Let us summarise what I think we have done so far. In order to understand the structure of Marx's reasoning we had to ask the question 'why were these conclusions obvious to Marx?'. We asked 'what propositions or presuppositions about value does this theory require' It emerged that there is a rigorous way of formulating Marx's theory of value, such that his principal conclusions about the profit rate turn out to be valid deductions from this value theory. It also turns out that this way of formulating Marx's theory is strongly supported by Marx's own texts, which we feel justifies asserting that it is actually Marx's theory.

The required presuppositions are: first, that the total value in society is unaltered by exchange; and second, that the value added to this by production is always and only equal to the living labour time expended on it, no more and no less.

We studied the logical structure of his critics' thinking in a similar way, by demonstrating its actual presuppositions – the propositions that would have to hold, in order for the theory to be true. It turns out that there are two alternatives. *Either*

- (a) the value added in society by production is (in some sense not necessarily well-defined) equal to the net new use value created, *or*
- (b) if the value added in production is determined differently, circulation destroys or creates exactly enough of this to bring the equalize the total value in society to that given by (a)

A further stage of analysis is needed for the following reason: this isn't how the theory presents itself. The confusion and also the dogmatism of the critics' presentation arises thus because they do not recognise their own concept for what it is, that is, do not understand their own presuppositions. The debate is therefore asymmetric: Marx presents his value-concept as it actually is, but his critics do not present their concept as it actually is.

This leads us to study a further necessary presupposition of physicalist doctrine which accounts both its hegemonic theoretical dominance and for the dogmatic vigour with which it is upheld: the notion that there is only one possible profit rate. This presupposition, synonymous with the idea that 'money is a veil', arises from the simultaneous method of determination itself. This method, we will argue, is not just an 'approach to dynamics' but an *ontological* presupposition; it constitutes a definition of what exists.

### **Opening the doors to perception; what the temporal determination of values and prices does and does not achieve**

In the growing debate on temporal values, those (few) physicalist writers who have made a genuine attempt to understand or follow the logic of the argument, have often supposed that a falling rate of profit arises, or is claimed to arise, from temporalism in and of itself. Thus Laibman (0000,0000,0000) has produced a series of temporal models in which, under certain conditions where Marx's profit rate falls, his temporal profit rates rise. This, he seems to take to refute the temporalist argument.

[TBA quotation]

But temporalism in and of itself does not produce a falling profit rate. The tendential fall in the profit rate arises from the *combination* of temporal value determination with the

determination of the magnitude of value by labour time. All that temporalism does is to distinguish between, to permit us to separate, the rates of profit arising from different monetary units. It assigns a real, not a fictional role, to money – as was evidently Marx’s entire project:

[TBA quote from Grundrisse]

The temporal calculation of value yields any of an infinite number of determinations of the actual magnitude of value and hence of the actual rate of profit, each corresponding to what monetary theory calls a ‘money of account’. To each money of account, corresponds a profit rate.<sup>16</sup>

From the temporalist standpoint, therefore, it is easy to understand the relationship between the various value concepts and the profit rates to which they give rise. Temporalism permits us to distinguish quantitatively between these different profit rates. It does not tell us that they all fall; it simply states that one of them – that which is determined by the magnitude of labour time – does actually fall as a consequence of accumulation in the way that Marx described.

Temporalism therefore creates the space for pluralism, for a genuine comparison, on a level playing field, of the various different theories of the rate of profit that correspond to the various different theories of value. It permits us to understand the connections between each theory of value and the consequences of that theory, because it quantitatively distinguishes those consequences.

What we now need, finally, to assess, is why simultaneism has failed to achieve this, and why it collapses all theories onto a single theory – physicalism.

### **Simultaneism and the dogma of a single profit rate**

Consider Moszkowska’s own calculations as represented by myself in table 2. I supposed here a (constant) monetary expression of labour of £1 per hour. What would happen if, in the second stage, all prices doubled so that in money terms, each hour became equivalent to £2? As far as the profit rate is concerned, nothing. Constant capital would become £544, variable capital £272, hence capital employed would be £816, living labour would add £680 and output would be £1224. Profits would be £1224 – £716 = £408 and the profit rate, £408/£816 = 50%. The expression for the profit rate is thus independent of the monetary unit.

This is a perfectly general result of the simultaneous method; the *rate* of profit (though not its mass) is the same, regardless of monetary unit. Money is a pure ‘*numéraire*’ which appears both in the top and in the bottom of the expression for the profit rate, and cancels out.

As a direct consequence, this profit rate is necessarily the physical profit rate. This is so since, every price (just like every value) is at least a ratio between use-value and money; it is the price ‘of’ a use-value. If money is irrelevant, then use-value is all that remains. The result that the ‘physical profit rate’ is the only possible profit rate thus arises directly from the simultaneous method precisely because it eliminates money.

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<sup>16</sup> Mathematically this is a very simple idea. The value profit rate is the rate of self-expansion of capital or  $r = K'/K$  where  $K$  is capital, and the differentiation is performed before deducting the consumption of capitalist revenue. If now  $eK$ , the monetary expression of capital, is equal to  $eK$  where  $e$  is the monetary expression of labour, then  ${}^{\text{£}}r$ , the monetary profit rate, is  $(eK')/eK = (eK' + e'K)/eK = r + e'/e$ ; the value profit rate, plus the proportionate rate of change of money prices relative to labour value. The ‘physical’ profit rate is a special case where the physical purchasing power of money is held constant.

The same is not true of the temporal presentation and nor is it true of the world. If, for example, an entrepreneur purchases an asset speculatively for £1000, and it then becomes worth £2000, the firm's balance sheet will show a profit of £1000. This is of course a speculative profit with no origin in production, but it is nevertheless a *monetary* profit and it is not a simple illusion. The firm really is £1000 richer and its behaviour, and the options open to it, really will be affected by this.

The temporal calculation *exhibits and quantifies* this real effect. Let us consider the effect of the same monetary inflation on table 5. Since the monetary inflation takes place in stage 2, we suppose that one hour is expressed in £1 in stage 1, but £2 at the end of stage 2. The output prices of stage 2 are thus doubled; the input prices, being the output prices of stage 1, remain the same. This yields table 7:

	C		...P...	C' - M - C	...P...	C'
Stage 1	<sup>c</sup> 170 £170	<sup>c</sup> 170 (£170)	→ £340	<sup>c</sup> 510 £510		
Stage 2				<sup>c</sup> 340 £340	→ £340	<sup>c</sup> 765 £1360

**Table 7: a doubling of the monetary equivalent of labour, temporal calculation**

Profits in stage 2 in *money* terms are now £1360 – £510 = £850 and the rate of profit is £850/£510 or over 150%. As occurs in the real world, price changes matter.

This applies, we should not, regardless of whether the money in which we evaluate the product is the actual money that is used for exchange. The profit rate in fact depends on the accounting unit; hence measured in labour hours, the rate of profit is different from the physicalist rate of profit and each of these in turn is different from the money rate of profit.

This is why the value concept adopted matters: there *is* no single rate of profit. The rate of profit depends on the value concept. There is no such thing as ‘the’ rate of profit. Hence, all statements to the effect that any physicalist theory has ‘disproved’ Marx’s theory are simply false, because they leave out of account a simple fact: Marx’s profit rate, and the physicalist profit rate, are not the same. Marx’s profit rate frequently falls when the physical profit rate rises and, in fact, falls under the exact conditions that Marx himself specifies. The theory contains no as-yet-identified error.

The peculiar relation of simultaneism to physicalism can now be clarified. Under simultaneous determination, the real effects of price variation, and of money, are not merely ‘abstracted from’; they are *eliminated*, assumed not to exist. They are set equal to zero. A *special case* – stasis or market perfection – is elevated to the general case. In consequence, everything that really happens which is logically excluded from this special case, such as crisis, finds no explanation from within the theory. Moreover, the history of the discussion shows that, within this theory, it becomes impossible even to *think* about such things.

For this reason, the entire literature on Marx’s theory of the tendential fall in the profit rate speaks, almost with one voice, of ‘the’ profit rate. It simply never occurs to the authors concerned to consider the dependency of the profit rate on the value concept applied, or even on the rate of inflation of money relative to physical goods. Even writers such as Roemer who take care to explain that their derivations assume equilibrium, do not realise that outside of this assumption, there is no such thing as a single profit rate. Roemer therefore does not hesitate to write such bald summaries as the following:

For at least a generation, various writers have pointed out that there is no necessity for the rate of profit to fall as a consequence of technical change...Okishio (1961) demonstrated in a simple and compelling model that the rate of profit would rise as a consequence of competitive innovation.

The list of writers that use such language is too long to exhaust. Thus Thompson (1995, p. 100) writes that “Okishio shows that viable technical change raises the equilibrium rate of profit.” Laibman (1996, p. 37, emphases omitted) asserts that “the viability condition [... and] the falling rate of profit condition ... cannot be fulfilled at the same time; this result is the famous Okishio Theorem.” Baldani and Michl (2000, p. 105) inform us that “If the real wage remains constant, the Okishio Theorem states that the profit rate will rise,” and so on.

The simultaneist determination of values or prices thus functions, ideologically, as a great deal more than a ‘model’, an ‘abstraction’, or a ‘first approximation’. It is not a simplification that can be dropped; it is an actual mode of thought, a paradigm, an ontology. It defines what is *allowed to exist*; and it excludes all else from the realm of the permissible. It is, to call it by its proper name, a dogma. This leads, for example, to the following statement:

Responses to this claim, of Okishio and others, have been of three types. These are, first, what Fine and Harris (1976) call fundamentalist positions on FRP. Second, there are empirical discussions of whether or not the organic composition of capital is indeed rising. While this sort of investigation may be useful, it does not bear upon the *theoretical* issue of whether or not the rate of profit falls due to technical change. That is, either such investigation will be consistent with the Okishio conclusion, or it will not be; in the latter case, it would show the need for a different microeconomic argument of capitalist technical innovation; it would not, however, show Okishio’s *argument* to be wrong. The empirical investigations, then, are certainly necessary, but they cannot provide refutation of a theory (Roemer 1979:380)

The very strong assertion that empirical facts *cannot* refute a theory is quite extraordinary and lies wholly outwith the practice of science as we know it. Take just one example of where such reasoning would lead: mediaeval arguments in support of the sun’s motion around the earth were logically implacable, mathematically irrefutable, and completely false. To refute them one avails oneself of a device called a telescope. This applies quite regardless of whether one can explain what is seen in the telescope. Nothing distinguishes Roemer’s argument from theological proofs that God must exist because all arguments to the contrary lead to paradox. There *is* no other theoretical issue: if theory conflicts with fact, the task of theory is to find something better, not to cling to a false theory on the grounds that one cannot see what is wrong with it.

Roemer’s position as stated is a classical abuse of logic. He begins from the correct observation that Okishio’s theorem, given Okishio’s presuppositions and definitions, demonstrates that Okishio’s profit rate cannot fall. But he excludes *a priori* the possibility that subsequent theoretical discoveries will arrive at alternative presuppositions and definitions which lead to alternative conclusions, or indeed, that these alternative presuppositions and definitions may – as in fact they do – already exist. He has converted logic into an independent source of authority elevating it not only above the empirical facts but against all possible theoretical alternatives. This is not logic but dogma, pure and simple.

How has economic theory – above all marxist theory – reached such a state?

To see how, let us ask what it means, if, in dealing with something – in this case price variation, hence money – which produces real effects, we suppose that this thing does not exist. Actually, it means that we remove, once for all, any possibility that this thing can play a causal role.

This is not the same as an abstraction. An abstraction enquires into that which may be said regardless of some variation. It does not suppose that there is no variation; after we have

made an abstraction we can still add in the missing determinations by introducing the variation. If, however, we suppose that the variation does not exist, we cannot subsequently re-introduce it.

For example, a bicycle can remain upright only if it is moving. A temporal description of a bicycle which *abstracts* from rotation would give its shape, its weight, and its orientation in space. Such a description simply would not state how far or how fast it was moving. It would leave ‘moving’ out of the things we speak of, when describing the bicycle. As a result, if we were asked the question, ‘can this bicycle stay upright’, the only answer we could give would be ‘I don’t know; it depends on additional information I don’t have.’ A simultaneist description would, to the contrary, *fix its speed as zero*. It would take one particular case – stasis – and elevate it to the general case. The answer to the question ‘can this bicycle stay upright?’ would be ‘no’ or if so, only unstably and exceptionally. It would be literally impossible to explain why the bicycle remains upright from within the ‘theory’ so created. For a bicycle that is not moving cannot in general stay upright.

Ontologically, we would conclude that it is part of the nature of a bicycle to fall over. Confronted with a bicycle that actually does not fall over, we would have to invent an *exogenous* force that held it upright. This is the position in which the simultaneist paradigm finds itself; except that the problem is the reverse of the bicycle: it is the *instability* of the market, not its stability, that requires motion for its explanation. Simultaneous determination in effect presumes *a priori* that the market works; that it distributes perfectly all goods from producers to consumers at unchanging prices with everywhere equal profit rates. It supposes that it is part of the nature of the market to work.

Indeed the entire language of economic theory – which in the twentieth century, is in general rooted in the simultaneous method through its Walrasian foundations – betrays this ontological preconception. Economists speak of ‘market imperfection’ – which already presupposes there is such a thing as market perfection, as a standard from which any actual market may be judged. They speak of ‘disequilibrium’ as if equilibrium itself were anything other than an accident. Cycles are explained in terms of ‘shocks’ or ‘disturbances’, and so on. This is the language of a discipline that has already assumed what it should in fact set out to prove, and has converted this assumption into a definition. It is actually a Platonic ontology; perfect form is taken as the standard against which imperfection is measured.

It then becomes *logically impossible* to deduce any failure to achieve these aims that arises from within the theory – as Roemer implacably notes; economic theory is obliged to seek its causal explanations from outside. The observed rate of profit really does fall; the issue at debate is the cause of this fall. Marx explains this fall as a part of the motion of the market; all other theories explain it as a deviation from the market.

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