OKISHIO AND HIS CRITICS:
HISTORICAL COST VS. REPLACEMENT COST

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ABSTRACT:

The recent *temporal single system* (TSS) literature sees value in non-equilibrium terms, and prices as inherently non-*stationary*. Technical change involving rising degrees of mechanization, it is argued, lowers the rate of profit even with constant real wages – contrary to the Okishio Theorem – because the capital stock impacts the profit rate at its historical (time-specific) cost rather than at its replacement cost (which incorporates productivity improvements). This argument fails to grasp the position of the dominant capitals, for which successful accumulation depends above all on access to state-of-the-art levels of productivity. The TSS position in fact charts the falling profit rate of the marginal firm tending toward bankruptcy, and therefore cannot ground a general theory of the tendential fall in the rate of profit.

Contrary to much accepted wisdom from non-Marxist circles, as well as some Marxist ones, the theory of the falling tendency of the rate of profit remains central to the political economy of capitalism. Solidly grounded, it is an important weapon that Marxist political economists can place in the hands of the working-class movement – not because it justifies notions of the fatalistic inevitability of capitalist collapse, but because it contributes to an understanding of the ways in which capitalist society's contradictions deepen and intensify as capitalism matures. The link between technical change and structural trends in capitalism reveals a central aspect of the endogenous determination of technical change within capitalism, a revelation that offsets the mystification and reification of technology and thereby contributes to the advancement of working-class self-capability and power. Finally, grounding the theory of both cyclical and secular crisis in long-term structural transformation (without, indeed, reducing crisis theory to that transformation) militates against piecemeal and instrumental policies and solutions, helping to keep the revolutionary edge in the working-class response to crisis and exploitation.

In delivering weapons to the working class, however, it is of vital importance that the weapons we deliver do not blow up in their hands. In their zeal to vindicate Marx's theory (or what they take to be that theory), the TSS value theorists have advanced some arguments that simply do not hold water. They do this in order to refute the Okishio Theorem; to demonstrate that mechanization as such must lead to a falling rate of profit; and that the rate of profit indeed falls to zero over time. In the process, they claim that their non-equilibrium, or temporal, interpretation of value theory plays a unique role in this demonstration. The circle of orthodoxy triumphant is closed with the assertion that the TSS position in value theory is, again, a uniquely valid interpretation of Marx's theory.

The key step in this equation is the assertion that *in Marx and in capitalist reality* capital goods, acquired at precise moments in time, remain valued at their historical cost, i.e., at the values for which they were purchased. The relevant profit rate is formed on capital stocks valued at historical cost, regardless of productivity increases occurring subsequently. These productivity increases do indeed lower the value of new capital goods, and therefore the replacement cost of capital goods in general. This replacement cost, however, is irrelevant to the actual capital stocks on the books; money borrowed to finance their purchase, for example, must be repaid in full. Mechanization forces capitalists into a double bind: they get caught between the historically determined values of their capital stocks, and the declining value content of their products. This forces the profit rate down, even if real wages are constant over time – a clear rebuff to the Okishio Theorem, which insists (as noted above) that if real wages are constant, viable technical change (technical change that raises the perceived innovator's profit rate) can only raise the equilibrium profit rate.

To set the stage for an analysis of this position, it is necessary to clarify systematically and carefully the relation between historical-cost valuation of capital stocks and trends in profit rates. This will be done in the next section of this paper. Section 2 will apply the results obtained to the TSS critique of the Okishio Theorem. In section 3, I return to the larger issues surrounding the theory of profit-rate trends and their relation to capitalist crises (and crisis).

1. A MODEL OF HISTORICAL-COST VALUATION AND PROFIT RATE TRENDS

I have chosen, as representative object of analysis, the paper by Andrew Kliman, *þA Value-Theoretic Critique of the Okishio Theorem,þ* from the Freeman-Carchedi collection (1996). Kliman's specific claims regarding the Okishio Theorem, value theory, and the falling rate of profit will be examined in section 2. Here, I want to propose and study a model designed to elucidate the relation between technical change and historical-cost valuation, on the one hand, and the trend in the rate of profit, on the other.

The model is based on the one in Kliman (1996). Its central features are: one good, serving as capital good, wage good and output; continuous technical change, with capital stocks and output growing through time at one constant rate and labor used in production growing at a lower constant rate; and a constant real wage rate. Output per worker and capital per worker are therefore growing at the same rate. Technical change is continuous; this is an advance beyond the comparative-static *þone-timeþ* change examined by Okishio and his followers. The real wage rate is constant, and the capital-output ratio is constant. The former feature is important in the effort to show that the profit rate can fall even without a rising real wage, and that Okishio's claim to the contrary is therefore false. It is not clear why it is important to set a constant capital-output ratio as a test for the falling profit rate. Kliman thinks it is important; he claims, for the case described, to have derived a fall in the rate of profit which 'has faced two very strong tests . . . not only the constancy of the real wage rate, but also the constancy of the output/constant capital ratio' (219).

The model is a *þpure fixed capitalþ* model; the capital goods, once in place, live forever. I have introduced two simplifications, in relation to Kliman's formulation. First, I have suppressed the flow of material inputs in production (Marx's flow of constant capital). The entire labor content of output is therefore the flow of current labor time (taken, as in Kliman, to be homogeneous), and unit value is therefore identified as current labor per unit of (current) output. Second, I will work directly with unit labor values, rather than converting them to quantities of money by means of a given and constant coefficient (î, in Kliman). This coefficient is unanalyzed, and its use contributes nothing to the analysis. Working with labor-value categories makes it possible to represent value magnitudes explicitly, even in the austere one-good framework; there is no need for a further translation into money magnitudes.

The combination of accumulation of capital (to maintain necessary scale of output) with technical change implies heterogeneous capital stocks, even in the one-good world. Capital stocks (and their associated labor flows and output flows) therefore form vintages (see Laibman, 1981; 1992, ch. 8). The separate vintages of capital goods must be tracked carefully, as we will see. Output, according to our highly abstract assumptions, is homogeneous, as is labor; the capital goods, however, are associated with specific levels of productivity and degrees of mechanization, and each vintage must therefore be regarded as qualitatively distinct from every other (otherwise, earlier vintages could be instantaneously and costlessly retooled to latest-vintage standards).

We write b for the growth factor of Y (output) and K (capital), following Kliman's notation, where a growth factor of any variable X is its level in one period divided by its level in the period preceding: Xt/Xt-1. This is roughly equal to 'the growth rate plus one,' provided the 'growth rate' (a concept that is inherently ambiguous in discrete time) is thought of as the change in the variable divided by its level at the beginning of the interval of change. The growth factor of labor (L) is c, with $1 < c < b$, as per assumption. The (constant) real wage rate is w.

The rate of profit at time 0 is then

$$r_0 = \frac{Y_0 - wL_0}{K_0} \qquad (1)$$

Now the path of each variable, both latest-vintage and aggregate, can be traced as in Table 1 (using output to illustrate). We therefore have Here and in all similar contexts, the superscript S characterizes the variable as the sum or aggregate of all vintages. For the capital stock and for labor, we have:

$Y_t = b^{t-1}$

Unit values þi are defined for each vintage; this might be called determination of labor value by þmarginal socially neces-

TABLE 1

Time	Latest	Aggregate
0		
1		
2		
3		
t		

sary labor time.þ The average socially necessary labor time will be based on the output and labor input aggregated over all of the vintages,

It is important to note the proportionality of the latest-vintage unit value and the aggregate unit value, with the former of course less than the latter.

We next form an expression for the rate of profit at time t. In this formulation, the assumption is that a given capital operates with the entire complex of vintages from 0 to t, and that the relevant rate of return is the return to the entire capital stock, whose value – pending careful examination below – is written Now will be found to be times Sij, where Sij is a sum of terms determined by a 2×2 assumption matrix:

þi

S11	S12
S21	S22

The meaning of this matrix is as follows: along the rows, we represent the choice to value the individual elements (vintages) of the capital stock by the given vintage unit value, þi, or by the unit value determined by the average of all vintages up to the one in question, Since the ith element of the capital stock is homogeneous and produced at time i, there is a presumption in favor of valuing it at the (individual) unit value appropriate to that period; this would seem to follow from the uniqueness and non-tradeability of each vintage of machine. We need not, however, completely rule out the more complex assumption that an average unit value pricing rule is applied.

The choice represented vertically is different: in the top option, the capital stock that is priced (historically) in each time period is the particular vintage produced (and purchased by capitalists) in that period, while in the bottom option the entire set of existing capital stocks is revalued and counted in each period. In this case, one choice, the top one, must alone be considered logically correct, as the bottom procedure results in massive multiple countings of the particular vintages. It is included here only for completeness of the analysis, and to emphasize the dangers of errors involving counting capital stocks when there are multiple vintages.

The historical-cost value of the capital stock, , = , as we will soon see. The expression for the profit rate at time t therefore becomes where is what Kliman calls the þmaterial rate of profit.þ Given the model's assumptions concerning the growth rates of Y, K, and L, a rate of profit calculated on the assumption of a homogeneous capital stock based on the latest vintage alone will rise asymptotically toward a maximum of Y0/K0, the (constant) output-to-capital ratio. The possibility that the þvalue/price rate of profit,þ with historical-cost valuation of the variously dated capital stocks, will fall depends on the counteracting behavior of Sij, to which we now turn.

We begin with S11, in which we avoid overcounting capital stocks and value the stock at each time period by the specific unit value þi appropriate to that period:

In this case, S11 = ct, and

It thus turns out that the rate of profit, calculated meticulously according to the historical-valuation procedure, is exactly equal to the material rate of profit, and rises monotonically to the asymptote Y0/K0! This follows from the fact that, while the unit value is falling, so is the relative weight of the early vintage capital stocks in the total capital stock. While the alternative measures of will be examined below, I emphasize that the S11 assumptions are the only completely correct ones. The falling þvalue/price rate of profit,þ corresponding to the rising but presumably irrelevant þmaterial rate of profit,þ thus turns out to be entirely illusory.

This result is so important that it may be worthwhile to illustrate it using a simple numerical example. The real wage rate is 0.5. Start with Y0 = 50, L0 = 40, and K0 = 100; r0 then = 0.3. If b = 1.10 and c = 1.05, we can compute the þmaterial rate of profitþ for the next two time periods:

Next, we calculate the þvalue/price rate of profit.þ First, we note that K1 = 10, K2 = 11, Y1 = 5, Y2 = 5.5, L1 = 2, and L2 = 2.1, so that þ0 = 40/50 = 0.8, þ1 = 2/5 = 0.4, and þ2 = 2.1/5.5 =

0.38181818... We also need the aggregate unit values: = 42/55 = 0.76363636... and = 44.1/60.5 = 0.728925619... Profit1 = (34) = 25.963636..., and r1 is then profit1/ = 0.30909..., identical to the calculated þmaterial rate of profitþ at t = 1. A similar calculation yields r2 = profit2/ = (38.45)/88.1999999... = 0.317768595..., again the same as the þmaterialþ rate at t = 2.

One aspect of the imagery of the TSS falling-profit-rate argument is the notion that the profit rate is hurt by the falling unit value of sales, owing to technical change. While it seems reasonable to use average rather than marginal socially necessary labor time to value goods – this, by the way, was Marx's procedure – we may examine the case in which the numerator of the profit rate uses þt rather than . This inserts the factor à into the expression previously obtained for the profit rate, which we may now write as rt, so that rt = . In this case, the þvalue/priceþ profit rate is less than the material rate by the constant factor à; it is, of course, still rising steadily, to the asymptote àY0/K0. The difference is quantitatively significant: à is dominated by the ratio of the growth rate of L to the growth rate of Y; using Kliman's assumption of b = 1.06 and c = 1.02, à = 0.35. Still, there is no reason to assume that the latest vintage dominates pricing of output in the manner required here. At most, there may be some average coefficient between à and 1, and the (rising) profit rate would be lowered accordingly.

If dated unit values are correctly applied to each vintage separately, but the unit values are the global ones for each period rather than those derived from the given vintage itself, we have position S12 in the assumption matrix, and In this case, and ct/Sij, after some simplification and using à, becomes:

This expression clearly falls as t ì, so the resultant impact on the profit rate depends on the relative strength of the two forces. While cyclical fluctuations are possible, the ultimate direction of rt can be ascertained by comparing rì with r0. rì = àY0/K0; r0 = (Y0 - wL0)/K0 = (Y0 - þ0Y0)/K0, where þ0 = wL0/Y0, the wage share at t = 0. The ultimate trend in r relative to its starting point, r0, thus depends on the relation between à, a measure of the pace of mechanization, and the profit share at t = 0: the profit rate ultimately rises, remains constant, or falls, depending on whether .

In the numerical example used above, the wage share at t = 0 is 20/50, or 0.4, so that 1 - þ0 is 0.6. With c - 1 = 0.05 and b - 1 = 0.10, à is approximately 0.5; this indicates a falling r, and r1 is indeed 0.2962.

This, in fact, is the basis of the falling þvalue/priceþ rate of profit in Kliman (1996). From his definitions of the growth paths of the variables (eqs. 1-4), the definition of value (eq. 5) and price (eq. 7), pp. 214-5, it is clear that when he comes to value the increments in the capital stock (his eq. 11, p. 217) the elements of the capital stock are being priced using the aggregate-over-all-vintages values. Without this procedure, the þvalue/priceþ profit rate coincides with the þmaterialþ profit rate, as we have seen. Even with the S12 procedure, it is by no means clear that the þvalue/priceþ rate falls over time, as Kliman himself notes (218-9).

A fall is made more likely if the latest-vintage prices are used in the numerator of rt. In this case, the condition for an (ultimately) falling profit rate is a condition that is much more likely to obtain. However, as noted above, this procedure seems to have little justification; the market price of output (and wages) will be governed by the socially necessary aggregate of all vintages in existence.

For the sake of completeness, I report the results for the (illegitimate) S21 and S22 cases, in the form of a summary table (Table 2) giving the main outcomes for all four assumption sets. It is clear that the illegitimate S2j cases fairly assure continually falling r; this fact, however, is of little practical or theoretical interest.

Table 2

Case	Condition for falling rt
1	none

Our main result is that – with careful attention to the vintage structure, and assuming the vintages of capital goods are sufficiently distinct to warrant pricing them at the individual values determined by their own productivities, rather than by aggregate unit values involving all prior vintages – the distinction between the material and value/price rates of profit disappears, and historical-cost valuation produces a monotonically increasing profit rate for the case under examination (in which, after all, wage cost vanishes relatively over time, and capital intensification does not take place). If, however, it is conceivable that the capital goods produced at time i are sufficiently competitive with their predecessors (and successors) so that is used to value them, historical-cost valuation produces an ambiguous result. For à < 1 - þ0, the value/price profit rate will fall, at least eventually. Does this case open up a space for the historical-cost valuation argument for a falling rate of profit?

In a word, no.

First, we should recall that, in Kliman's model, capital goods, once produced and installed, never leave the scene. They remain in use, and their value remains on the books, forever. Sophisticated treatments of depreciation are possible. The simplest version, however, would be enough to make the point: a given and fixed lifetime of capital goods, linear depreciation, and a simple sinking fund. If the oldest vintages of capital goods are eventually scrapped, for whatever reason, the average productivity of the remaining set rises, and the historical-cost model gives way to a version of the replacement cost one, in which the set of vintages in existence at t = 1 replaces the set in existence at t = 0. In this case, even if we were to use the S12 valuation assumptions, and those assumptions yielded rì < r0 for the case in which capital goods stay in production forever, the calculated profit rate would converge toward , and would therefore be rising. This point makes apparent the fact that Kliman's falling rate of profit is subject to correction by the capitalists themselves, who always have it in their power simply to scrap a certain number of the early vintages of capital goods that are weighing down the profit rate. (I will discuss the matter of fixed loan obligations below.)

Even without physical depreciation of capital goods or a rising real wage rate, a case for scrapping can be made. Capitalists need two weapons in their struggle to survive and accumulate: scale, and productivity. The former is necessary to minimize susceptibility to random fluctuations by invoking the law of large numbers, and to establish economies in marketing and financial power. The latter is the key to rapid growth. A firm can achieve extremely high average productivity simply by scaling way down, scrapping a large part of its early-vintage capital stock; but this would leave it small, and vulnerable to raiding and takeover. Alternatively, it could maximize the advantages of scale by holding on to all of its capital vintages, at a cost of low average productivity and growth. Without formalizing the problem at this stage, it is apparent that a tradeoff exists, and that capitalists will seek some optimal point (however loosely defined) along it. This implies some degree of scrapping of early vintages, and therefore some degree of progressive approximation to .

This argument suggests that average socially necessary labor time is determined, in the capitalist context, by the specific exigencies of accumulation. For a given rate of technical progress (which is also determined strategically and endogenously), it will be the labor time socially necessary for capitalists to succeed, and therefore embodies a socially (capitalistically) necessary scale for the individual capital.

2. How Fares the Okishio Theorem?

In the contrived example of continuous technical change examined in the last section, in which the þmaterial rate of profitþ rises continuously, I conclude that the presumably more relevant þvalue/price rate of profitþ also rises, except in very special and unacceptable cases. The question now is, What does this suggest for the TSS critique of the Okishio Theorem?

a. The Okishio Theorem is true. No matter how many times

Kliman and other writers in the TSS camp proclaim that þthe Okishio Theorem is falseþ – in fact, in proportion to the number of times they make that proclamation – the truth of the theorem emerges ever more clearly. Kliman himself admits this: þMy claim . . . is not that the theorem suffers from a mathematical error. The relevant matrix algebra theorem of Perron and Frobenius, upon which the Okishio Theorem is based, is trueþ (Kliman, 1997a, 1). Kliman notes that the theorem is a comparative equilibrium exercise, and as such is not concerned with dynamics. It involves a comparison between two equilibrium states, following a one-time technical change. That is one of its core assumptions. Kliman is sensitive to the distinction between refuting a theorem on its own ground, on the one hand; and deriving different results by changing one or more of its assumptions, on the other. He applies this distinction when he rejects the work of others, including this writer, who challenge (for example) the relevance of the assumption of a constant real wage rate, lamenting that this leaves the theorem intact. He, however, insists on substituting a continuous process of technical change for the one-time change in Okishio. While this is a laudable effort to examine technical change and its effect on the profit rate in a more dynamic context, it also transgresses one of the key assumptions of the Okishio Theorem; any valid results obtained in this context therefore augment the theorem, rather than refute it.

Kliman quite properly points to passages in the writings of proponents of the theorem (viz., Roemer, 19xx), which casually imply that the theorem's key result extends to dynamic situations. Nothing of the kind, of course, can be assumed. The extension of the theorem to dynamics must be done formally, and with care.

If the time period within which technical changes are evaluated and introduced is progressively shortened, one might purport to generalize the theorem by treating dynamics as a sequence of short-period equilibria. Two problems arise in this connection. First, a sequence of arbitrary and exogenous technical changes reveals the poverty of this entire conception, and the need for theorization of the constraints on technical change and the endogenous choice of a technical-change path by capitalists. It should be noted that Kliman's model replaces one-time change with continuous change, but leaves technical change just as exogenous and arbitrary as it is in the

Okishio original. Second, if we assume (as I believe we should) that technical change takes some time to complete, then a sequence of infinitesimally small equilibrium steps does not capture key qualities of the process. We will need to study technical change choice by capitalists as determined by out-of-equilibrium positions: a process of disequilibrium dynamics. For this, we need at least two sectors, so that unequal profit rates and market prices diverging from production prices can be studied.

b. The TSS critique is irrelevant to the theorem. Kliman's falling profit rate model still has not come to terms with the primary motivating question from which the Okishio Theorem springs. This is the question, If the profit rate falls as a result of technical change, why would capitalists – who are surely rational within the bounds of their own production relations – introduce that change? In the section of the paper (Kliman, 1996) entitled þMicro-Enforcement of the Law,þ Kliman notes that his þmaterial rate of profitþ is greater than his þvalue/priceþ rate (this, as we now know, is only true if the questionable are used, and if à < 1 - þ0, and if there is no scrapping of early vintages). Assume that these conditions hold, for the moment. The next-period material rate of profit will be higher than this period's, and even higher than this period's value/price rate; this is the rate that will be perceived by capitalists, whatever prices they use; þthe board of directors or central planning agency would therefore always þgive the go aheadþ to the new techniqueþ (Kliman, 1996, 219).

In this formulation, however, the central dynamic of the Okishio process has been lost. That dynamic is the relation between the firm that holds the new technique as the temporary monopoly of the innovator, on the one hand, and the remaining firms, on the other. More precisely, every capital (firm) thinks of itself continually as the innovator, and must do so, even if all capitals act from this position and innovate simultaneously. The effort to capture the momentary extra profits from the position of pack-leader – the conjunctural moment – is essential to the survival of the individual capital. This is independent of whether or not the individual capitals can anticipate subsequent developments (including falling profit rates). This intense dialectic of the individual capital and capital in general, which defines the historically specific character of capitalist competition, is present in both Marx and Okishio, and absent in Kliman. The example in his Table 10.3 (p. 220), in which a particular capital is the þinnovatorþ and alone has the ability to innovate over time, while the other capitals never do, is entirely irrelevant to this conception.

As the phrasing of the above quote concerning board of directors/central planning agency indicates, Kliman is wedded to a conception of capital as a disembodied force that can inhabit an unlimited range of property/institutional structures at will, so that the individual-capital/capital-in-general dialectic, and indeed the entire role of valorization of social relations, do not exist for him. He quotes the famous passage from Marx – þCapital exists and can only exist as many capitalsþ – but then argues from the context of the quote that this passage refers only to the fact that competition manifests capitalism's inner laws but does not þinventþ them (Kliman, 1996, 209). It is not hard, however, to supply a wider context in Marx for the truly dialectical understanding of value: inner relations both appear as outer ones, and are constituted by them. The dynamic of technical change, like much else in capitalist production relations, is governed by the contradictory process of interaction among atomistic units of control þ the individual capitals þ that gives rise to the objective process confronting those capitals as immanent laws. For textual support, we might begin with the first two sentences of Volume I of Capital.

c. TSS value theory is irrelevant to the TSS critique. Despite all of the posturing about þnon-equilibriumþ and þtemporalþ theorizing, the sequence of values (or prices) in Kliman's model is essentially a sequence of equilibrium values. To see this, we will examine the basic determination of value in the system, following Kliman's assumptions concerning technical change. The basis dynamic equation, in obvious notation, is:

We then get the solution which is virtually identical to Kliman's (5þ). Kliman, however, places the two terms of this solution on equal footing, suggesting that a > c/b and a < c/b are equally likely. In fact, a is the material input/output coefficient, presumably significantly less than one; Kliman uses a value of 0.5 in his examples. c/b, on the other hand (using the values from one of Kliman's examples) is close to 1, on the order of 1.02/1.06 = 0.96. The first term of the solution therefore vanishes much more rapidly than the second, and the second therefore dominates the movement of Vt over time. The first term is the complementary function, denoting movement resulting from divergence of V0 from its equilibrium at time 0 (an unanalyzed initial discrepancy between market price and value). The second term, the particular integral of the solution, traces the decline in the (moving) equilibrium unit value itself over time, due to technical change. It is this term, as noted, that dominates the overall movement. Despite all of the protestation to the contrary, then, Kliman's model is essentially based on moving equilibrium unit values, and does not draw in any significant way on the notion of þnon-equilibriumþ economics.

d. The þexpulsion of living laborþ gambit. Kliman considers the case in which the actual quantity of labor in production falls over time: c < 1. Reverting to the pure fixed capital formulation for ease of exposition, and ignoring the niceties of time subscripts and the distinction between aggregate and individual vintage quantities, we can examine a line of argument that has a long lineage. The profit rate is (The second equality follows from þY = L, a feature of the pure fixed capital case; a similar but slightly more involved derivation would apply in a case with material input flows.)

From an expression of this sort (his eq. (12þ)), Kliman reasons: þIf c < 1, that is, if mechanization leads to an absolute decline in the extraction of living labor, the profit rate approaches zero over time. The numerator of (12þ) – the mass of profit – declines to zero as time proceeds, while the value of the capital stock and thus the denominator of the profit rate remain positiveþ (217). His general conclusion: þExpulsion of living labor through mechanization spells the doom of the systemþ (218).

Now, if the value of the capital stock is tracking the value of the latest vintage, through the simple weighting process when individual values are used as aggregators, or through scrapping of early vintages, or both, the unit values in the denominator are also falling to zero; in fact, they are falling at a rate c - b, which is greater than the rate of decline of labor, c - 1. Using þ = L/Y, the expression for r above is easily processed into (1 - þw)Y/K, which (again) rises to a maximum of Y/K. This exercise, in fact, reveals the difficulty with the historical cost procedure: with current labor declining absolutely, although output continues to rise, we are led to believe that the profit rate is falling toward zero, even though the profit share is rising and the output-capital ratio is constant. Something is clearly wrong, and rhetorical references to the þdoom of the systemþ do not help to clarify matters.

e. The ultimate falling-r argument. Kliman, as noted previously, does not claim that the model we have been considering even proves that the rate of profit must fall. He does, however, make this claim on the basis of a model presented in Appendix 2, in Kliman, 1997b, which is headed þRefutation of the Okishio Theorem.þ

There is, indeed, considerable overkill in the attack leveled against the Okishio Theorem. In places, we are led to believe that it is internally inconsistent, despite the denial of this, quoted above. Elsewhere, its fatal flaw consists in the fact that it is þsimultanist.þ Finally, in the argument we are about to consider, the problem with the theorem is that it þdoes not employ DVLTþ (DVLT: þdetermination of value by labor timeþ).

I believe that Okishio is getting in our way here. The argument in Kliman, 1997b, is in fact a straightforward theory of the necessity of the falling rate of profit, and should be considered as such.

The argument begins with five assumptions: 1) pure fixed capital; no physical depreciation; 2) no material input flows; 3) the real wage = zero; 4) all profit is reinvested; and 5) the labor input, L, is constant over time. Assumptions (1) through (4) assure that, in value or physical terms, (gross) output = profit = the addition to the capital stock. The argument proceeds in value terms, for which I will adopt the most traditional notation available. Writing C for the stock of constant capital, we have the simple dynamic relation:

This resolves, almost trivially, to the solution Forming the rate of profit at time t, we obtain:

From this, Kliman concludes: þSince all terms on the right-hand side except t are constant, rt falls continuously and approaches zero as t approaches infinityþ (Kliman, 1997b, 9).

Now at risk of being tagged with employing a þmetaphysical materialist primitiveþ (Kliman, 1996, 211), I will seek to discover the counterpart to the above in terms of physical quantities. By the same method of addition, we can write the time path of the physical capital stock (the þmassþ of constant capital, in Marx's terminology) as This implies a growth rate of the capital stock of which falls to zero as t ì. Now if there is a given technical relation between K and Y, given by an output-to-capital ratio þ = Yt/Kt, then and The profit rate is constant through time and equal to þ, as we would expect, almost by definition. Output is growing in the same linear fashion, at the same declining rate, as physical capital. Nevertheless, without technical change impacting in a biased fashion on the output-to-capital ratio, the profit rate does not fall.

To clinch this, put it into value terms. The unit value, þt, is which is, of course, declining in time.

THE ÞVALUEÞ RATE OF PROFIT IS THEN

Once again, Kliman has lost track of the trend in the value coefficient in the denominator.

The only way to make sense of his falling-profit-rate argument is to make the implicit assumption that Y is constant over time! The profit rate, then, clearly falls to zero over time if anything out of profits is being added to the capital stock, increasing the denominator, while the numerator is not changing.

NOTING THAT THE PROFIT RATE CAN BE WRITTEN

This form is closest to Kliman's actual formulation. But if Y is growing, the rise in t in the denominator is offset by the fall in Y0/Yt, and once again the profit rate does not fall. (Of course, the same result would follow from the more elegant assumption of constant proportional growth.)

To get his r 0 result in this example, Kliman has given up:

1) value theory in general (the exercise, in one good, does not require value in any sense, and the historical-cost formulation has disappeared; 2) TSS value theory in particular (as noted above, þnon-equilibriumþ processes, whatever these may be, are not invoked); 3) technical change (the example works with accumulation of K and Y with constant technique: just let L grow at the same rate); 4) the Okishio viability criterion (this has gotten lost somewhere); 5) simple logic: capitalists continuously accumulate capital stocks that are apparently never removed from their crates or installed, since they produce no output. Question: has it really been worth the cost?

3. Does any role remain for historical-cost valuation?

What is really at issue in the choice between historical-cost and replacement-cost valuation of capital stocks? Is some sort of synthesis of these two perspectives possible?

What matters in capitalist competition is the dynamic struggle to survive and expand. The capital stock that matters most for the rate of profit that matters most (for future accumulation) is one valued at its expected replacement cost. When productivity increases cheapen the replacement for an existing machine that was purchased earlier for more money, that machine is subject to Marx's þmoral depreciationþ; in his terms, constant capital is cheapened – something that he saw as a partial offset to the tendency for the composition of capital to rise. The potential profit rate has risen, and if one capitalist does not get that rate, its competitors will. This is simply an application of the proposition that it is the social, not the individual, situation that determines value.

Now there is the undeniable fact, mentioned earlier, that the financial aspect of capital may come into conflict with the production aspect, in possibly significant ways. The capitalist that has borrowed to purchase a machine that is now depreciating morally must repay the actual loan that was originally contracted. Its creditors will not be satisfied with a reduced repayment schedule, because they are told that newer machines can now be purchased for less money! In a period of rapid technical change – and especially in one of unanticipated change – we may well imagine that a conflict arises between the book, or historical, rate of profit, on the one hand; and the potential, or replacement-value, rate of profit, on the other. This conflict may lead to foreclosure or bankruptcy of the firms most severely affected by it, especially at moments of cyclical crisis. This, I believe, is the core of truth in the historical-cost conception.

The ability to repay loans, however, depends on a capital's success in the competitive struggle to accumulate. Dynamic collateralization – the power to roll over debt, and eventually pay it down – is determined in large degree by creditorsþ perceptions of the ability of a firm to compete in the present for profits. This means having cutting-edge productivity, growth and market potential – in a word, keeping up with technical change. The specter of a firm having to repay old loans out of earnings from production involving rapidly obsolescing capital goods is precisely a vision of the situation facing a capitalist that is not keeping pace; this capitalist of course faces a fall in its profit rate that is peculiar to it.

Successful capitalists do not face this fall in the rate of profit, precisely because they are able to use their financial and borrowing power to scrap old vintages and keep the average productivity of their capital stocks rising toward (although always lagging somewhat behind) the productivity of the latest vintage. A model of instantaneous and total replacement of early vintages by the latest vintage undoubtedly exaggerates the profit rate, which, as noted earlier, is held down to some extent by the need of the individual capital to maintain scale and therefore keep superseded capital stocks in place. There should be no doubt, however, that replacement value, perhaps conceived as a moving average of the values of some grouping of the most recent time periods, is the key to the real growth that is measured by the profit rate, and that the replacement-cost profit rate is accordingly the most appropriate measure of the profit rate that matters.

To base a theory of the falling rate of profit on capitals that confront the historical cost of their capital stocks as a dead weight is, quite simply, to miss the track of successful accumulation. This is precisely what the historical-cost theorists do: they chart the fall in the rate of profit of the marginal firms that are heading for bankruptcy or takeover. Just as the truly revolutionary analysis of capitalist exploitation reveals the production and appropriation of surplus value in the strong case of full effectivity of the law of value – i.e., with all purchases and sales of goods taking place at their benchmark (dare I say þequilibriumþ?) labor values – so a truly revolutionary theory of the falling rate of profit must examine the strong case of successful accumulation, and not rely on the obvious nose-diving profit rates of those capitals destined to be destroyed/absorbed in the accumulation process.

The successful capitals – not the absolute front-runners, or þinnovators,þ but the main stream of capitals – can replace obsolescing capital stocks with latest-vintage ones, use the power thus afforded them to roll over or repay old loans (at full value), and still compete for market shares and accumulation against all comers. These capitalists have, of course, higher profit rates than the losers. The question is: does the process of technical change and accumulation lead to a fall in their profit rates over time? The relevant profit rates for this, truly revolutionary, analysis will be based on capital stocks valued at replacement cost – at least, the cost of a minimum-scale average of the latest vintages. This cost, incorporating changes in productivity, reveals the true expansion potential, and therefore the real competitive positions, of the capitals in question.

The historical-cost argument, therefore, with its projection of rising-but-illusory þmaterialþ rates of profit and falling þvalueþ or þvalue/priceþ rates of profit, and its mechanistic projection of profit rates inevitably falling toward zero, is not only illogical at its core. It is also a diversion from the real task of determining the conditions in which a dynamic path of biased technical change will be undertaken by rational, competing capitals, and the implications of that bias for critical processes – including (but not limited to) a tendential fall in the profit rate. Models that posit exogenously given increases in mechanization and productivity, with a constant capital-output ratio, that ignore the conjunctural innovation/imitation dialectic, and that fail to grasp the real production relations of successful capital-stock renovation and replacement, do not even step into the starting gate.

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