Debt, Economic Crisis, and the Tendential Fall in the Profit Rate

A temporal perspective

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Debt, Economic Crisis, and the Tendential Fall in the Profit Rate: A temporal perspective

Following Brazil's recent success in obtaining new credit, financier George Soros and Michel Camdessus of the International Monetary Fund have declared that the global crisis is over. What they mean is that the world has again been made safe for the inflow of *capital.* Even if this proves to be true, hundreds of millions of *people* throughout East Asia, Russia, Brazil, and elsewhere have been — and continue to be — subjected to immense suffering as a result of the crisis. Nor does the putative end of the crisis mean anything more than that permanent crises do not exist under capitalism. Rather, the system lurches from crisis to crisis. Soros himself is awaiting the next one.

The fundamental problem, I suggest, is the antagonism between two aspects of the production process — the production of use-values (goods and services) and the production of value — that is the very nature of the capitalist mode of production. On the one hand, it "tends towards an absolute development of the productive forces … while on the other hand its purpose is to maintain the existing capital value and to valorize it [expand its value] to the utmost extent possible" (Marx, 1981b, pp. 357-58). As productivity rises, commodities' values fall. This failure of value to "self-expand" sufficiently leads to slumps in use-value production, precisely because it and value production are but different aspects of one and the same production process.

The latest crisis has appeared in the form of a *crisis of overproduction or inadequate demand* and a *debt crisis*. Accordingly, the main questions I will address are (1) what determines the growth of demand? (2) What determines the volume of debt that is sustainable?

The first objective of this paper is to argue that the crux of the answer to *both* questions is: the growth of new value. Rather than value being a "metaphysical" appendage lacking any

influence upon real relations — which is the status to which atemporal theories reduce it — the rate of self-expansion of value *over time* is a crucial determinant of the dynamics of capitalism. It is a key influence upon the profit rate, which in turn influences investment demand, and thus total demand. Excessive growth of debt, moreover, must be defined with reference to the growth rate of value, because the latter determines the volume of debt that is sustainable.

If this is correct, then a further question must be addressed: "what determines the growth rate of value?" According to Marx's theory, it is determined by growth of employment or, more precisely, of living labor extracted in production. The paper's second objective is to argue that this theory can explain the relevant phenomena better than the dominant theory in Marxist circles, according to which the profit rate (and, implicitly, the self-expansion of value) is determined principally by productivity. What must be explained is the *co-existence* of the following phenomena: (1) sluggish, if not negative, employment growth; (2) rising productivity, including a microelectronics revolution that has been dubbed the Third Industrial Revolution; (3) the tendency of prices to fall, which has recently intensified; (4) rising burdens of public and private debt; and (5) economic crises appearing in the forms of overproduction and debt crises.

Tautologies vs. Explanations

In a much-discussed recent work on crisis, Robert Brenner (1998, p. 8) argues that the "*unplanned, uncoordinated, and competitive* nature" of private capitalism compels firms to compete by expanding. They systematically expand faster than demand will permit in the long run — "there is insufficient demand to allow the higher cost firms to maintain their former rates of profit" (Brenner, 1998, p. 25). The result is a crisis of excess capacity and overproduction, i.e., production in excess of demand.

One fundamental shortcoming of this account is that it is actually a tautology, not an explanation of crisis. As Marx (1981a, p. 486) pointed out, "It is a pure tautology to say that crises are provoked by a lack of effective demand or effective consumption. … The fact that commodities are unsaleable means no more than that no effective buyers have been found for them." To attribute crisis to an excess of production over demand, in other words, is merely to restate that there is a crisis. It does not begin to explain what has caused it. To do so, one would need to explain *why* the volume of output has proven to be excessive — *why*, that is, demand has been too sluggish to enable everything to be sold at existing prices.

Brenner makes little effort to formulate such an explanation. Greider (1997), another recent advocate of the overproduction thesis, likewise fails to do so. The tendency to substitute tautologies for explanations can also be seen in the fashionable attempts to attribute the Asian economic crisis to an overexpansion of credit. This begs the question in much the same manner as the overproduction thesis. That a sudden outflow of capital from the region occurred *means* precisely that the prior expansion of capital inflows has, in retrospect, proven to be excessive. The phenomenon has been restated, but not explained.

A similar observation can be made with respect to Minsky's (1982) "financial instability hypothesis." By emphasizing the excessive increase in indebtedness — speculative and "Ponzi" financing — that takes place in tranquil times, this theory offers highly valuable insights into the conditions that permit "shocks" to the economy to develop into a full-blown crisis. Yet the excessiveness of the debt burden is itself left unexplained. With reference to *what* has it become excessive? Just as writers like Brenner and Greider need to explain why demand cannot keep pace with production, finance-based accounts of crisis need to explain why the economy's ability to absorb credit cannot keep pace with its creation. Again, what determines the growth of

demand, and what determines the volume of debt that is sustainable? Only by answering such questions does one move from tautology to explanation.

Traditional Underconsumptionism

In contrast to Brenner and Greider, prior "demand-side" theories have indeed tried to explain what determines the growth of demand. The key point is always that total demand is ultimately determined by the demand for consumer goods, which is strictly limited by biological needs and/or the restricted development of new needs under capitalism.

Underconsumptionists do recognize that investment spending constitutes an additional source of demand, and that it is determined in a different way, namely by the extent to which firms desire to increase production. Yet, they maintain, the increase in production is limited by the demand for consumer goods because, directly or indirectly, "the process of production is and must remain, regardless of its historical form, a process of producing goods for human consumption" (Sweezy, 1970, p. 172). The demand for consumer goods thus sets a limit to investment demand as well.

Given the restricted growth of consumer demand, and the quicker growth of *potential* output that results from technological progress, it follows that that a chronic, structural tendency exists for aggregate supply to exceed aggregate demand. This situation is of course unsustainable in the long-term. When the growth of output does temporarily exceed the limit set by consumer demand, crises of overproduction result. Either production and employment must decline, or prices must fall, or some combination of the two.

That the underconsumptionists have tried forthrightly to explain why demand does not keep pace with production is a considerable merit. Yet their crucial claim, that the expansion of

capitalist production is limited by consumer demand, happens to be false. This was first demonstrated by Marx, in his schema of reproduction in *Capital* II. He did not dispute the tendency toward underconsumption, but showed that this tendency constitutes no insurmountable obstacle to the expansion of production (Dunayevskaya, 1989, p. 126).

One part of total output consists of consumer goods, and another of means of production that will be used, directly or indirectly, to produce consumer goods in the future. Consumer demand does set a limit to the expansion of these parts of output. Yet Marx demonstrated, first, that there exists a final part of output, means of production that will be used to produce additional means of production, which themselves then produce even more means of production, and so on. (Iron, for instance, is used to produce steel, which is used to produce mining equipment, which is used to produce iron, etc.) *The growth of this final part of output is not constrained by "human consumption," since its demanders are not humans, but capitals.*

Marx also demonstrated that growth under capitalism generally requires an expansion of this final part of output in relation to the total.[1] Thus, rather than being a system that produces for the consumption's sake, capitalism increasingly becomes a system of production for production's sake.

Instead of attempting to refute these demonstrations — which, since they are valid, cannot succeed — the underconsumptionists simply reject them in favor of what they believe to be reality, namely their dogma that even capitalist production is production for the sake of consumption.[2] Explanations must of course correspond to reality; the problem, however, is that Marx's reproduction schemes *demonstrate* that the underconsumptionist dogma fails to do so.

Because the part of output that is not constrained by consumer demand constitutes an increasing share of the total, production can indeed grow faster than consumption, even in the

long term. Yet, if the expansion of production is not limited by consumer demand and, again, investment demand is governed by capitalists' desire to expand production, it follows that consumer demand can set no insuperable limit to the growth of investment demand. Appeals to underconsumption are thus unable to explain what determines *total* demand.

This also implies that underconsumptionism cannot account for crises. *If* investment demand is sufficiently strong, no crisis will occur, despite the constraints on the growth of consumer demand. If, on the other hand, investment demand is too weak, so that a crisis does erupt, the lack of investment demand, and thus the crisis, are not due to underconsumption.

It is widely recognized that what actually drives investment is profitability — past profits to finance it and expectations of future profitability to provide the incentive to do so. Behind sluggish investment spending, therefore, is the tendency of the profit rate to fall.

Demand-side theorists would agree. They contend, however, that the lack of demand in the market is what depresses the profit rate, and this in turn leads to an insufficient volume of investment. As has just been shown, however, the insufficiency of investment spending must *first be presupposed* in order to account for the lack of demand. The underconsumptionists are thus guilty of circular reasoning. Their explanation reduces to the claim that a lack of investment is responsible for a lack of investment!

Only by reversing the causal relation is it possible to break free from this circularity. It is the profit rate that regulates investment demand, and thus total demand, not the opposite. *The tendency of the profit rate to fall, therefore, cannot be the result of "realization" problems in the market, since these problems are not its cause, but its consequence*. This was recognized more than 50 years ago by Dunayevskaya (1991, p. 43)[3]: "The crisis … is not caused by a shortage of 'effective demand.' On the contrary, it is the crisis that causes a shortage of 'effective demand.'

The … 'inability to sell' manifests itself as such *because of the fundamental antecedent decline in the rate of profit, which has nothing whatever to do with the inability to sell.*"

The Profit Rate and the Growth of New Value

Yet if the falling tendency of the profit rate does not originate in the market, what is its origin? One possibility is rising wages. There exist strong theoretical arguments, however, suggesting that any wage increases which threaten profitability will be temporary and self-negating (Marx, 1977, pp. 769-772). Falling profitability leads firms to reduce production and lay off workers, which depresses wages. Rising wages, moreover, induce firms to substitute machines for workers, and this likewise depresses the demand for labor and thus wage rates. The temporary nature of "excessive" wage gains, together with strong empirical evidence of sluggish and even negative wage growth, suggest that the stagnation in the global economy that has lasted for a full quarter-century cannot be explained principally on the basis of rising wages (Brenner, 1998, pp. 16-21).

The other possibility is that the falling tendency of the profit rate originates instead in the production process. As I shall show presently, once we abstract from changes in the wage rate, the predominant determinant of the profit rate in the long run is the growth rate of new value (value added).

The simplest way to abstract from the influence of wages is to examine the maximum profit rate, r, which corresponds to a zero wage. $r = N/C$, where N is the new value generated and C is the existing capital-value advanced. Whether r rises, remains constant, or falls depends upon whether

$$\frac{N_{t+1}}{C_{t+1}} \begin{matrix} > \\ = \\ < \end{matrix} \frac{N_t}{C_t}. \qquad (1)$$

C_{t+1} depends on two factors. The first is the "*destruction of capital* through crises" (Marx, 1968, p. 495, p. 496) — both the destruction of "real" or physical capital, and the destruction of "nominal" capital, the "depreciation of *values*" — which tends to lower C_{t+1} in relation to $C_{t.}$ Assume, for the moment, that no such destruction occurs. Then C_{t+1} would depend upon only upon what I will call the "accumulation share," the fraction of the total value of period *t* that is reinvested or accumulated. Assuming further that no fixed capital exists (the results are similar if it does), then the total value of output of period *t* is the sum of existing and new value, $C_t + N_t$. Given these two assumptions,

$$C_{t+1} = a(C_t + N_t) \tag{2}$$

where *a* is the "accumulation share." Employing the identity

$$N_{t+1} \equiv (1 + g_N)N_t \tag{3}$$

in which g_N is the growth rate of new value, substitution yields

$$\frac{(1 + g_N)N_t}{a(C_t + N_t)} \gtrless \frac{N_t}{C_t} \ . \tag{4}$$

After some manipulation, and recalling that $r_t = N_t/C_t$, this can be rewritten as

$$\frac{g_N + (1 - a)}{a} \gtrless r_t \, . \tag{5}$$

It is easily proved by induction that *r* converges upon the left-hand side (LHS) of (5). From the foregoing, we know that, if the LHS is greater (less) than r_t, then *r* rises (falls). Hence, r_{t+1} is closer to the LHS than r_t was. Repeating this reasoning process for r_{t+1}, we see that r_{t+2} must be even closer. And so on.

$r_{LR} = \frac{g_N + (1-a)}{a}$ is thus the maximum profit rate in the long run. Its determinants are simply the accumulation share and the growth rate of new value.[4] It seems reasonable that movements in the accumulation share are principally short-term ones, associated with the business cycle, so that *a* may well be essentially trendless in the long run. Nor is there any reason to believe that the growth rate of new value undergoes a secular decline. There is consequently little, if any, justification for assuming that r_{LR} falls over time. How, then, can the profit rate be said to have a falling tendency?

The answer is that the falling tendency is not a matter of different steady states (levels of r_{LR}), but of transition dynamics, i.e., adjustments toward the steady state. Recognizing this, and bringing the "destruction of capital through crises" into the picture, some crucial dynamics of accumulation and crisis are easily understood. Imagine, for simplicity, that the actual profit rate of any period equals the maximum rate, *r*. If, initially, *r* is greater than r_{LR}, then it will tend to fall toward it, as was shown above. *This*, the downward adjustment of the profit rate toward r_{LR}, is the tendency of the profit rate to fall.

In ways that I have yet to discuss, this falling tendency leads to crisis, which in turn lead to the destruction of capital. Such destruction raises the profit rate by reducing the denominator. Hence, *r* is once again greater than r_{LR}, and the process is set to begin all over again.

Three key results emerge from this discussion. First, the tendency of the profit rate to fall expresses itself, not in a secular decline in profitability over time, but in recurrent crises: "the falling rate of profit … has constantly to be overcome by way of crises" (Marx, 1981b, p. 367). Second, "Permanent crises do not exist" (Marx, 1968, p. 497n) because, by destroying capital, they restore profitability.

Finally, and most importantly for the present discussion, *the profit rate is limited by the growth rate of new value.* If g_N is too low in relation to the existing profit rate, profitability will tend to decline. And since investment demand and total demand depend on profitability, they too are limited by the growth rate of new value. Even if they do not vary in response to short-term movements in profitability, the growth of new value conditions their growth in the long term, since total demand in value terms cannot permanently exceed the total value produced.

The Growth of New Value and the Debt Burden

The framework just developed can help clarify that what makes debt burdens excessive is debt expansion that is too great *in relation to* the new value generated. The same imbalance likewise makes Ponzi finance a destabilizing factor, rather than something sustainable in the long term.

Debt at time $t+1$ is equal to (a) the debt of time t plus interest upon it, *minus* (b) net repayment of debt (retirement of debt minus new borrowing). Outstanding debt plus interest can be expressed as $D_t(1 + i)$, where i is the interest rate. Assuming no net liquidation of assets, the *maximum* amount of debt that can be repaid is the total value produced ($C_t + N_t = C_{t+1}/a$) minus the portion of that total value recommitted to production (C_{t+1}), or $([1/a] - 1)C_{t+1}$. This case is clearly the one *least* likely to lead to an excessive buildup of debt. The best-case scenario is thus

$$D_{t+1} = D_t(1 + i) - ([1/a] - 1)C_{t+1} . \qquad (6)$$

"Ponzi finance" refers to an increase in indebtedness, not for the purpose of acquiring new productive assets, but simply in order to pay interest on outstanding debt (Minsky, 1982, p. 28). Hence, if the ratio of debt to the value of assets, D/C, is rising, Ponzi finance is taking place.

Since we are considering the best-case scenario, we must assume that capital obtains the maximum profit rate. As was shown above, this rate is convergent, implying that C, its

denominator, grows at the same rate as *N*, its numerator, in the long run. Thus, in the long run, $C_{t+1} = (1 + g_N)C_t$. Dividing (6) by C_{t+1}, and using this last equality, we obtain:

$$\frac{D_{t+1}}{C_{t+1}} = \left(\frac{D_t}{C_t}\right)\left(\frac{1+i}{1+g_N}\right) - (1/a - 1). \qquad (7)$$

If the growth rate of new value is less than the interest rate, *D/C* rises over time. Thus, if new value fails to grow or grows very slowly, Ponzi finance is inevitable or nearly so. The financial structure becomes unstable, increasingly prone to crisis when confronted with a "shock." A decline in the interest rate, perhaps engineered by central banks, could conceivably offset this tendency. On the other hand, as debt rises in relation to the asset base, lenders will demand higher risk premiums, and the interest rate will instead tend to rise.

Another common measure of the burden of debt is the ratio of debt to income. For the economy as a whole, income is the same thing as *N*, the new value added. Since *N* and *C* grow at the same rate in the long run, the ratio *D/N* grows at the same rate as *D/C*. Once again, the debt burden becomes unsustainable if the growth rate of new value falls short of the interest rate.

When referring to the growth rate of value in this section, and the one above, I have implicitly assumed no discrepancy between the growth rates of *real* value and *nominal* value. (If employment growth determines the growth of real value, then any growth in new value in excess of that is nominal.) During the expansionary phase of the business cycle, however, aggregate nominal value tends to grow faster than aggregate real value. This raises the nominal profit rate temporarily, and ameliorates the tendency towards excessive indebtedness.

A considerably longer-term discrepancy between nominal and real growth of new value arises when government debt is used as a policy tool, and when easy money policies encourage private sector borrowing. Aggregate demand increases more quickly than does the real growth

of value, causing commodities' prices to rise above their values. This process likewise tends to counteract the tendency of the (nominal) profit rate to fall.

In contrast to the expansion-induced discrepancy between nominal and real values, however, this one *exacerbates* the debt problem, precisely because excessive debt buildup — a buildup of debt in excess of the underlying values — is the very mechanism that is propping up prices. On the one hand, then, the tendency of the profit rate to fall is less likely to find *immediate* expression; the profit rate, in other words, is less likely to fall. On the other hand, rather than Keynesianism negating the system's crisis tendencies, it *displaces* them. Instead of the crises appearing in the goods market, they crop up instead mostly in the forms of debt crises and of fiscal crises of the state.

Table 1

PUBLIC DEBT*, 1980-1995, AS PERCENTAGE OF GROSS DOMESTIC PRODUCT

COUNTRY	PUBLIC DEBT/GDP 1980	PUBLIC DEBT/GDP 1995	PERCENTAGE CHANGE
United States	37.0%	62.2%	68
Japan	49.6	76.0	53
Germany	31.1	60.5	95
France	30.9	60.1	94
United Kingdom	54.5	59.0	8
Italy	58.1	124.2	114
Canada	43.3	97.6	125
Spain	20.8	71.4	243
Netherlands	46.9	78.6	68
Belgium	77.1	130.8	70
Sweden	44.3	79.8	80
Austria	36.6	69.2	89

* General government gross public debt.
Source: *Economic Outlook* No. 64, December 1998, OECD.

Table 1 helps to indicate the magnitude as well as the ubiquitous nature of the fiscal difficulties. The twelve countries, listed in order of GDP, together account for about half of the world's output. Except for the UK, all of them have experienced massive increases in the burden of public debt.

Falling Prices and "Debt-Deflation"

There are a couple of other, closely related ways in which the lack of new value leads to crises. If living labor is the source of all new value, then a given amount of living labor generates no more value when productivity rises. Yet because it produces more output, values per unit of output decline. Prices tend to fall as a result (though excessive debt expansion can offset this tendency), and this lowers profitability. Falling prices can also give rise to a process of debt-deflation.

The way in which technological innovation leads to falling prices, and falling prices lead to falling profitability, is simple. By increasing its productivity, a firm produces at lower cost than its rivals, and it can thus lower its sales price and still maintain or even increase its profit rate. The drop in price allows it to capture a larger share of the market. Its rivals must either lower their own prices in order to restore their market shares, or go out of business. In either case, the firms that remain sell at lower prices, leading to declining profit rates.

Although, as will be discussed below, the dominant, atemporal theory within "Marxian economics" denies this relationship between technological change, falling prices, and falling profitability, the relationship is very well known. Both Brenner and Greider, for instance, emphasize it.[5] The latter writes:

> The dirty little secret about technological revolution is that it typically depresses a firm's rate of return per unit, whether the firm is making cars or computers. Falling prices, as always, threaten profit margins. Production costs may fall dramatically, sales volumes may expand robustly. Yet the rate of return remains in jeopardy (Greider, 1997, p. 46).

This was also Marx's view. He held that "The progressive tendency for the general rate of profit to fall is thus simply *the expression, peculiar to the capitalist mode of production*, of the progressive development of the social productivity of labour" (Marx 1981b, p. 319). "The profit rate does not fall because labour becomes less productive but rather because it becomes more productive" (Marx, 1981b, p. 347).[6]

In addition to tending to lower the profit rate, the tendency for prices to fall as a result of technological change also leads to what Irving Fisher (1933) termed "debt-deflation." The decline in the current values of goods and/or financial assets, relative to the denominated value of debt, leads to capital losses, debt service problems, bankruptcies, bank failures, and so forth.[7] All this can in turn cause a crisis in the real economy.

Although this process is a simple one, it possesses great theoretical significance, because it reveals an essential flaw in the notion that "only relative prices matter." The notion is a quite prevalent one; the dominant, atemporal current in "Marxian economics" tends to subscribe to it. Its proponents tell us that, in a "one-commodity" world, the categories of value and price would be superfluous, because profit and the rate of profit would be determined "directly between quantities of corn without any question of valuation" (Sraffa, 1982, p. xxxi).

To see what is wrong with this claim, consider a firm that produces corn by means of corn. It acquired 4 bushels of seed-corn a year ago, planted them, and harvested 5 bushels of

corn today. The original 4 bushels cost $25 each, for a total of $100. Due to rising productivity, however, corn today is worth only $20/bu. Together, the firm's 5 bushels are worth only $100. Since it holds no more value today than it did a year ago, the firm's profit seems to be $0 and its rate of profit seems to be 0%. Sraffa, however, tells us that its profit is actually 1 bushel and its rate of profit is actually 25%!

Yet imagine that the firm *borrowed* the $100 that it used to purchase the seed-corn, and that the loan has now come due. Can the firm persuade its creditors that, since the $100 they lent out last year was equivalent to 4 bushels of corn, they should accept 4 bushels as their repayment? Can it persuade them that, since the $100 was equivalent to 4 bushels, and the equivalent of four bushels today is $80, they should accept $80 as their repayment? It is more likely that they will demand that the whole $100 be repaid — *plus* interest, which the firm is unable to pay.

Thus, even if only one *produced commodity* were to exist, *fixed loan obligations and other fixed financial liabilities* might also exist. Measured in terms of its creditors' asset (the loan), our corn-producing firm has suffered a decline in the *relative* price of its product, and the creditors have benefited from a rise in the relative price of their asset, which commanded 4 bushels of corn a year ago, but 5-plus-interest today. If, on the other hand, the firm fails to meet its obligation, or is even in danger of failing to do so, the market price of the creditor's asset plummets in relation to its denominated value.

As King (1993) emphasizes, "debt deflation is a real not a monetary phenomenon, and is concerned with a change in relative prices. It is the change in the distribution of net worth from debtors to creditors which leads to a fall in demand and output." Conversely, default on debt makes the creditors relatively poorer. Even a heightened risk of default does so, by reducing the

market value of their assets. This may well provoke a withdrawal of financial capital, again resulting in falling demand and output.

Hence, although value and price are undeniably relative categories, this by no means implies that "Value is a relation between *contemporary* commodities … only" (Bailey, 1825, quoted in Marx, 1971, p. 154), which is the true import of the relative price doctrine. All financial relations are necessarily temporal relations, relations that link the past and the present, the present and the future, relations in which value *persists* over time.

The Productivity Theory on Profitability

Adherents of the dominant, atemporal theory within Marxian economics deny almost everything I have said above about the falling rate of profit, the effect that falling prices have upon it, the importance of the growth rate of new value, and the relationship of all this to economic crisis. Let us see why, and let us see whether they are right to do so.

On the basis of general equilibrium models formulated by theorists such as Bortkiewicz (1952), Sraffa (1960), and Okishio (1961), the dominant current in Marxian economics subscribes to what can be termed a *productivity theory of profitability* (PTP). Its models imply that the maximum profit rate is the ratio of output to the physical capital stock (or its equivalent in a multisector economy). A rise in the productivity of capital thus results in a rising maximum rate. Rising productivity is also held to exert an unambiguously positive influence upon the actual profit rate.

Given a constant real wage rate, the profit rate of the PTP becomes an index of "total factor productivity." For a falling profit rate tendency to arise from within the production process, total factor productivity must decline (see Brenner, 1998, p. 11). If instead it is the

value of wages that is constant — a "stylized fact" of economic growth — the actual profit rate, just like the maximum rate, becomes purely an index of capital productivity.[8] In this case, a falling profit rate tendency must be caused by diminishing productivity of capital. To obtain a falling profit rate, for instance, Laibman (1997, p. 56) explicitly postulates "severe diminishing returns to mechanization." In both cases, the result is, in Brenner's (1998, p. 11) apt phrase, an "impeccably Malthusian proposition."

Because total factor productivity obviously rises over time, the PTP is unable to account for a falling rate of profit except by appealing to rising real wages. Yet rising wages originate *outside production*, so the PTP is actually unable to ground declining profitability in the production process.

The empirical evidence against the diminishing capital productivity argument is strong enough to have made the *constancy* of the aggregate output/capital ratio one of the crucial "stylized facts" that any theory of economic growth must be able to explain. Micro-level data indicate, moreover, that capital productivity actually *rises* over time. Summarizing the evidence, Peterson (1994, p. 124) writes that "Whatever the industry, almost all technological advances tend to lead to substitution of more efficient capital equipment for less efficient capital equipment." Yet even if, during a particular period, profitability is correlated with the output/capital ratio, this fails to support the diminishing capital productivity argument, due to a problem of reverse causation. In a slump, for instance, output falls, but the capital stock falls less or not at all — it is just utilized at a lower rate — and the output/capital ratio thus falls *as a consequence, not a cause,* of declining profitability.

The PTP is also subject to criticism for its implicit denial that capitalists are compelled to adopt technological advances in order to survive the battle of competition. It is generally

understood that, when some firms innovate, their rivals will see their profit rates decline, so that their survival requires that they likewise adopt technological advances. According to the PTP, however, the backward firms' profit rates will remain undisturbed — their productivity, after all, has not been affected — unless the relative prices of their products happen to fall. Yet it is impossible for all relative prices to fall. The PTP thus suggests that, if technological advances are occurring throughout the economy, then backward firms can remain backward and, on average, maintain their existing rates of profit.

Profitability and Falling Values

Proponents of the PTP do accept that technological advances create a tendency for prices to fall. What they reject is that the price reductions impair profitability. They do so in one of two ways.

First, they derive their conclusions from general equilibrium models that are static in nature. Prices in these models are stationary — the price of every commodity is the same when it enters production as an input and when it exits as an output. How, then, can technological change be said to lead to falling prices? The answer is simple: there has been history, but there is no longer any. Technological change did cause prices to fall, they are now lower than before, but they have since stabilized. "Equilibrium" has been achieved, at a profit rate higher than the original one.

Some, though by no means all, theorists in this tradition have taken care to stipulate that it is only the "equilibrium" profit rate that tends to rise as a result of productivity increases. Even when qualified in this manner, however, the proposition is untrue, because an equilibrium profit rate — i.e., the achievement of a uniform rate throughout the economy — neither requires nor guarantees that prices are stationary (Kliman 1997b).

It would be unreasonable, however, to suggest that any single technological innovation leads to price reductions that last forever. The problem with the stationary price postulate is rather that technological advance under capitalism is an ongoing process, not a single episode. Long before the effects of one innovation would die out, another innovation is introduced, and then another, and continuous technological change tends to lead to continuous declines in prices. To the extent that this tendency is realized, output prices continually fall *in relation to* input prices. By continually reducing revenues received today *in relation to* costs incurred in the past, this process tends to depress profitability.

Rising productivity thus influences the profit rate in two contradictory ways. It raises output per unit of input. Considered in a one-sided, abstract manner, this tends to raise the profit rate. Yet this tendency is also immediately negated because, *at one and the same time, the very same productivity increase* produces a tendency for prices to decline.

The "Replacement Cost Profit Rate"

The other way in which the PTP's adherents try to deny that falling prices reduce profitability is by "defining" profit and the profit rate in terms of replacement costs. By making the actual change in prices between the time of input and the time of output irrelevant, this procedure, just like the stationary price postulate, does yield a measure of the "profit rate" that varies directly with productivity. There are, however, a few problems with this measure. It is not the profit rate that guides capitalists' decisions (the rate they seek to maximize), the rate of "self-expansion" of value, or the rate that regulates capital accumulation.

From the standpoint of the practical investor, manager, or state planner, the profit rate is the rate of return on their actual, original investment. Their concept of profit is thus a temporal

one. Measures of profitability used in investment decisions, such as the internal rate of return (IRR) or the net present value of an investment project, compare sums of value of different moments in time. In the simple case of a one-period investment, the internal rate of return is IRR = $(R_1 – C_0)/C_0$, the relative difference between the returns (R), received at time 1, and the cost (C) of the project, incurred at time 0.

Marx's way of measuring profit was also temporal, and essentially the same as that used by the practical capitalists. When first introducing the concept of the circuit of capital, M–C–M', he explicitly defined surplus-value as the difference between the sum of value that "is *finally* withdrawn from circulation" (M') and the original sum "thrown into it *at the beginning*" (M), i.e., M' – M, the "excess over the *original value*" (Marx, 1977, p. 251). He also regularly defined profit as "an excess over and above the total capital *advanced*" (Marx 1981b, p. 133), rather than an excess over and above the replacement cost of means of production.

Other passages indicate even more clearly that Marx used "profit" to mean the increase in the value of capital at the end of a period over the sum of value advanced at the start. "Profit … expresses in fact the increment of value which the total capital *receives at the end* of the processes of production and circulation, over and above the value it *possessed before* this process of production, *when it entered* into it" (Marx 1991, p. 91). "The relation between the value *antecedent* to production and the value which *results* from it — capital as antecedent value is capital in contrast to profit — constitutes the all-embracing and decisive factor in the whole process of capitalist production" (Marx 1971, p. 131).[9]

This temporal profit rate is the "all-embracing and decisive factor" for two reasons. First, it is a precise measure of the rate of "self-expansion of value" through production. Since capitalists' aim is to expand their holdings of value (accumulate capital), the profit rate governs

their investment decisions. Second, it governs the rate of capital accumulation, since the latter can be no greater than the profit rate. If all profit is reinvested, the two rates are the same. Through the medium of the rate of accumulation, then, the profit rate influences the economy's growth rate. It is thus for good reason that the principal quantitative question addressed by Marx's value and profit rate theories is, what determines the size of this difference "between the value antecedent to production and the value which results from it"?

This question cannot be answered by means of the replacement cost concept. "Profit" conceived in replacement cost terms is not the difference between M and M', but the difference between returns received at time 1 and the cost — *also at time 1* — of replacing the assets used to generate the returns. The "replacement cost profit rate" is thus RCPR = $(R_1 - C_1)/C_1$. When proponents of the PTP seem to be explaining the origin of surplus-value, M' – M, they are in fact explaining something else, the difference between the value of output and inputs' replacement costs at a single moment in time.

An Example

Consider the following simple example, chosen not because it is realistic, but because it helps bring the difference into sharp focus. Assume an economy without fixed capital, in which corn is produced by means of seed-corn and labor. The wage rate is zero, so profit equals the new value added in production (N), and the capital-value advanced (C) equals the value advanced for the seed-corn. Capitalists reinvest all corn output as new seed-corn; correspondingly, the total value (R = C + N) of output of one year becomes the capital-value advanced in the next.

Finally, assume that N is constant throughout time. It will be helpful to think of N as being determined in accordance with Marx's value theory. He held that the extraction of living

labor in capitalist production determines the magnitude of new value generated, so that the same amount of labor always yields the same amount of new value (see, e.g., Marx, 1981b, p. 323). The constancy of N thus implies that employment fails to grow.

Given the initial conditions C = $1250 and N = $125, Table 2 shows that the amount of new value generated (the numerator of the profit rate) is stagnant, $125 in every year. Nonetheless, total value (R) does increase year after year, precisely by the $125 of new value generated in production. Since all value is reinvested, moreover, the capital advanced (the denominator of the profit rate) increases by $125 every year. The temporal profit rate, the IRR (here equivalent to [M' – M]/M), therefore falls continually and tends toward zero. The rate of capital accumulation (the percentage increase in C) is always equal to the profit rate, which is as it should be, since all profit is continually reinvested.

Table 2

Year	C	N	R	**IRR**	**%ΔC**
1	$1250	$125	$1375	**10.0%**	**10.0%**
2	1375	125	1500	**9.1**	**9.1**
3	1500	125	1625	**8.3**	**8.3**
4	1625	125	1750	**7.7**	**----**

Note that the relations specified above were sufficient to compute the rates of profit and accumulation, and to chart their declines, even though no information about productivity was provided. The above results are therefore compatible with all possible series of input-output figures. Given the seed-corn (SC) and corn output (CO) series in Table 3, the declining rates of profit and accumulation in this economy coexist with continually rising capital productivity and, correspondingly, a continually rising material profit rate (MPR = (CO – SC)/SC).[10] Because employment is constant, while output rises, labor productivity also rises continually.

Table 3							
Year	SC	CO	Net	**MPR**	C_{RC}	N_{RC}	**RCPR**
1	1250	1375	125	**10.0%**	$1250.00	$125.00	**10.0%**
2	1375	1525	150	**10.9**	1352.46	147.54	**10.9**
3	1525	1705	180	**11.8**	1453.45	171.55	**11.8**
4	1705	1921	216	**12.7**	1553.23	196.77	**12.7**

The unit price of corn output is R/CO, so the replacement cost of seed-corn is C_{RC} = (R/CO)(SC). New "value" added in replacement cost terms is $N_{RC} = R - C_{RC}$. The RCPR (= N_{RC}/C_{RC}) rises continually, and is identical to the material rate of profit. If the growth paths of SC and CO continue indefinitely into the future ($SC_t = 625[1 + (5/6)(1.2)^t]$ and $CO_t = 625[1 + (1.2)^t]$), the MPR and the RCPR would eventually approach 20%, even though the IRR and the rate of accumulation are falling toward zero. Although the profit rate should be equal to the maximum rate of accumulation, the RCPR increasingly exceeds it. *As time proceeds, the RCPR becomes a decreasingly adequate measure of the actual expansion of value in relation to the original capital-value advanced, and of the rate of accumulation of capital-value.*

A few additional features of this example are noteworthy. First, it refutes the Okishio (1961) theorem, which attempts to overturn Marx's law of the tendential fall in the profit rate. The theorem purportedly proves that, given a constant real wage, no technical changes that reduce per-unit costs when computed at current prices can reduce the equilibrium (i.e., uniform) rate of profit. Yet the real wage of zero in this example is a constant, the declining ratio of SC to CO implies that the technical changes are continually cost reducing and, since only one sector exists, the profit rate is necessarily uniform.

Second, since the example assumes away fixed capital, its presence is clearly not needed in order to re-establish the logical coherence of Marx's law. Different methods of valuing fixed

capital therefore cannot affect the above results, and allegations that the vindication of Marx's law requires that "capital goods once purchased and added to the capital stock never leave it" (Laibman, 1999b) are obviously untrue. Each year's seed-corn is fully used up in the production of that year's corn output; the latter is the sole source of every bit of next year's seed-corn.

Third, were technological differentiation introduced into the example, the likely result would be rising profit rates for the advanced producers and falling rates for the backward ones. It could thus *appear, falsely,* that the *cause* of the decline in the average rate is either a depressing effect exerted on the profit rate by technologically backward firms (Laibman, 1999a), or competition for technological supremacy, specifically the punishing effect that the advanced producers exert on the backward ones (Brenner, 1998; Reuten, 1998). Yet all producers in the present example were *equally advanced*. In each year, all of them employed the most up-to-date techniques available, and their productivity consistently rose. This makes clear that the falling profit rate was instead caused by a fall in the production of new value relative to existing value.

What Creates Value?

Is there *any* way, then, that one can challenge the coexistence of rising productivity with falling rates of profit and accumulation? Certainly. One needs only to repudiate Marx's theory that the extraction of living labor creates all new value — but one does need to repudiate it.

One way of doing so is to contend that value is determined in the market, not in production. The total value of commodities, in other words, is just the price paid for them. Total value is thus determined by the relation between aggregate supply and aggregate demand. As was shown above in connection with underconsumptionism, however, aggregate demand must be explained on the basis of the profit rate, not the reverse. Because the profit rate, in turn,

depends on the growth of value, theories of this sort again fall prey to circular reasoning: the generation of value is determining the aggregate demand that determines the generation of value! Hence, such theories actually cannot account for the determination of value.

Another way of repudiating Marx's theory is to claim that the magnitude of new value generated is determined, not by the amount of living labor extracted, but by the amount of net output. Since value is thus determined by use-value, the movement of value and the movement of use-value can no longer be contradictory, and profitability does indeed become determined by productivity.

It will be helpful to illustrate this using the example above. Net output is given by the "Net" series in Table 3. If net output is the source of all new value, then new value must remain proportional to it. Thus, if the 125 units of net output produced in year 1 are expressed monetarily as $125, the revised series for new value, N*, is simply the Net series with dollar signs attached. On the basis of the same assumptions that were used to generate Table 2, we now obtain the figures in Table 4. The revised rates of profit and capital accumulation are identical to the material and replacement cost rates. Increasing productivity of capital is reflected precisely by increases in the profit rate.

Table 4

Corn as Value Substance

Year	C*	N*	R*	**IRR***	**%ΔC***
1	$1250	$125	$1375	**10.0%**	**10.0%**
2	1375	150	1525	**10.9**	**10.9**
3	1525	180	1705	**11.8**	**11.8**
4	1705	216	1921	**12.7**	**----**

I noted earlier that *proponents* of the PTP accept that technological change tends to reduce prices. Yet the PTP *itself* is not compatible with this tendency. *Once net output is made*

the determinant of new value, not only do the rates of profit and accumulation rise in accordance with the PTP, but technological advance cannot cause the unit price of output to fall (see Table 5).[11] The two go hand-in-hand: precisely because the profit rate is a value measure, the movements of prices and the movements of profit rates are directly related to one another.

Table 5

				Unit Prices	
Year	CO	R	R*	**R/CO**	**R*/CO**
1	1375	$1375	$1375	**$1.00**	**$1**
2	1525	1500	1525	**0.98**	**$1**
3	1705	1625	1705	**0.95**	**$1**
4	1921	1750	1921	**0.91**	**$1**

That sources of value other than living labor may exist cannot, however, be ruled out *a priori*. Marx's law of the tendential fall in the profit rate could be *false*. Nevertheless, examples produced by temporalists (Ernst, 1982; Freeman, 1996, Kliman 1996, Ramos, 1997), such as the one above, demonstrate conclusively that the law does not suffer from the *internal inconsistency* that has been attributed to it.[12] Empirical criteria must thus be used to decide the matter.

I suggest that the well-known tendency for rising productivity to lead to falling prices counts as very strong evidence in favor of Marx's theory. In essence, *the idea that value is determined by labor-time is a restatement of this very tendency*. With rising productivity, the same amount of labor yields more output, but no more value, so the value of each individual unit of output falls. The other theories, in contrast, cannot predict this tendency. Because underconsumptionism cannot account for the movements in demand, it cannot account for movements in prices. The PTP fares even more poorly. If changes in the profit rate are to mirror changes in productivity, rising productivity *cannot* lead to falling prices.

Conclusion

This paper has critiqued, on theoretical as well as empirical grounds, prominent theories of profitability and crisis, especially underconsumptionism and the "productivity theory of profitability" that dominates Marxian economics. It has argued instead that economic crises are rooted in the value-producing nature of capitalism. The imperatives imposed by the production and accumulation of value lead to recurrent disruptions of material production.

A key policy conclusion emerges from the conclusion that capitalism's immanent barrier and source of crisis is the production of value as an end in itself. An end to recurrent crises will require a different way of producing and coordinating society, based on a different goal: "the development of human powers as an end in itself" (Marx, 1981b, p. 959).

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Notes

[1] A decline in input-output coefficients could counteract this tendency.

[2] "Any attempt to get away from this fundamental fact represents a flight from reality …. [The existence of] reproduction schemes which apparently demonstrate the opposite does not change matters one whit: production is production for consumption" (Sweezy 1970, p. 172).

[3] This analysis, under the pseudonym "Freddie Forest," first appeared in *New International,* April 1946 and May 1946.

[4] If all capital is fixed, i.e., nondepreciating, it can be shown that $r_{LR} = g_N/a$ — so that its determinants are exactly the same. Since the actual r_{LR} must be some average of these two rates, it is likewise determined by these two factors.

[5] Neither of them, however, adequately explain why prices drop. They both suggest that technological advances cause too much to be produced relative to demand, and that prices thus decline. As discussed above, this explanation is tautological because it lacks a theory of demand to ground it.

[6] See also Marx (1968, p. 439): "The rate of profit … falls, not because labour becomes less productive, but because it becomes more productive." I belabor the obvious, to the point of citing nearly identical passages, only because Laibman (1999b) has recently tried to challenge the obvious. He suggests that, because "rising productivity is intimately connected to a *rising organic composition of capital,"* Marx really meant that the profit rate falls due to the latter *instead of* rising productivity (rather than the combination of the two). The following passage, a famous specimen of Marx's "logical errors," should be enough to demonstrate otherwise:

> No capitalist voluntarily applies a new method of production, no matter how much more productive it may be …, if it reduces the rate of profit. But every new method of production of this kind makes commodities cheaper. At first, therefore, he can sell them above their price of production …. He pockets the difference between their costs of production and the market price of other commodities, which are produced at higher production costs. … But competition makes the new procedure universal and subjects it to the general law. A fall in the profit rate then ensues (Marx 1981b, pp. 373-374).

[7] Falling prices will tend to reduce the prices of financial assets by depressing the future expected earnings upon which their prices are based.

[8] The PTP's aggregate profit rate is $(Y - wL)/(K + wL) = (1 - [wL/Y])/([K/Y] + [wL/Y])$, where Y is net output, w is the real wage rate, L is labor, and K is the physical capital stock. wL/Y is interpreted as the value of wages. If it is constant, the profit rate falls if and only if the average product of capital, Y/K, falls.

[9] All emphases in the last two paragraphs have been added.

[10] Laibman (1999b) writes that "Kliman and [Alan] Freeman … can cite *no passage whatsoever* in Marx describing a rising 'material' or 'productivity' rate of profit, versus a falling 'true' or 'value/price' rate." Indeed. I cannot even find any passage whatsoever in which Marx abandons his concept of the profit rate as a ratio of values, and instead considers to be as a ratio of physical quantities. Can Laibman?

[11] This perverse phenomenon was recognized, independently and concurrently, by Freeman (1997) and Kliman (1997a).

[12] Weeks (1982), Harvey (1982), and Carchedi (1991) also contain highly valuable analyses of this matter from a temporal perspective.