Equilibrium, Uneven Development and the Tendency of the Rate of Profit to Fall

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Since the publication of Volume III of Capital, *debate has raged over Marx's theory of the tendency of the rate of profit to fall in advanced capitalist society. Unfortunately, the debate often takes an extremely rarefied form, so rarefied that its implications for theory, much less for practice, are at best obscure. This is indeed unfortunate, since the debate, abstract as it may seem at times, is fundamental to political practice. What is at stake is whether capitalism is by its nature stable and capable of sustained dynamism or whether the accumulation of capital is self-limiting. It must be stressed that the issue is not whether 'Marx was right' or whether his theory can be defended, but rather what is the actual nature of capitalist accumulation and the correct way to analyze it.*

The link between theoretical analysis and the political outlook and practice of particular individuals cannot be made mechanistically. However, the debate over the tendency of the rate of profit to fall does correspond to the debate over revolutionary strategy. If, as argued below, the process of capitalist accumulation is inherently unstable (the tendency of the rate of profit to fall being the fullest expression of that instability), then it follows that a system of commodity production cannot be altered in such a way as to eliminate that instability. Rather, commodity production must be abolished.

If, on the other hand, the accumulation of capital finds its limits in aggregate demand ('underconsumption') or in wage pressures ('profit squeeze'), then a managed, rationalized system of commodity production becomes a political possibility, at least as a transitional social formation on the road to a fully proletarian state. Obviously involved here is the debate over the possibility of a 'peaceful' road for socialist transformation. The purpose of these comments is not to label underconsumptionists and profit-squeeze theorists as 'reformists' and to bless others as 'revolutionaries'. Such labels close out debate among comrades rather than facilitating it. Our point is that the debate over the

tendency for the rate of profit to fall relates directly to key questions of political strategy – the role of the wage struggle and 'economistic' demands, possible divisions within the capitalist class and their significance, and class alliances for the overthrow of capitalism and the construction of socialism.

Introduction

The hearts of untold thousands of Marxists must have sunk to read the obituary of Marx's theory of the tendency of the rate of profit to fall. We are not told where the funeral was held, but one can presume that the theoretical remains were laid to rest in Highgate Cemetery along side the great revolutionary himself, marked by a tombstone financed by subscriptions from 'orthodox' Marxists. Despite this grave passing, while the ground is still fresh, so to speak, it is worth considering whether we have here a case similar to Samuel Clemens reading his obituary in a newspaper and commenting, 'the reports of my death are greatly exaggerated.'

The apparently deadly blow to the law of the tendency of the rate of profit to fall (LTRPF) occurs in an article by Nobus Okishio. That article was published almost twenty years ago, but his arguments have continued to be developed by others.[1] In what follows we consider Okishio-type arguments, particularly their analytical method and their treatment of competition, money, and fixed capital. The Okishio argument is disarmingly simple: if one considers two static equilibria, holding the standard of living of the working class constant, technical changes which lower the unit costs of commoditities must raise the equilibrium rate of profit. For some, this buries the LTRPF forever, since it appears to contradict Marx's central argument that it is the progressive development of productive forces which gives rise to the LTRPF, which undermines accumulation.[2] For Marx this is 'the single most important law of political economy'. In what follows, we evaluate the Okishio argument and how it has been elaborated by others, to see if, like in the famous story by Poe, we have a premature burial.

The Argument Elaborated

In the introduction, I briefly summarized the Okishio argument, and now I present that hypothesis in more detail so that it be clear what is under criticism. There are similarities between the Okishio method and the general Sraffian approach, so much so that the former can be interpreted as part of the latter world-view. However, it is not the purpose of this article to undertake a critique of Sraffian theory. The purpose is the much more limited one of critiquing the recent literature on the tendency of the rate of profit to fall which bases itself on what is called the 'Okishio theorem'. Within this limited context, fundamental issues of scientific method arise, such as the proper method of abstraction. All theoretical disagreements can be carried back to differences in method of abstraction, but the present critique will not locate itself at such a fundamental level. As important as such debates are, to enter into them here would obscure and push to the background

the specific issue at hand; namely the importance and implications of the Okishio critique of the law of the tendency of the rate of profit to fall. The fundamental questions of method have been debated elsewhere,[3] and those familiar with the debates will recognize their implicit presence as our argument unfolds.

The Okishio theorem is quite straight-forward and can be summarized without reference to esoteric mathematics, though those mathematics provide a rigor of proof with which we take no exception. Let a closed production system be uniquely defined by a prevailing technology in each department (sector) of production and a unique standard of living for the working class, where the latter is some unique collection of commodities. In this production system, a positive rate of profit for the system as a whole is implied, assuming that the prevailing techniques allow a level of productivity for which the net product of the system exceeds the production necessary to satisfy the standard of living for all employed workers. In the terms Marx used, this means necessary labor time is less than total current labor time; though it is unnecessary to use Marx's terminology to explain the Okishio theorem, and probably misleading to do so.

The heart of the Okishio critique of the theory of the tendency of the rate of profit to fall is the analysis of the consequence of the availability of a new technology in one or more sectors of the production system (while holding the standard of living of workers constant).[4] The first crucial step in the analysis is the specification of the decision rule upon which capitalists act when considering the adoption of a new technology. The decision rule reflects common sense: capitalists will adopt a new technology if and only if the new technology is anticipated to lower unit costs of production. The unit cost calculation is assumed to be on the basis of prevailing prices, both of the inputs and the output(s), though obviously technological change will in general alter relative prices over time. However, the calculation of costs on the basis of current prices is a strength of the Okishio theorem, for it does not apparently require capitalists to predict the consequences of the technical change beyond the parochial impact on their immediate production cost. It is then possible to demonstrate that all technological changes which conform to this rule, when adopted by all capitalists in a sector, will have the effect of raising the implicit rate of profit for the closed production system as a whole. And if we postulate some process by which the rate of profit equalizes across sectors, this equalised rate of profit – the rate of profit realized by capitalists in each sector – will also be higher than the rate of profit that prevailed before the new technique(s) were generally adopted. The reason for this result is that the technical change(s) introduced under the decision rule must necessarily reduce the total labor time, current and past, necessary to produce the products within the production system. The theorem can be summarized as follows: given the standard of living of the working class, technical changes which rational capitalists will introduce, when generally adopted, will raise the overall rate of profit. Or even briefer, *ceteris paribus*, technical change raises the rate of profit.

Anyone familiar with Marx's theory of the tendency of the rate of profit to fall will immediately see the apparently devastating implication of the Okishio theorem. Whether or not one thinks that Marx had a 'profit squeeze' theory of the tendency of the rate of profit to fall,[5] it is universally agreed that he sought also (or instead) to formulate a theory of the tendency of the rate of profit to fall for a given standard of living of the working class. And in this theory, the tendency of the rate of profit to fall is the consequence of technological change; or more explicitly, of increases in the productivity of labor, defined as more output per worker per unit of time. The Okishio theorem apparently refutes this: Marx said that productivity changes cause a tendency for the rate of profit to fall; Okishio showed that productivity increases cause a tendency for the rate of profit to rise. Marx apparently stands refuted.

I will argue that the law of the tendency of the rate of profit to fall is not refuted by the Okishio theorem; indeed, that the theorem is largely irrelevant to the tendency of the rate of profit to fall, unless one interprets the law a particular way. It should be noted that my purpose is not primarily to defend Marx, even less to compare the Okishio critique to Marx's writings. Rather, my purpose is to demonstrate that there is a tendency for the rate of profit to fall in capitalist society, and that the Okishio theorem has not refuted the existence of this tendency.

To initiate my critique, I point out several characteristics of the Okishio analysis, each of which demands attention. First, in terms of formal mathematics, all sectors of the production system are treated as if each could be aggregated into a single production unit, or single capital. This notwithstanding, the analysis of technical change is at the level of individual capitals. Implicitly involved here is the familiar assumption of the 'representative firm'. The only way that one can both treat a sector as an aggregate and consider the behaviour of one capital within it as typical is by assuming all the capitals within the sector to be the same. The point is a logical one, and its implications will be pursued below. At this point, I am not making a criticism, but only identifying the characteristics of the model.

Second, and related to the first, the Okishio theorem compares two states of static equilibrium in order to draw its conclusion. This is stated explicitly by Van Parijs, who writes that 'it is impossible for a fall in the equilibrium rate of profit (due to a rise in the organic composition) to generate crises.' Throughout the Okishio analysis we are dealing with equilibrium profit rates, equilibrium prices, and equilibrium values. Further, the equilibria are presumed to be stable, for otherwise a dynamic analysis would be required and none is offered.

Third, in the Okishio analysis there is no exchange as such, for in equilibrium we always view the production system after all markets have been cleared, and cleared at equilibrium prices. As a consequence, money as such plays no part in the analysis. This point

in and of itself is not a criticism or an original observation about static equilibrium models. It becomes important, however, in the context of a dynamic analysis of the tendency of the rate of profit to fall.

Fourth, the critique is formulated within a model in which there is strict division between variables and parameters, which is characteristic of static equilibrium analysis. On the one hand, the model treats technology and the standard of living of the working class (and implicitly, the value of money) as exogenously determined. These two central elements are not analyzed, but are taken as given. Within the model, the manner in which they can change is not specified, except for the indirect constraint on technical change set by the cost-price decision rule. On the other hand wages, prices, and profits are variables, determined in effect by the parameters. This dichotomizing of the elements of the theory has two consequences. First, the variables are explained by elements which themselves go unexplained. The indeterminacy of one set of elements is solved by assuming but not explaining another set of elements. Further, the structure excludes an analysis of how the variables might exert causality upon the parameters. To be explicit, the dichotomy between variables and parameters rules out the possibility of one of the parameters, namely technology, undergoing change out of equilibrium. Of course, it would not be impossible for the elaborators of Okishio's critique to formulate a model in which technology and the standard of living are endogenous. But they have not done so, and this omission is not accidental. We shall argue that if they did so, their results would be quite different.

Overall, the approach is one of comparing static equilibria, which is ill-designed by its nature to analyze the dynamic passage from one equilibrium to the next. In comparing static states, the question of stability of the equilibria is not treated, but rather subsumed under the rubric of competition. This use of equilibrium analysis has the consequence of excluding time from the model, except in a purely formalistic way. The treatment of time is formalistic in that the past, present and future in the theory are perfectly inter-changeable. The 'time' sequence of the different equilibria can be altered merely by changing the subscripts on the equations. We are not dealing here with chronological time, but logical steps from one equilibria to another – Robinson's famous islands characterised by different technologies, and the islands can be visited in any order. This implication of the Okishio critique becomes extremely limiting analytically when an attempt is made to treat fixed capital, as we see below.

As a final note before a counter-critique, I should stress that my characterization of the Okishio model has not been made to accuse it of lack of 'realism', though it is not realistic, if by 'realism' one means corresponding to the concrete. Rather, the purpose has been to show the limited phenomena which the model can treat, whether realistically or unrealistically. My argument will be that the tendency of the rate of profit to fall is a law of capitalist accumulation, a law of uneven

development. Firmly located in equilibrium theory, the Okishio model cannot incorporate this law in any way, so it has not so much refuted it as excluded it logically. I do not exclude the possibility that the defenders of the model could render their analysis dynamic. It is, however, for them to demonstrate that their analysis is relevant to the dynamic process of capitalist accumulation. Such an attempt would be welcomed, not in small part because it would probably support the argument which follows.[6]

The Okishio Model and the Harmony of Competition

Central to the Okishian model is a particular and ahistorical view of competition. In the model competition renders all things the same, generalizing the adoption of the most advanced techniques, which is necessary for their stable equilibria. This view of competition is essentially neoclassical and counter-intuitive in its treatment of the interaction of capitals. In neoclassical economics competition is a mechanism which renders capitals identical. Competition here creates equilibrium, a situation of harmonious coexistence of many capitals within each sector of social production. This homogenizing effect of competition is abolutely essential for the analysis, for without it no static equilibrium is possible. Consider a sector of the economy in which there are capitals of varying efficiencies, enjoying different rates of profit by virtue of selling at different cost-prices. Such a circumstance is by definition inconsistent with equilibrium, since the conditions are present for the expansion of some capitals relative to others. As a consequence, price, market shares, total production, and the average conditions of production are not uniquely determined. The disequilibrium nature of such a situation is easily demonstrated. If within a sector different capitals use different production techniques, then the average conditions of production are not independent of the distribution of output within the sector. Further, it is not justified to assume that the distribution of output by capitals is given, since the heterogeneity of techniques implies a heterogeneity of cost-prices, and capitals with lower cost-prices will tend to expand compared to those with higher cost-prices. Thus, for a stable equilibrium, competition must be defined as a homogenizing force; or if there is uneven development, it must be assumed to operate *between* sectors (equalizing the rate of profit), but not *within* sectors where it would change the distribution of output by capital ('firm') and invalidate the assumption of a unique and exogenously given technology in each sector.

We can compare the neoclassical view of competition to the analysis of a tennis match. The average tennis fan would analyze a field of, say, sixteen contestants, by predicting that the competition among the players would be resolved, in general, by one player emerging victorious over the others. This prediction would be based on an assessment of the relative abilities of the contestants. The Okishio model, on the other hand, would argue that in the process of play, the weaker players would improve to the level of the stronger, and that the tournament would reach a state of equilibrium in which

all matches were continuously at 'deuce' point. Such an equilibrium is as unlikely in the competition among capitals as at Wimbledon. Yet this is the 'competitive' relationship required in the analysis of the Okishio model.

As pointed out before, we are not arguing that the Okishio model cannot incorporate uneven development. However, were it to do so, the static equilibrium framework would have to be discarded, and it is for the defenders of the model to show that their critique can be generalized when general equilibrium does not hold.

Central to the model is this view of competition and missing from the treatment is competition as the *struggle and conflict among capitals*. This omission derives from treating competition ahistorically and divorced from dynamics. Competition as an equilibrating force is ahistorical in that it is divorced from the circuit of capital, a circuit which develops and changes qualitatively over time. In the early stages of capitalist development (Britain in the first half of the 19th century, for example), the extent and intensity of competition was quite limited. The underdevelopment of competition reflected both the characteristics of production and circulation in this early period.[7] With regard to production, both the class struggle and the development of the productive forces (obviously inter-related) had not created the basis for raising surplus value relatively.[8] The basis of raising profits was the production of absolute surplus value (e.g., lengthening the working day) or increasing the mass of profit by the concentration of capital.[9] In this rude state of technology, which Marx called 'manufacture,' the technical conditions for large scale expulsion of living labor were not present. Along with this, the social relations facilitating the centralization of capital were not well developed. The credit system was unsophisticated, making it difficult for capitalists to obtain large amounts of money-capital.

Under such circumstances, the expansion of individual capitals was through the capitalization of realized surplus value, a method which severely limits the qualitative changes in the work process which could be achieved, as well as limiting expansion, as well as limiting expansion quantitatively. To the extent that the Okishio view of competition has any historical referent, it most closely coincides to this early period of the struggle among capitals, when the circumstances of class struggle, technical development, and relations of circulation greatly limited the extent to which one capital could attack others. The relatively slow pace of technical change (because machinery was not mass produced) limited the degree to which individual capitals would gain cost-price advantages over other capitals. Credit relations restricted increases in the scale of production, circumscribing the stratification of capitals by size. The bourgeois view of competition is, in effect, an idealized extension of this period of capitalism, with emphasis upon the most historically primitive aspect of it.

With overall development of the productive forces and the working class victory to limit the working day, capitalism entered into the epoch of the production of *relative* surplus value, the reduction of

necessary labor time relatively to surplus labor time by the reduction of the values of commodities. The Okishian analysis addresses itself to this epoch in its treatment of technical change, but retains an idealized theory of competition based upon the earlier epoch of the production of absolute surplus value. The law of the tendency of the rate of profit to fall is a law which manifests itself when the production of relative surplus value becomes dominant in the process of accumulation. The competition which Okishio models invoke to refute the law is an anachronistic, as well as idealized, concept.

In order that one can move conceptually from one static equilibrium state to anther, competition must play the role of rendering all capitals identical within a sector of industry. Thus, the analysis of static equilibrium requires not only the assumption of competition, but the assumption that all new capitals enter a sector with a technique of production identical to that of the most efficient capital; and further that all resident capitals also adopt this most efficient technique or cease production. Now, under what conditions would competition generate this result? It must be noted that it is not justified here to assume that the most efficient technique is generally known and established, as Roemer does in his critique of Presky and Alberro,[10] for this is to assume what remains to be proved. What must be shown, if the static equilibrium analysis is to be accepted, is that competition leads to even development – identical capitals. To say that techniques are known to capitalists and their development predictable, as Roemer does, is merely to make the assumption of even development in other words. What is at issue is whether competition itself engenders revolutions in the productive forces.

One can only argue for a harmonizing competition if one has previously assumed that alternative production processes are given to capitalists independently of competition. Then homogenization of capital follows as a logical conclusion, since a capitalist would have to be stupid to choose a less efficient technique. Under what circumstances would techniques be generally known and predictable in their emergence? This would occur when technical change was occurring slowly. And this corresponds to the period of the production of absolute surplus value, in the early stage of the development of capitalism.

Once the means of production are mass-produced and the credit system develops, the competition among capitals assumes greater intensity and becomes the mechanism of uneven development. Once the development of the productive forces becomes continuous, competition itself is motivated by the discovery of new techniques. Capitals enter into sectors of industry armed with new techniques, implying lower cost-prices. Across sectors, this tends to equalize the rate of profit; but within sectors it generates uneven development, the stratification of capitals by levels of efficiency. The equalizing tendency of competition across sectors is continuously contradicted by the effect of competition within sectors. What appears in the static Okishian analysis as an equilibrating force is actually a process of

cumulative uneven development. Roemer criticizes this portrayal of competition generating uneven development on the grounds that it presumes that capitalists cannot correctly anticipate the pace of technical change. But such an argument presupposes the general equilibrium which competition itself is required to bring about. What must be 'anticipated' is not merely technical developments themselves, but the profit and cost flows in the future from these developments. These can only be 'anticipated' if the static equilibrium upon which the price calculations are made will actually occur.

The internal circularity of Okishio-type arguments is quite clear when their treatment of competition is scrutinized. The analysis bases its critique upon comparison of static equilibrium states in which each sector of the economy can be treated as a single capital. This, in turn, requires some mechanism to render all capitals in a sector identical. The mechanism is labelled 'competition'. In order that the assumption of 'competition' not be the same as merely assuming all capitals to be identical, the argument must specify how the competitive struggle would lead to similarity among capitals. This is achieved by granting capitalists perfect foresight and this requires knowlege of future static equilibrium prices and costs. But such knowledge is irrelevant unless the static equilibrium will actually come to prevail. And it will come to prevail only if competition generates even development. Having followed this line of argument, we see that 'competition' in this theory is nothing more than the assumption of static equilibrium itself.

In summary, we see that the movement of capital among industries to equalize the rate of profit is also the process of uneven development; the struggle among capitals has the contradictory effect of tending to equalize returns among sectors and to generate unequal returns among sectors. It is a mistake to conceive of the struggle among capitals as an equilibrating mechanism, for it does not establish a stable, sustainable, relationship among capitals. The tendency of the rate of profit to equalize hides a fierce competitive struggle within industries.[11] By ignoring the struggle among capitals, Okishio, like neo-classicists, treats the interaction of capitals as an equilibrating force, though in fact it is the source of uneven development. Consideration of competition among capitals, as opposed to competition in the abstract divorced from social relations of production, renders static equilibrium comparisons irrelevant.

A further point needs to be made. The model, in its treatment of competition, equates the tendency for profit rates to equalize with the equalization itself, and therefore interprets Marx as an equilibrium theorist because he postulated an equalizing tendency. Whether Marx was or was not is of limited interest, for in terms of logic there is no reason why a tendency need result in an equilibrium, for a tendency can set in motion forces which contradict it. Because of the nature of capitalist social relations, capital is mobile and forced by competition to move in response to differences in profit rates across industries. This movement is not just a movement of money capital, but also involves the reorganization and reallocation of the elements of

production, one aspect of which is technical change. Even if the movement of capital results in a momentary equalization of profit rates across industries, there is no logical basis for presuming that the conditions of competition within each sector (uneven development) are such as to maintain this momentary situation.

Money Briefly Considered

The capitalist mode of production is the first in which the reproduction of class relations and class rule involves the general circulation of the products of labour as commodities. As commodities, these use values must be exchaged against money in order that capital may realize value in a general social form, a form in which that value can again be employed as capital. Marx symbolised this unending circulation with the symbols M-C...P...C′-M′ (money capital is exchanged against the means of production and labor power; this productive capital is consumed in the labor process to create commodity capital; and the commodity capital is reconverted into money capital). No consideration of capitalist production is possible without a treatment of money. This point is not novel, but the Okishio model does not appreciate its importance.

A moment's reflection shows that comparative statics in effect define money out of existence. To understand this, we need briefly to treat the functions of money in capitalistic society. The most obvious role of money in capitalist circulation is as means of circulation. In this role, money is the agent of the movement of commodities, circulating commodities which fall out of circulation to be consumed in the production process or directly by workers and capitalists. This function necessarily implies other functions. A capitalist must exchange his commodities against money or the surplus value latent in those commodities goes unrealized and cannot be converted into capital. However, once commodities are realized as money, the possibility of an interruption in circulation is created. Since money is the generalized expression of social labour, it can be held as a claim on all other commodities (as a store of value); i.e., money need not be *realized*, since it is by definition and practice realized value, generalized wealth in the abstract.[12]

In and among states of equilibrium this function of money as store of value has no significance. By definition, in equilibrium all exchanges have already occurred smoothly or are occurring smoothly without interruption. In equilibrium there is no 'motivation' by capitalists to hold money idle, unless one presumes hoarded 'cash balances', which must also be in equilibrium consistent with the stability conditions of the static state. As a consequence, the assumption of static equilibrium assumes away the fundamental contradictions of a money economy, the division between *money as means of circulation* and *money as means of payment*. These, in turn are closely related to money as a store of value and the possibility of an interruption in the circulation of capital.

In the process of accumulation, exchanges between capitalists for the means of production occur on the basis of credit, so that a

pyramid of indebtedness builds up as accumulation proceeds. Here, credit is serving as a *means of circulation*. At some later point, these debts must be paid off, at which time money acts as a *means of payment*. In its role as *means of payment*, money does not circulate commodities, but cancels debts contracted by the circulation of commodities during a previous period. If the analysis restricts itself to states of equilibrium, the distinction between means of circulation and means of payment is trivial. In equilibrium, by definition any incongruity between circulation of commodities and payment for commodities has been eliminated. However, if we allow for the cumulative uneven development generated by the competition among capitals, then the possibility of credit crises presents itself.[13] These crises can result from changes in the values of commodities or from changes in the value of money itself. If either or both occur, capitalists may be unable to cancel the debts they previously incurred.[14]

All this is ruled out by considering equilibrium states, for in equilibrium all markets are cleared, including financial markets. By restricting itself to equilibrium states, the model first rules out any disruptions in accumulation arising from the process of value formation,[15] and, second, rules out any contradictions in the circulation or non-circulation of money which results from the process of value formation. In such an analysis one searches in vain for a crisis theory; it has ruled out the forms crises necessarily take in capitalist society. In effect, we are offered a model of capitalist society without money. The importance of this is demonstrated in the next section.

Fixed Capital and Circulation

The omission of any meaningful consideration of money by Okishio becomes particularly glaring when others 'generalize' the critique of the tendency of the rate of profit to fall to include 'fixed capital'. The latter term must be placed in inverted commas, since their analysis fails to distinguish fixed capital from circulating constant capital in a meaningful way. In the context of static equilibrium, fixed capital for the Okishio model is constant capital which lasts longer than one production period. As Marx pointed out, this is merely the *basis* of the distinction, not the distinction itself.[16] It fails analytically because it does not recognize the two-fold nature of fixed means of production; like all commodities they are *both values and use values*.

When considering the production of value (and surplus value), the relevant distinction is between constant and variable capital. Constant capital is exchanged against the means of production whose value is passed on unchanged in production. Variable capital is exchanged against labor power, which when consumed by capital, expands value. However, when one analyzes the circulation of capital, the relevant distinction is between fixed and circulating capital, for the production of value is presupposed. Fixed capital has two characteristics important for the circulation process. First, the use value of fixed means of production does not circulate, only their value does. Unlike other means of production, fixed means of production

undergo no change of material form in the production process. Part of their usefulness is exhausted through 'wear and tear'. What is transferred to commodities in the labor process by consumption of fixed capital is *value*, and value alone. Second, and related to the first point, fixed means of production impart their value to commodities piecemeal, over several production and circulation cycles. As a result, a portion of the value of fixed capital *does not circulate*, but remains 'fixated' in material objects.

This second characteristic lends a special character to the circulation of fixed capital. Since fixed means of production have been purchased with money (they are capital), they must be replaced by a subsequent money exchange when their usefulness is exhausted. Their value is transferred, passed on to the commodities continuously, but they are replaced discretely.[17] This reflects the two-fold nature of fixed means of production. As values, they shrink with their material wearing out, and this value is accumulated continuously as money for their replacement. As use values, they are replaced all-at-once. By reference to concepts previously employed, we can summarize by saying that the transformation of fixed means of production from productive capital to money capital occurs continuously with the realization of new commodities in money-form (money-capital). However, the transformation of money capital back into productive capital for these fixed means of production is a separate, discontinuous process. Realization of value and replacement of use value are separate processes.

It should now be clear why fixed capital is defined by how it circulates. In all societies labor processes have included means of production with a life span longer than a single production period. This is only the basis of the difference between fixed and circulating capital. The difference itself is the manner in which value is transmitted and use values replaced in each case. For circulating capital, value is transmitted completely and the use values replaced upon resumption of the circuit of capital. For fixed capital, value is transmitted incrementally and replacement of use values necessarily deferred.

We can now see that the attempt to 'generalize' to fixed capital within the Okishio framework is no generalisation at all, but merely a mathematical treatment of fixed capital as if it were circulating capital. By considering states of equilibrium, the difference between how fixed capital transmits its value and how fixed capital is realized is eliminated from the analysis. What we observe in an equilibrium state is a moment after both transmission of value and realization of value have occurred. What has been done in essence is to define the turnover period between equilibrium states to be equal to the time period necessary to realize all the value objectified in fixed means of production. In short, fixed capital is 'incorporated' into the Okishio analysis by treating it as circulating capital. In effect, fixed capital is treated as a commodity which circulates (a 'joint product').

Out of equilibrium, the difference between the transmission and

realization of the value of fixed capital assumes a contradictory character. The possibility exists that conditions may change such that the transmission of value cannot quantitatively correspond to the *realization* of that value. The struggle among capitals turns this possibility into an actuality. As technical change proceeds, the value of commodities falls. Older means of production progressively become less efficient compared to new ones. As values fall, part of the value in old means of production becomes unrealizable. In effect, part of the value of old means of production becomes socially unnecessary, and must be absorbed by individual capitals by monetary losses.[18]

It should be clear that this contradiction between value transmission and value realization is closely entwined with the division between money as means of circulation and money as means of payment, considered in the previous section. There we pointed out that changes in values can create a situation in which the money realized upon sale of commodities is not sufficient to act as means of payment for means of production previously contracted for with credit money. Competition stimulates technical change, which devalues exisiting fixed capital, so that the total value it transmits to commodities is less than its initial value. The money capital which returns after realization of commodities will be less than the money capital advanced for fixed means of production. Such difficulties are inherent in capitalist circulation due to the devaluation of fixed capital by technical change.

This process of devaluation is lost by treating static states. In equilibria, all capitals are assumed identical, so uneven development is ruled out by definition. All exchanges have occurred under equilibrating assumptions, so there is no difference between sale and payment for commodities (money as means of circulation and means of payment). The transmission, realization and replacement of fixed capital are simultaneous and instantaneous, so no devaluation of fixed capital can occur. It is hardly surprising that Okishio models get no tendency for the rate of profit to fall or crises in their system.

Accumulation and Dynamics

Throughout history, humanity's struggle to control nature and produce the products which society requires has been characterized by uneven development of the productive process. In feudal Europe, for example, productivity varied among manors, due to the natural condition of the soil, if for no other reason. In capitalist society, this uneven development of the productive forces takes on fundamental importance, for in capitalist society the productive forces are mobile. This creates a contradiction within capitalist society, between the uneven development itself and the competitive nature of capital as a social relation. These two contradictory elements were elaborated by Marx in two laws, the law of the tendency of the rate of profit to fall and the law of the counteracting tendencies to the law of the tendency of the rate of profit to fall. The first, 'the law as such', is a law of the development of the productive forces. The second is a law of the interaction of capitals. In effect, the Okishio model considers only the 'law as such', and divorces the development of the productive forces

from the social relations within which that development occurs.

In order to develop these two laws we must first consider the nature of technical change, which in the first instance impacts upon the labor process itself. Therefore, it needs to be treated as the relationship between use values before its impact on values, prices, wages, and profits can be considered. Increases in the productivity of labor involve, by definition, workers producing more products per unit of time. This is achieved through the division of labor within the labor process. The division of labor comes about by use of more machinery, so that each production task is reduced to a simple operation carried out mechanically. Marx called this 'the expelling of living labour from the production process' (the general law of capitalist accumulation). The result of technical change, therefore, is in general to increase the technical composition of capital, or the relationship between the mass of the means of production and the labor power required to operate and process those means of production.

The new technology implies a new set of values for the economy and a new set of relative exchange values. However, at the moment the new technology is introduced, the new values and new exchange relationships are only latent in the new technology, and must await the interaction of capitals (competition) to realize them. This point does not refer to merely a logical progression, but to the actual process of acumulation. Technical change first alters conditions in the sphere of production, and subsequently conditions in the sphere of circulation. Okishio models treat the two as occurring simultaneously.

A rise in the technical composition of capital has the immediate impact of raising the ratio of constant to variable capital at the prevailing values. Since the prevailing values also determine the rate of surplus value, a rise in the technical composition of capital has occurred but the rate of surplus value has not changed. This process is 'the law as such'. The technical composition of capital measured in the values prevailing when the new technology was introduced was called by Marx the 'organic' composition of capital.

At this point the development of the productive forces is inconsistent with prevailing values, and a dynamic process of adjustment is necessary. This process of adjustment is the operation of the law of the counteracting tendencies to the tendency of the rate of profit to fall. The interaction of capitals leads to the reduction of values, which cheapens the commodities which go to make up constant and variable capital. The technical composition of capital undergoes revaluation as values change. The valorized composition of capital consistent with the new technology Marx called the 'value' composition of capital. These two concepts, the organic and value compositions, enable us to analyze two distinct but interrelated phenomena within the process of accumulation: the development of the productive forces and the adjustment in circulation to that development. The adjustment to that development (the process of value formation) counteracts the tendency of the rate of profit to fall in two ways. First, the commodities which make up constant capital may fall in value

more than the commodities that make up the normal consumption of the working class. This would counteract the rise in the *organic* composition of capital. Much more important is the rise in the rate of surplus value due to the cheapening of commodities.

What the Okishio model does in effect, is to eliminate completely the process of value formation. It takes the technical changes as given, interprets them narrowly as nothing more than changes in technical coefficients in an input-output table, then calculates the exchange relationships they would imply were they to prevail in each sector. This equilibrium calculation abstracts from the social relations of capitalist reproduction – competition, money, and the capitalist nature of fixed means of production. These are precisely the elements which create instability within a capitalist economy.

With this in mind, we can see the insight provided by the Okishio critique. Abstracting as it does from the social relations of capitalist society, the critique demonstrates that it is not the development of the productive forces as such which limits the accumulation process. On the contrary, if the productive forces could develop smoothly and evenly, capitalist society would not be inherently unstable. Capitalist society is beset by crises because the productive forces develop in the context of specific social relations (see Sections III and IV) which make that development uneven, and that even development calls for resolution in the form of economic crises.

We therefore owe Okishio a debt, for he has rigorously demonstrated the primary role of social relations in capitalist society.

Notes

This article is a substantial revision of a joint paper with Ben Fine of Birkbeck College, University of London. The discussion of methodology which appeared in the earlier version will be forthcoming in a book by Ben Fine in a chapter entitled "On the Law of the Tendency of the Rate of Profit to Fall'. In the following article the author is indebted to Ben Fine but accepts sole responsibility for the content. Invaluable comments were provided by Simon Mohun, Mike Williams, Bob Rowthorn, S. Hargreaves, Steve Rankin and Anne Phillips.

1 What we refer to as 'Okishio models' can be found in Nobus Okishio, 'Technical Change and the Rate of Profit,' *Kobe University Economic Review*, 7 (1961); John E. Roemer, 'Technical Change and the Tendency of the Rate of Profit to Fall,' *Journal of Economic Theory*, 16 (1977); John E. Roemer, 'Continuing Controversy on the Falling Rate of Profit: Fixed Capital and Other Issues,' *Cambridge Journal of Economics*, 3 (1979); and Philippe Van Parijs, 'The Falling-Rate-of-Profit Theory of Crisis: A Rational Reconstruction by Way of Obituary,' *Review of Radical Political Economics*, 12, 1 (Spring, 1980). One should also mention two articles which present the mathematics of the argument clearly and, at the same time, are more modest in their conclusions: Jose Alberro and Joseph Persky, 'The Simple Analytics of Falling Profit Rates, Okishio's Theorem and Fixed Capital,' *RRPE* 11, 3 (Fall, 1979); and Susan Himmelweit, 'The Continuing Saga of the Falling Rate of Profit. A Reply to Mario Cogoy,' *Conference of Socialist Economists*, Bulletin, 9 (1974).

2 The theory appears in Part III of *Capital*, Chs. XIII-XV.

3 For example, see Ben Fine and Laurence Harris, *Re-Reading Capital* (London: MacMillan, 1978); Robert Rowthorn, 'Vulgar Economy,' *New Left Review* 86 (1974); Susan Himmelweit and Simon Mohun, 'The Anomalies of Capital,' *Capital and Class* 6, (1978) and Ben Fine, *Economic Theory and Ideology* (London: Edward Arnold, 1980).

4 Here and throughout this article, we consider only 'basic' sectors; i.e., those which produce

products which workers consume or inputs for those products; or inputs for inputs, *etc.*

5 We have argued that he did not, but this is irrelevant to the current discussion. See John Weeks, 'The Process of Accumulation and the "Profit Squeeze" Hypothesis,' *Science and Society* XLIII, 3 (Fall, 1979).

6 See Joseph Persky and Jose Alberro, 'Technical Innovation and the Dynamics of the Profit Role,' Chicago, University of Illinois, 1978, cited in Van Parijs (1980).

7 For a discussion of the historical development of competition, see James Clifton, 'Competition and the Evolution of the Capitalist Mode of Production,' *Cambridge Journal of Economics* (June 1977).

8 For an elaboration of this, see Fine and Harris, *Re-Reading Capital*, and John Weeks, *Capital and Exploitation* (London and Princeton: Edward Arnold and Princeton University Press, 1981), Chap. III.

9 Where *concentration* refers to the growth of individual capitals, and *centralization* involves the redistribution of capital among many capitals.

10 Roemer, *op.cit.*, p.388.

11 '... (in competition) all determinants appear in a position which is the *inverse* of their position in general. There price determined by labor, here labor determined by price, *etc.*, *etc.*' Karl Marx, *Grundrisse*, (New York: Vintage, 1973), p.657.

12 See Karl Marx, *Capital* (London and Moscow: Lawrence and Wishart and Progress Publishers, 1970), I, Chap. III; and Weeks, *Capital and Exploitation*, Chap. IV.

13 'In so far as actual payments have to be made, money does not serve as a circulating medium, but as the individual incarnation of social labor, as the independent form of existence of exchange value, as the universal commodity. This contradiction comes to a head in those phases of individual and commercial crises which are known as credit crises.' Karl Marx, *Capital*, I, p.137.

14 '(S)ince the circulation process of capital is not completed in one day but extends over a fairly long period until the capital returns to its original form, since this coincides with the period within which market-prices equalize with [prices of production], and great upheavals and changes take place in the productivity of labor and therefore also in the *real value* of commoditities...' Karl Marx, *Theories of Surplus Value*, II, (Moscow: Progress Publishers, 1968), p.495.

15 By this we mean uneven development, which results in a spectrum of techniques in use. This implies a momentary indeterminacy in normal conditions of production, which must be resolved by competition. See Section III.

16 'This difference in the behaviour of the elements of productive capital in the labor-process forms however only the point of departure of the difference between fixed and non-fixed capital, not this difference itself.' Karl Marx, *Capital*, II, (London and Moscow: Lawrence and Wishart and Progress Publishers, 1967), p.201.

17 'In the performance of its function that part of the value of an instrument of labor which exists in its bodily form constantly decreases, while that which is transformed into money constantly increases until the instrument of labor is at last exhausted and its entire value, detached from the corpse, is converted into money. Here the particularity in the turnover of this element of productive capital becomes apparent. The transformation of its value into money keeps pace with the pupation into money of the commodity which is the carrier of its value. But its conversion from the money-form into a use value proceeds separately from the reconversion of the commodities into other elements of their production and is determined by its own period of reproduction, that is, by the time during which the instrument or labor wears out...' *Capital*, III, p.166.

18 See *Capital*, II, p.249; Karl Marx, *Grundrisse*, p.446.