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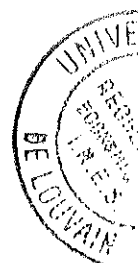
CONVULSIONS IN A SCIENTIFIC COMMUNITY

A rational reconstruction of the fall
of the theory of the falling rate of profit

par

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INTRODUCTION

1. Since the early seventies, there has been, in various parts of the advanced capitalist world, a remarkable revival of interest in Marxist economics, and particularly in Marxist crisis theory.* This has not only meant a renewed success for the ritual recitation of a handful of excerpts from 19th century books, rough drafts and letters. It has also induced an increasingly sophisticated critical examination and reformulation of the very core of Marxist economics. One of the most notable outcomes of this effort is the (final?) rejection of what many took to be the central element in Marxist crisis analysis : the so-called theory of the falling rate of profit.

This theory is here interpreted as consisting in the conjunction of the following three propositions (1) :

- (i) The capitalist mode of production is such that the organic composition of capital necessarily rises.
- (ii) A rise in the organic composition of capital necessarily leads to a fall in the (general) rate of profit.
- (iii) A fall in the (general) rate of profit necessarily leads to crisis.

From this conjunction it follows logically that :

- (iv) The capitalist mode of production is such that crises necessarily occur.

And the latter proposition can then be used both to explain and to predict crises as being intrinsic to the capitalist mode of production.

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- (1) Which means that the theory does not reduce to the vague claim that the behaviour of the rate of profit is decisive in the generation of crises. It may of course be possible to save the vague claim, while being forced to give up the theory.

2. The history of the theory can be very briefly sketched as follows. From the Grundrisse to the second volume of Theories of Surplus Value and the third volume of Capital, Marx seems to hold both a "classic" and an "anti-classic" theory of crises, which generations of Marxist scholars have tried to reconcile. Both theories are consistent with the central idea of historical materialism, according to which the fundamental contradiction of a mode of production (as manifested in crises) is one between the nature of the relationships of production and the development of the productive forces. The classic theory is inspired mainly by Ricardo (1817) and is claimed to hold true even under Say's law (which asserts that "supply creates its own demand"). It attributes the necessity of capitalist crises to the growth of constant capital (invested in means of production) relative to variable capital (invested in labour power), i.e., in the final analysis, to the rising exchange value of the means of production under capitalist relationships of production. Marx's anticlassic theory is inspired mainly by Sismondi (1820) and rests on the rejection of Say's law. It attributes the necessity of capitalist crises to the growth of the economy's production power (stemming from the accumulation of its means of production) relative to its consumption power (limited by the misery of its labour force), i.e., in the final analysis, to the rising use value of the means of production under capitalist relationships of production.

What the latter (anticlassic) theory exactly means, and how it relates to the former, need not concern us here (1). The former (classic) theory, on the other hand, is precisely the "theory of the falling rate of profit" to which this paper is devoted. Although its content now sounds very familiar, it is not until the 1930's that it came to constitute the core of the Marxist interpretation of crises. Earlier Marxist approaches rather tended to locate the origin of crises either in disproportionality (Tugan-Baranowski, Hilferding) or in underconsumption (Kautsky, Luxemburg). It is only with Grossmann's (1929 : ch.5) and Dobb's (1937 : ch.4) influential presentations, that a prominent place was given, in the explanation of crises, to the theory of the falling rate of profit. About at the same time, however, severely critical treatments of the theory by Moszkowska (1935 : ch.4), Sweezy (1942 : ch.6) and Robinson (1942 : ch.5) opened the modern debate, a "rational reconstruction" of which is proposed in this paper.

(1) Discussions of the various kinds of Marxist crisis theories and their relationships with each other can be found in Rosdolsky (1968 : ch.21, 27, 30-33), Mattick (1974 : ch.2), Itoh (1975, 1978a), Weisskopf (1978), Berger (1979).

3. To reconstruct a debate means to describe it in a simplified idealized way. To reconstruct it rationally means that the arguments actually put forward are selected, formulated and ordered in such a way that unnecessary assumptions, irrelevant remarks, terminological inconsistencies, confusions and misunderstandings are eliminated. In the following pages, clear formal statements of the various propositions and of their logical relationships with each other should help the reader check whether the proposed rational reconstruction is really "rational". And copious references should help him check whether it is really a "reconstruction".

What is the point, one may wonder, of reconstructing a debate, however rationally, rather than subjecting the issues it deals with to a straightforward discussion? Firstly, the theory to whose collapse the debate leads is still widely believed in. Often, in Marxist writings, its validity is simply taken for granted, whether in the explanation of crises or (as reactions against the tendency toward crises) in the explanation of State intervention or inflation (1). The reader, as a result, may well be among the believers and in need, therefore, of being persuaded that he is wrong. Now, the persuasive impact of reformulating the objectant's own argument as a step in the reasoning which leads to the conclusion one wishes to defend, is incomparably more irresistible than that of any other (argumentative) strategy I can think of. This is a first reason for proposing a reconstruction of the debate.

Secondly, some readers may be interested in tracing a not-too-shallow analogy between the debate surveyed here and the mediaeval discussion on rational proofs of the existence of God. In both cases, part of the scholars' job is to squeeze the desired conclusion out of plausible premises which do not entail it, or alternatively to smuggle unplausible claims into the premises of a valid argument. Beyond such an analogy, the kind of reconstruction proposed - however schematic it remains - may give some insight into the way "bad news" spreads and is resisted in a scientific community which is more exposed than many others to the pressure of "extra-theoretical" considerations.

(1) See typically Editorial Collective (1978 : 333), Boccara (1971 : 302), Poulantzas (1976 : 35-36), Bullock & Yaffe (1975 : 29). The theory also remains a fairly popular topic of dissertation, esp. in Germany : see e.g. Halbach (1972), Künzel (1976), Stamatidis (1977), Fahling (1977).

Thirdly and perhaps most importantly, such a reconstruction may prove useful for teaching purposes. By providing a systematic survey of the literature, it may help some students (and teachers) find their way in this frequently confusing area of the Marxist tradition.

Before entering the reconstruction proper, I shall briefly introduce a number of assumptions (and definitions) which are required in order to be able to conduct the whole discussion in a convenient way without missing the key issues, i.e. in order to be able to refer to a general rate of profit expressed in value terms.

I. BACKGROUND : THE EQUILIBRIUM RATE OF PROFIT

Chapter 1: The price rate of profit

1. The universe to which the following discussion applies is one in which there are two classes of agents : the capitalists, who own the means of production, and the workers, who own their labour power. The means of production - which embody dead labour and constitute constant capital - and the labour power - which produces living labour and constitutes variable capital - are the two kinds of productive forces (or inputs) which enter the production process. Their respective owners share the net output in the form of profits and wages. This corresponds to a first idealization : in our society, there are no independent producers, no landowners, no rentiers.

Further, we shall assume that

(A1) Capitalists do not consume *

This implies that all the goods produced in the economy fall into one of two categories : means of production or capital goods (K-goods) which are bought by the capitalists, and means of subsistence or wage goods (W-goods) which are bought by the workers. The economy can then (conceptually) be divided into two sets of industries which we shall call Department I

* In order to facilitate further reference, crucial propositions will be isolated and numbered. The letter before the number indicates whether the proposition is a definition (D), an assumption (A) or a theorem (T). No proofs will be given for the theorems, but only the numbers of the crucial propositions from which they follow.

(K-goods) and Department II (W-goods). In other words, if K-good industries are numbered from 1 to n and W-good industries from n+1 to m, the two departments are defined by :

$$(D2) \quad I = \{1, 2, \dots, n\} \quad \text{and} \quad II = \{n+1, n+2, \dots, m\}.$$

2. Further, we shall adopt the working day as the reference period for all flows, e.g. inputs, outputs, profits or wages. As far as the production process is concerned, this means that there may be a discrepancy between stocks and flows of means of production (or constant capital) and of labour power (or variable capital), i.e. constant and variable capital may not turn over in exactly one day. We shall assume, however, that workers are paid at the beginning of each one-day period, i.e. that the rate of turnover of variable capital (t_V) is equal to one (1) :

$$(A3) \quad t_V = 1. \quad (\text{Workers are paid daily})$$

The average rate of turnover of constant capital (t_C), on the other hand, is much more plausibly assumed to be smaller than one, as there is likely to be fixed capital (e.g. machines, buildings), i.e. constant capital that lasts for more than one period. Therefore :

$$(A4) \quad t_C < 1. \quad (\text{There is fixed capital})$$

The definitional relationships between the stock of labour power (L) and its flow (the number of workers, N, multiplied by the number of hours they work every day, T) and that between the stock of means of production (K) and their flow (k) are given by (2) :

$$(D5) \quad L = (N \cdot T) / t_V. \quad (\text{stock of labour power})$$

$$(D6) \quad K = k / t_C. \quad (\text{stock of means of production})$$

From the previous assumptions, it then immediately follows that :

$$(T7) \quad L = N \cdot T. \quad (\text{From 3, 5})$$

$$(T8) \quad K > k. \quad (\text{From 4, 6})$$

(1) It is also sometimes assumed (e.g. in Weisskopf 1978, or Armstrong & al. 1978a) that no variable capital is advanced, i.e. that workers are paid at the end of the period. Then A3 becomes : $t_V = \infty$. T7 becomes : $L = 0$. And the simplified definition of the rate of profit (T10) need not make any reference to variable capital in the denominator.

(2) In the general case, where there are various kinds of means of production and of labour power, K, L and N are all vectors. The following expressions then only make sense if t_C and t_V are general, not just average rates of turnover.

3. On this basis, it is possible to introduce a crucial variable (in any capitalist economy), the rate of profit (1). The latter is defined as the ratio of the flow of profits - i.e. the difference between the flow of receipts and the flow of (material and labour) costs - over the stock of (constant and variable) capital invested, expressed in price terms. Receipts are obtained by multiplying the daily real output (Y) by the price vector ($p = p_1, p_2, \dots, p_m$) ; material costs by multiplying the daily flow of means of production (k) by the price vector of department I ($p_I = p_1, p_2, \dots, p_n$) ; labour costs by multiplying the daily flow of labour power (N.T) by the corresponding unit price (2), i.e. the hourly money wage, or the daily money wage divided by the length of the working day (W/T) ; material investment by multiplying the stock of means of production (K) by the price vector of department I (p_I) ; and labour investment by multiplying the stock of labour power (L) by its unit price (W/T). By combining these various elements, we obtain the following definition of the (average) rate of profit (π), whether the unit of reference is a firm, an industry, a department or the whole economy :

$$(D9) \quad \pi = (p.Y - (p_I.k + W.N)/(p_I.K + (W/T).L). \quad (\text{rate of profit})$$

Taking the remarks about rates of turnover into consideration leads to the following slight simplification :

$$(T10) \quad \pi = (p.Y - (p_I.k + W.N))/(p_I.K + W.N). \quad (\text{From 7, 9}).$$

Chapter 2 : Value concepts

1. Goods are commodities when they are produced for exchange. Commodities have both a use value and an exchange value. The use value of a commodity is its ability to be used as a means of subsistence (for W-goods) or as a means of production (for K-goods). The exchange value of a commodity is the rate at which it is exchanged against other commodities.

(1) I am here taking for granted that the rate of profit has to be defined in the price system and not in the value system (as convincingly argued e.g. by Glyn 1972 : 101 and Morishima 1973 : 46-47, 57-58) and that it considers profits in relationship to the stock of capital advanced, not to the flow of capital used up (as convincingly argued e.g. by Robinson 1948 : 107-108 or Blaug 1962 : 208). Alternative definitions of the rate of profit are of course possible, but, I believe, less convenient for the purpose of our discussion.

(2) Also possibly a vector : see fn (2) p.5.

The (labour) value of a commodity is neither its use value nor its exchange value. It is the amount of labour time socially necessary to produce one unit of that commodity. More explicitly, the value (λ_i) of a commodity (i) is given by the sum of the amounts of each kind of means of production (a_{ji}) each multiplied by its unit value (λ_j) and of the amount of living labour (l_i) socially necessary to produce one unit of i :

$$(D11) \quad \lambda_i = \sum_j^n \lambda_j \cdot a_{ji} + l_i. \quad (\text{Definition of value})$$

This makes the value of a commodity equal to the sum of the socially necessary dead ($\sum \lambda_j \cdot a_{ji}$) and living (l_i) labour "embodied" in it. Given the division of the economy into two departments (D2), the value of each commodity in the economy is determined by the following system of equations :

$$(T12) \quad \begin{cases} \Lambda_I = \Lambda_I \cdot A_I + L_I \\ \Lambda_{II} = \Lambda_I \cdot A_{II} + L_{II} \end{cases} \quad (\text{From 2, 11})$$

where Λ_I is the vector ($\lambda_1, \dots, \lambda_n$), Λ_{II} the vector ($\lambda_{n+1}, \dots, \lambda_m$), L_I the vector ($l_1, \dots, l_n$) and L_{II} the vector ($l_{n+1}, \dots, l_m$), while A_I and A_{II} are matrices of dimensions $n \times n$ and $n \times (m-n)$ which indicate for any good i and any K-good j the amount of j which is socially necessary to produce one unit of i (1).

2. Two commodities, under capitalism, have a very special status, which makes them irreducible to K-goods of W-goods. The first one is money, the "general equivalent", whose use value is to be used as an exchange value. If we assume that money takes the form of an actual product, e.g. gold, rather than of fiat paper money or of credit, then it makes sense to define the (labour) value of money exactly like that of other commodities (D11) :

$$(D13) \quad \lambda_M = \sum \lambda_j \cdot a_{jM} + l_M.$$

(1) This definition of value, as well as the general format of the formalisms used, is very close to Morishima's (1973), which, with many slight variants, now seems to have become standard. As Cohen (1979 : section 2) correctly points out, however, this definition makes the label "labour theory of value" a misnomer : since it defines value in terms of labour, what it is the labour theory of, cannot be value.

In words : the value of one unit of money is equal to the amount of labour socially necessary to its production, whether indirectly $(\sum \lambda_j \cdot a_{jM})$ or directly (ℓ_M) .

The second special commodity is labour power. Its value cannot analogously be defined in terms of the required means of production and living labour. Rather, the amount of labour socially necessary to produce one unit of labour power, i.e. the ability to work for one hour, is given by the bundle of W-goods necessary for a worker's daily subsistence, with each of its components multiplied by the corresponding unit value and divided by the number of hours of work in a day. In other words, the (unit) value of labour power (λ_{LP}) is defined by :

$$(D14) \quad \lambda_{LP} = (\Lambda_{II} \cdot B)/T, \quad (\text{The value of labour power})$$

with $\Lambda_{II} = (\lambda_{n+1}, \dots, \lambda_m)$ giving the unit values of the various W-goods, with $B = (b_{n+1}, \dots, b_m)$ giving the subsistence level of consumption of the various W-goods, and with T being the length of the working day.

3. The definition of value adopted above (D11), if it is to make sense, requires us to make a number of assumptions. First of all, in order to be able to talk about the amount of living labour (ℓ_i) , we must assume that :

(A15) Labour power is homogeneous,

or that all labour is simple labour. Secondly, in order to be able to speak unequivocally of the amounts of means of production (the a_{ji} 's) and of living labour (ℓ_i) socially necessary to produce one unit of i , we must assume that :

(A16) The technological coefficients are uniform,

or that there is no variation in the technique used at a given level of technical progress. Thirdly, in order to avoid paradoxes arising from the non-additiveness of values determined according to the above algorithm (D11), we must assume that :

(A17) There is no joint production,

or that production processes can be distinguished in such a way that only one commodity, and no by-product, is produced by any one of them. Finally, in order to enable the technological coefficients to catch most of the social labour, we must assume that :

(A18) Technological labour is quantitatively negligible, or that the kind of labour which brings about changes in the technological coefficients, and is only required on a once-for-all basis for the production of a given type of commodities, represents a much smaller amount than the kind of labour that is required on a permanent basis to produce a given type of commodities according to a given technique (1).

4. After having defined the concept of value and specified the conditions under which it can be used, we can now introduce the value concepts of constant and variable capital. The stock of constant capital (C) is given by the sum of the (physical) stocks of the various kinds of means of production, each multiplied by the corresponding unit value :

$$(D19) \quad C = \Lambda_I \cdot K, \quad (\text{stock of constant capital})$$

where $\Lambda_I = (\lambda_1, \dots, \lambda_n)$ and $K = (K_1, \dots, K_n)$. The flow of constant capital (c) is given by the same expression, except that physical stocks are replaced by (daily) physical flows :

$$(D20) \quad c = \Lambda_I \cdot k, \quad (\text{flow of constant capital})$$

where $\Lambda_I = (\lambda_1, \dots, \lambda_n)$ and $k = (k_1, \dots, k_n)$.

Analogously, the stock of variable capital (V) is given by the stock of labour power (L) multiplied by its unit value (λ_{LP}) :

$$(D21) \quad V = \lambda_{LP} \cdot L. \quad (\text{stock of variable capital})$$

And the flow of variable capital (v) is given by the (daily) flow of labour power (N.T) once again multiplied by its unit value (λ_{LP}) :

$$(D22) \quad v = \lambda_{LP} \cdot N \cdot T, \quad (\text{flow of variable capital})$$

where N is the number of workers and T the length of the working day. If we take into account the convention about rates of turnover (A3) and the definition of the value of labour power (D14), we can derive :

$$(T23) \quad V = v = \Lambda_{II} \cdot B \cdot N, \quad (\text{From 7, 14, 21, 22})$$

i.e. the stock and the flow of variable capital are both equal to the value of the daily subsistence bundle, multiplied by the number of workers.

(1) Useful discussions of the first three conditions can be found in Morishima (1973 : ch. 14), Steedman (1977 : ch. 6-8, 10-13), Armstrong & al. (1978 : section 1) or Morishima & Catephores (1978 : ch.2). The fourth condition, usually ignored in economic literature, is stressed e.g. by Habermas (1963 : 255-261).

5. Finally, we introduce the concept of the organic composition of capital (or OCK), which will be used here in a systematically ambiguous way to refer either to the value composition of capital (or VCK) or to the ratio of dead to living labour (or RDL) (1). The value composition of capital (q) is the ratio of the stock of constant capital to the stock of variable capital, i.e. :

$$(D24) \quad q = C/V \quad (\text{Definition of the VCK})$$

The ratio of dead to living labour (r), on the other hand, is the ratio of the stock of constant capital to the stock of labour power, i.e. :

$$(D25) \quad r = C/L \quad (\text{Definition of the RDL})$$

By virtue of the assumption about the rate of turnover of labour power (A3), these definitions can be transformed into :

$$(T26) \quad q = C/(\Lambda_{II} \cdot B \cdot N), \quad (\text{From 23, 24})$$

$$(T27) \quad r = C/(N \cdot T). \quad (\text{From 7, 25})$$

The relationship between the two interpretations of the organic composition is then given by :

$$(T28) \quad q/r = T/(\Lambda_{II} \cdot B), \quad (\text{From 26, 27})$$

i.e. the VCL is to the RDL as the number of hours in a working day are to the number of hours required to produce a worker's daily subsistence.

(1) The reader surely knows Marx's (1867 : 641) rather tricky definition of the organic composition of capital. The VCK-interpretation of the OCK as C/V is the standard one (e.g. Mandel 1962 : I, 195-196 or 1964 : 49), sometimes with a $C/(C+V)$ variant (e.g. Sweezy 1942 : 66, Samuelson 1972 : 54). The RDL-interpretation of OCK as $C/(v+s)$, though already present in Moszkowska (1935 : 52) or Okishio (1961 : 87), has only recently become very popular (e.g. Purdy 1973 : 18, Cogoy 1973 : 56-58, Hodgson 1974 : 61, 80-81, Wright 1975 : 13, Shaikh 1978a : 233), sometimes with a C/N or $C/(N.T)$ variant (e.g. Okishio 1972 : 3-4, Robinson 1978 : 6). All these variants are roughly equivalent because $v+s$, N and $N.T$ are all indicators of the flow of living labour (or of net output in value terms) for a given period. Again, since our concerns are not exegetical, the question of which definition should be chosen is purely a matter of convenience.

Chapter 3 : The value rate of profit

1. We must now move from these value concepts to the law of value. In order to do so, we must introduce further specifications about the two classes of economic agents and the way they interact on the market. Firstly, let us assume that :

(A29) The economy is perfectly competitive,
i.e. that both capital and labour consist in small unorganized units, fully mobile and fully informed. Secondly, suppose that :

(A30) Capitalists maximize profits (given the capital available), which implies that there is a tendency for a general (or uniform) equilibrium rate of profit (π^*) to emerge, as a result of capital movements towards industries yielding a higher rate of profit :

(T31) π^* tends to emerge. (From 29,30)

Thirdly, we shall suppose that :

(A32) Workers maximize their earnings (with a given working day), which implies that there is a tendency for a general (or uniform) equilibrium wage rate (W^*/T) to emerge, as a result of labour migration towards industries offering higher wages, i.e. :

(T33) W^*/T tends to emerge. (From 29,32)

Finally, the situation on the labour market is assumed to be dominated by the fact that :

(A34) There is permanently a large reserve army of unemployed, i.e. the supply of labour power is permanently much larger than demand for it (1).

To these four institutional assumptions which further specify the characteristics of an idealized capitalist economy, we must now add a very unrealistic, but highly convenient "technical" assumption :

(1) The compatibility between profit-maximizing perfect competition (A29-30) and the permanence of a large reserve army (A34) is guaranteed by the assumption of fixed coefficients (A16). I shall here ignore the objection that, as soon as more realistic production functions are assumed, involuntary unemployment is incompatible with competitive equilibrium (see Samuelson 1957 : 908-911).

(A35) The VCK is the same in all industries (1).

2. Assuming the existence of (only) two classes and assuming the conditions for a meaningful use of the concept of value (A15-18), perfect competition between profit-maximizing capitalists and between earnings-maximizing workers must lead, providing VCK's are equal, to the following relationship :

(T36) For all i, j , $p_i^*/p_j^* = \lambda_i/\lambda_j$, (From 29, 30, 32, 35)

where $p_{i,j}^*$ and $\lambda_{i,j}$ are, respectively the equilibrium (or market-clearing) price and the (labour) value of one unit of commodity i,j . This relationship, which states the proportionality between equilibrium prices and values, I shall call the relative law of value.

As we have assumed that it makes sense to speak of the labour value of money (D13), the same premises also imply a theory of absolute prices, not only of relative prices, in the form of the following relationship:

(T37) For all i , $p_i^* = \lambda_i/\lambda_M$, (From 29, 30, 32, 35)

i.e. the number of units of money for which one unit of commodity i is exchanged in a market-clearing situation is equal to the ratio of the unit value of i to the unit value of money. This proposition I shall call the

(1) The assumption of equal VCK's (A35), on the background of the other assumptions introduced previously, can be shown to be a necessary and sufficient condition for the simple value formulation of the equilibrium rate of profit (T44) (see Morishima 1973 : 69-70, 74-76). Apart from this case (A35) and the case of simple commodity production (where the rate of profit is zero), however, there are other assumptions - e.g. Samuelson's (1971) condition of "equal internal compositions of capital" or Morishima's (1973 : ch.6) condition of "golden equilibrium balanced growth" - which would have served equally well the purpose of guaranteeing (jointly with the previous institutional assumptions) that $\pi^* = s/(C+V)$ (T44). However, since they are either even less plausible (as is Samuelson's assumption) or considerably more complicated to explain (as is Morishima's), while at the same time failing to entail the proportionality of prices to values (T36), the choice of assumption A35 (equal VCK's), however restrictive, seemed the most convenient one to make. This involves no serious bias in the discussion of the falling rate of profit, since both proofs and refutations (in so far as they are formulated in value terms) generally assume equal VCK's (as emphasized e.g. by Hodgson 1974 : 56-57, Steedman 1977 : 117, or in the editors' footnote to Okishio 1978 : 95). The only major exception, as far as I know, is Morishima's (1973 : 142-144) "first rigorous proof of the law", which assumes "golden equilibrium balanced growth".

absolute law of value (1).

These two "laws of value" are about prices. If we add to the previous premises the assumption of a large reserve army (A34), we also get a theory of wages :

$$(T38) \quad W^*/T = \lambda_{LP}/\lambda_M, \quad (\text{From } 29, 30, 32, 34, 35)$$

i.e. the equilibrium money wage rate (per hour) is equal to the unit (or hourly) value of labour power divided by the unit value of money. Let us define the equilibrium (daily) real wage (w^*) by

$$(D39) \quad W^* = p_{II}^* \cdot w^* \quad (\text{Definition of } w^*)$$

where W^* is the equilibrium (daily) money wage and where $p_{II}^* = (p_{n+1}^*, \dots, p_m^*)$ and $w^* = (w_{n+1}^*, \dots, w_m^*)$ are vectors of equilibrium prices and equilibrium consumptions of W-goods, respectively. The above theory of wages (T38) can then be expressed more simply in real terms :

$$(T40) \quad w^* = B, \quad (\text{From } 14, 37, 38, 39)$$

i.e. the equilibrium real wage is the subsistence bundle. This proposition, whether in its nominal (T38) or real (T40) formulation, I shall call the wage law of value (2).

(1) When a metallic currency is debased, i.e. when several ($p_M > 1$) units of the (nominal) currency correspond to one unit of the (real) precious metal, the absolute law of value (T37) must be modified as follows : $p_i^* = (\lambda_i/\lambda_M) \cdot p_M$, or the equilibrium price of i (p_i^*) is equal to its value (λ_i) multiplied by the "monetary expression of value" (p_M/λ_M) (see e.g. Gouverneur 1978 : 35-39). Another way of making the same point is to say that, when a metallic currency is debased, the unit price of the money commodity is not 1 (as assumed in T37) but p_M . Applying the relative law of value (T36) then yields : $p_i^*/p_M = \lambda_i/\lambda_M$ for any commodity i , which is equivalent to the above formula. However, as p_M is normally not determined by market mechanisms, it seems more reasonable to abandon the labour theory of value as a theory of absolute prices and to restrict its relevance to the determination of the relative prices of commodities.

(2) Whereas the notion of an equilibrium price is fairly straightforward (something like : the lowest price which clears the market), that of an equilibrium wage is problematic in a Marxian framework. For the equilibrium wage rate cannot be the lowest one which clears the market (as it would be in a neo-classical framework) : with a permanent reserve army, the labour market is never cleared. What is it then that prevents the equilibrium real wage from falling below a certain level ? If the Malthusian demographic mechanism is rejected, as Rowthorn (1978 : section 3) points out, there is only one solution left : Trade Union bargaining. This introduces an (awkward) non-competitive element into an otherwise fully competitive theoretical framework.

3. Let us now return to our last expression for the rate of profit (T10). Substituting value for price and wage magnitudes leads to the following determination of the emerging equilibrium rate of profit, under conditions in which the law of value holds true :

$$(T41) \quad \pi^* = \frac{(\Lambda.Y)/\lambda_M - (\Lambda_I.K)/\lambda_M - (\lambda_{LP}.N.T)/\lambda_M}{(\Lambda_I.K)/\lambda_M + (\lambda_{LP}.N.T)/\lambda_M} . \quad (\text{From } 10, 37, 38)$$

As the value of money (λ_M) appears in every term of this expression, it can be eliminated - which shows, incidentally, that in order to derive this result we do not need the absolute law of value (T37) : the relative law (T36) is enough.

Let us then define the (daily) flow of surplus value (s) as what is left of the value of the (daily) gross product ($y = \Lambda.Y$) after the deduction of the (daily) flows of constant and variable capital (c and v) :

$$(D42) \quad y = c + v + s \quad (\text{Definition of } s)$$

Replacing y, c and v by their definitions leads to the following, more explicit expression for the flow of surplus value :

$$(T43) \quad s = \Lambda.Y - \Lambda_I.K - \lambda_{LP}.N.T \quad (\text{From } 20, 22, 42)$$

If we compare this result with the expression for the equilibrium rate of profit (T41), the following relationship between rate of profit and surplus value becomes apparent :

$$(T44) \quad \pi^* = s/(C+V), \quad (\text{From } 41, 43, 19, 21, 7)$$

i.e. the equilibrium general rate of profit, in a situation which meets all the conditions both for the use of the concept of value and for the validity of the law of value, is given by the amount of surplus value produced (daily) over the stock of (constant and variable) capital advanced.

As the whole subsequent discussion is conducted in terms of such a value rate of profit, its relevance is in principle restricted to situations in which the latter coincides with the actual rate of profit, i.e. to situations in which all the assumptions introduced so far (or alternative sets of assumptions which perform the same job) are at least approximated. Firstly, however, many of the subsequent arguments can

also (though less simply) be formulated in situations where proposition T44 does not hold (1). And secondly, as the conclusion we shall eventually reach is a negative one, there is little harm in taking an ideal case very favourable to the theory.

After having set out the background, we now turn to the substantive discussion.

II. THE TRADITIONAL DEBATE : NECESSITY VERSUS CONTINGENCY

Chapter 4 : The rise in the organic composition of capital

1. Depending on how the organic composition of capital is interpreted - as the value composition of capital (D24) or as the ratio of dead to living labour (D25) -, the first two propositions of the theory (i and ii on p.1 above) can be defended in two different versions. The first way (in terms of VCK), I shall call the textbook variant of the theory (2). The second version (in terms of RDL), I shall call the modern variant (3). Let us start by considering the difficulties encountered in establishing proposition (i) - which states that, in the capitalist mode of production, the organic composition of capital necessarily rises - within the framework of either variant of the theory.

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- (1) The relationship between the organic composition and the rate of profit under less restrictive conditions (than those required for T44 to hold) is explored e.g. by Medio (1972 : 339-340), Holländer (1973 : 19), Armstrong (1975 : 8-10), Steedman (1977 : 129-132).
 - (2) The textbook variant is the one Marx clearly uses in his most explicit formulation of the theory (1894 : 221-224). In various formulations, it also appears e.g. in Sweezy (1942 : 96-97), Robinson (1942 : 35-36), Meek (1960 : 129-130), Mandel (1962 : I, 210-215), Samuelson (1972: 54), Salama & Valier (1973 : 108-113), Bullock & Yaffe (1975 : 19-20), Gamble & Walton (1976 : 129-130), Groupe Yenan (1976 : 16-17), Hussain (1977 : 452), Théret & Wiewořrka (1978 : 35), Gouverneur (1978 : 168-170),...
 - (3) That Marx had this second, modern variant of the theory in mind is defended e.g. by Rosdolsky (1956: 209-215) and Bader & al. (1975: 398-399). Passages particularly favourable to this interpretation are Marx (1858: 635-636, 643, 653) and Marx (1894: 223, 226). The underlying reasoning is present in Rosdolsky (1956), Dickinson (1957), Meek (1960), Okishio (1961), Mage (1963). It received its definitive, most elegant formulation from Okishio (1972), and has since tended to become standard : see e.g. Glyn (1972: 100-101), Purdy (1973: 17-20), Hodgson (1974 : 80-82) Himmelweit (1974: 2), Holländer (1974: 113-114), Itoh (1975: 6), Wright (1975: 13-16), Glombowski & al. (1975: 40-41), Bechler (1975: 169-174), Bader & al. (1975: 401-405), Fahling (1977: 313-317), Okishio (1978: 95-96), Shaikh (1978a: 233 & 1978b : 239), etc.

2. The first crucial proposition, on which both variants rely, asserts a rise in the technical composition of capital (TCK). The technical composition of capital (t) is the ratio of the stock of means of production (the vector K) to the stock of labour power (L) :

$$(D45) \quad t = K/L, \quad (\text{Definition of TCK})$$

which, given our assumption about rates of turnover (A3), is equivalent to :

$$(T46) \quad t = K/(N.T). \quad (\text{From 7, 45})$$

Now, if we can make it plausible that, under capitalism, technical progress necessarily tends to be labour-saving, i.e. that the mass of means of production necessarily grows faster (or falls less) than the amount of labour employed, or *

$$(A47) \quad \dot{K} > \dot{N} + \dot{T}, \quad (\text{Labour-saving technical progress})$$

then it directly follows that, under capitalism, the TCK must rise (1) :

$$(T48) \quad \text{The TCK rises.} \quad (\text{From 46, 47})$$

However, why should individual profit-maximizing capitalists necessarily prefer to save labour (i.e. to reduce, comparatively, $N.T.$) rather than to save "capital" (i.e. to reduce comparatively K) ? The standard argument in support of this view is that, if the economy grows substantially faster than the potential labour force - a plausible assumption to make under capitalism -, then labour-saving technology must be an intrinsic feature of the system (if it is to keep growing), whereas capital-saving technology is not. However, it is a logical fallacy to infer from the fact that some feature x is necessary while another feature y is not, to the necessity of having more of x than of y . While there are good reasons why the capitalists should try to economize on labour, there are no good reasons (once K has ceased to be negligible) why they should economize on labour more than on (constant) capital. In the course of capitalist development, the balance of labour-saving and capital-saving innovations may be such that A47 (and therefore T48) holds. But this would be a

(*) Pointed variables represent rates of growth : e.g. $\dot{K} = (dK/dt)/K$. The growth rate of a product is the sum of the growth rates of its factors : e.g. $(N.T) = \dot{N} + \dot{T}$.

(1) Strictly speaking, the TCK will, in general, neither rise nor fall, but the $K/(N.T)$ vector will rise in some of its components and fall in others: e.g. more electricity but fewer pit ponies per man-hour (see e.g. Steedman 1977 : 132). However, it is convenient (and common practice) to suppose that some index of the mass K of means of production can be used, in such a way that the TCK can be considered as a scalar magnitude which will, generally, either rise or fall.

contingent fact, not one stemming from the nature of the capitalist mode of production (1).

3. Suppose, however, for the sake of the argument, that under capitalism the TCK necessarily rises. This still does not mean that the OCK must rise. For the textbook variant, however, which interprets OCK as VCK, the additional step is fairly easy to make. If we use λ_I and λ_{II} as indexes for the values in Departments I and II respectively, the definitions of TCK (D45) and VCK (D24) yield the following relationship:

$$(T49) \quad q = (\lambda_I / \lambda_{II}) \cdot (T/B) \cdot t. \quad (\text{From 24, 19, 23, 46})$$

Now, it seems fairly plausible to assume that values in the two departments are unlikely to diverge (substantially) i.e.

$$(A50) \quad \lambda_I / \lambda_{II} = \text{constant}, \quad (\text{"Unbiased" technical progress})$$

which is another way of saying that productivity trends are (about) the same for K-goods and for W-goods (2). It may seem much less plausible to assume that the hourly real wage (B/T) does not grow. However, as will be argued below (ch.5), it makes sense to suppose, for the sake of the argument, that the hourly real wage remains (approximately) constant, i.e.

$$(A51) \quad B/T = \text{constant}. \quad (\text{Constant hourly real wage})$$

(1) The above argument purporting to show the necessity of predominantly labour-saving technical change is most explicitly given by Yaffe (1972 : 21). The fact that a secular rise in the TCK was asserted by Marx (as evidenced e.g. by Fahling 1977 : 327-329) and that it has actually been observed in capitalist economies (as argued e.g. by Mattick 1969 : 87-88, Cogoy 1973 : 62-63, Fahling 1977 : 321-325) is obviously irrelevant here. The point that a rising TCK is just a contingent fact (at least after the "transition from manufacture to machinofacture") is argued, along the lines sketched in the next, e.g. by Lange (1935 : 84-85), Robinson (1942 : 35-36 ; 1948 : 114-115, 1956 : 170, 1966 : XIII), Samuelson (1948 : 749-750), Blaug (1960 : 234-243), Güsten (1960 : 83-85), Dobb (1973 : 157), Hodgson (1974 : 60-62), Wright (1975 : 17-18, 34), Sweezy (1973 : 45-46, 49). An alternative line of argument, in terms of a conflict between the capitalists' collective and individual rationality, is adopted by Elster (1978 : 100-102). But even if capitalists acted as a class, rationality would not imply the predominance of labour-saving technical change.

(2) This assumption is discussed e.g. by Glyn (1972 : 95), Morishima (1973 : 34-35), Shaikh (1978b : 250-251). Part of the plausibility of this assumption derives from the fact that, even if productivity trends in K-goods and W-goods plants tend to diverge, this divergence is kept in check by the fact that any productivity increase for K-goods implies a productivity increase for W-goods (through a reduction in the amount of dead labour required).

Given these two additional assumptions, the necessity of a rise in TCK implies the necessity of a rise in VCK (1) :

(T52) The VCK rises. (From 48, 49, 50, 51)

In other words, as far as the textbook variant is concerned, proposition (1) is established (2).

4. The step which the modern variant must take (beyond T48) is very different. As it interprets the OCK as RDL, the relevant connection between OCK and TCK is now given by :

(T53) $r = \lambda_I \cdot t$. (From 25, 19, 45)

Whether or not a rising TCK implies a rising OCK now depends on the trend in the values of K-goods, i.e. on the productivity trend in Department I (2). Suppose that the level of productivity in Department I (represented by $1/\lambda_I$, where λ_I is an index of unit values in I) is an increasing function of the TCK (represented by some scalar index τ) :

(A54) $1/\lambda_I = f(\tau)$, with $df/d\tau > 0$. (TCK-determination of productivity)

Suppose further that the impact of the TCK on productivity decreases as both increase, i.e. that :

- (1) Which must also be assumed to be necessary features of a capitalist economy. Otherwise, the logical inference (from T48 to T52) which they make possible does not transform the necessity of a rising TCK into the necessity of a rising VCK (in a capitalist mode of production).
- (2) There have been attempts at short-circuiting the argument by skipping the TCK intermediary and dealing straight away with the necessity of a rising VCK. For instance, Bullock & Yaffe (1975 : 18-19) and, in a more sophisticated way, Bader & al. (1975 : 420-459) claim to derive the rise in the VCK from the concept of capital itself, defined as self-expanding value. Their argument runs roughly as follows. First, with a given labour force (N) and a given length of the working day (T), the amount of living labour employed is necessarily limited. As a consequence, with a fixed rate of turnover of variable capital (t_V), the value of the stock of variable capital can only decrease, as productivity improves and depresses its unit value (λ_{LP}). This implies that, if (constant plus variable) capital is to grow in value terms, there is only one way in which it can do so : through an increase in constant capital (dead labour) which more than offsets the fall in variable capital (the value of living labour). Hence the logical necessity of a rising VCK. This provides a good example of how heavy assumptions can be quietly smuggled in, in the guise of innocent-looking definitions.
- (3) This is the old "cheapening of the elements of constant capital" countertendency, mentioned by Marx (1867 : 651-652, 1894 : 245-246) and discussed (as an objection or as a difficulty) e.g. by Mandel (1962: I, 213-214), Glyn (1972: 95, 1973:104), Murray (1973: 74), Hodgson (1974: 64-65), Hussain (1977: 447-449), Harrison (1978: 116), Shaikh (1978a: 234). Note that, strictly speaking, this countertendency is only relevant when the OCK is interpreted as RDL, not when it is interpreted as VCK.

(A55) $df/d\tau < f/\tau$. (1) (Falling "marginal productivity")

In such circumstances, it is correct to infer that the development of productivity in Department I cannot offset the rise in TCK :

(T56) $(1/\lambda_I) < \tau$. (From 54, 55)

This is exactly equivalent to saying that :

(T57) $\lambda_I \cdot \tau$ rises. (From 56)

And replacing indexes by vectors then yields :

(T58) The RDL rises. (From 53, 57)

In other words, as far as the second variant is concerned, proposition (i) is established (2).

Here again, however, and even more than in the case of the rise in TCK, the problem is to show the (capitalist) necessity of the assumptions. No argument can make the required technological fact (that the "marginal productivity" of TCK-increasing technical progress tends to fall) more than a contingent fact of capitalism - if it is a fact at all.

5. For the sake of the argument, however, let us suppose that, in addition to the necessity of a rising TCK (T48), we can take for granted the necessity of equal productivity increases in both departments (A50) and of a non-increasing hourly real wage (A51) (textbook variant), as well as the necessity of a falling "marginal productivity" of technical progress (A55). Let us suppose, in other words, that the capitalist mode of production is such that both the VCK and the RDL necessarily rise. Does this imply that the rate of profit must fall? This question takes us from the discussion of proposition (i) to that of proposition (ii) : a rise in the organic composition of capital necessarily leads to a fall in the (general) rate of profit.

(1) This formulation is indirectly suggested by Lebowitz (1976 : 252-253), who shows that, if productivity is a linear function of TCK (i.e. if $df/d\tau = f/\tau$), a rising TCK leaves the RDL unchanged, while (paradoxically) depressing total capital per worker $((C+V)/N)$.

(2) Arguments of a similar type are presented by Glyn (1972: 95-98) and Stamatidis (1976a: 80, 1976b: 106-107). Alternatively but (nearly) equivalently, the necessity of a rise in the RDL (or, as we shall see, in the maximum rate of profit) can also be derived from the necessity of mechanization, defined as technical progress which increases the amount of machinery per unit of output (not only per man), without

Chapter 5 : The fall in the equilibrium rate of profit

1. Even in the absence of any other downward pressure, proposition (ii) claims, the general rate of profit will fall if the organic composition of capital rises. We must therefore start by assuming away the possibility of alternative downward pressures. In order to do so, let us first reformulate more explicitly the value rate of profit (T44).

First, the value of one unit of a commodity i can be expressed as :

$$(T59) \quad \lambda_i = c_i + \ell_i, \quad (\text{From 11, 20})$$

where c_i is the constant capital and ℓ_i the living labour socially necessary to produce one unit of i . By multiplying unit values by the (daily) real output, one obtains :

$$(T60) \quad y = c + N \cdot T, \quad (\text{From 59})$$

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decreasing the amount of other material inputs per unit (see e.g. Purdy 1973: 19, Schefold 1976, Shaikh 1978b : 239-240). The quasi-equivalence between this approach and that adopted in the main text (in terms of TCK and λ_i) can be sketchily shown as follows. Asserting that the mass of means of production per unit of output (K/Y) is growing, i.e. that mechanization occurs, is equivalent to asserting that the mass of means of production per manhour ($K/(N \cdot T) = TCK$) is growing faster than the number of units of output per man-hour ($Y/(N \cdot T)$). Since the latter magnitude (number of units per hour) is identical to the reciprocal ($1/\lambda$) of the "representative value" (number of hours per unit), the difference between the two approaches can be indicated as follows. Our condition T56 (necessary and sufficient for the RDL to rise) stipulates that the TCK rises faster than the average productivity for K-goods ($\tau > (1/\lambda_I)$). The mechanization condition (sufficient, not necessary, for the RDL to rise) stipulates that the TCK rises faster than the average productivity for K-goods and W-goods ($\tau > 1/\lambda$). Since productivity increases in I are reflected in II but not the other way round, the rate of increase in total productivity ($1/\lambda$) must be at least as high as the rate of increase in productivity in I ($1/\lambda_I$), and therefore less likely to be smaller than the rate of increase in TCK (τ). In other words, the mechanization condition is more difficult to meet, or stronger, than condition T56 : all cases of mechanization satisfy T56, but not all cases which satisfy T56 are cases of mechanization (cf. a rise in RDL resulting from a reduction of labour coefficients in II, without any change in the mass of means of production per unit).

where $y (= \Lambda \cdot Y)$ is the (daily) output in value terms, c the (daily) flow of constant capital, and $N \cdot T$ the (daily) flow of living labour. If we compare this expression with the definition of surplus value (D42), we immediately obtain :

$$(T61) \quad N \cdot T = v + s, \quad (\text{From } 42, 60)$$

i.e. the number of hours worked per day ($N \cdot T$) is equal to the sum of the daily flows of variable capital (v) and surplus value (s). Replacing v by its definition (D22) then leads to the following expression for s :

$$(T62) \quad s = (T - \Lambda_{II} \cdot B) \cdot N,$$

i.e. the daily flow of surplus value is equal to the number of workers (N) multiplied by the difference between the total length of the working day (T) and the part of it which is necessary to produce a worker's subsistence bundle ($\Lambda_{II} \cdot B$).

On this basis, we can reformulate as follows the equilibrium rate of profit :

$$(T63) \quad \pi^* = (T - \Lambda_{II} \cdot B) / (\Lambda_I \cdot K/N + \Lambda_{II} \cdot B), \quad (\text{From } 44, 62, 19, 21)$$

which can also be transformed so as to make apparent the influence of the VCK (q) or of the RDL (r) :

$$(T64) \quad \pi^* = (T - \Lambda_{II} \cdot B) / ((\Lambda_{II} \cdot B) \cdot (q+1)), \quad (\text{From } 63, 24)$$

$$(T65) \quad \pi^* = (T - \Lambda_{II} \cdot B) / (r \cdot T + \Lambda_{II} \cdot B). \quad (\text{From } 63, 27)$$

The last two formulas make it clear that the size of the labour force (N) and the values of K-goods (Λ_I), which appear in the preceding, more explicit expression (T63), do not exert any influence on π^* independently from the influence they exert on the OCK (q or r). Apart from a rise in the OCK (q or r), therefore, we are left with three potential sources of downward pressure on the equilibrium rate of profit : a fall in the length of the working day (T), a rise in the real wage (B) and a rise in the values of W-goods (Λ_{II}).

2. The first two of these factors are typically stressed in a profit squeeze approach to the falling rate of profit (1). We want to discard them because what our theory asserts, in its proposition (ii), is that : even if the (nominal) length and the intensity (2) of the working day are not pushed down nor the real wage pushed up by working class resistance, the rate of profit will still fall as a reflection of a rising organic composition of capital. We must therefore assume , for the sake of the argument (3) :

- | | |
|----------------------|--|
| (A66) T is constant, | (constant length and intensity of the working day) |
| (A67) B is constant. | (constant subsistence real wage). |

The third factor (rising Λ_{II}) is the one picked up in the Ricardian account of a falling rate of profit in terms of declining productivity for agricultural products (4). Marx emphatically rejected this account on the grounds that, under capitalism, productivity keeps rising.

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- (1) See e.g. Glyn & Sutcliffe (1972) or Boddy & Crotty (1974, 1975). The primary emphasis, both in a secular and in a cyclical perspective, is of course on the increase in the real wage, whether interpreted as an increase in the "historical subsistence level" or as a deviation from it due to the growth of working class power.
- (2) Although it is sometimes assimilated to a fall in productivity, i.e. in the amount of relative surplus value (e.g. Groupe Yenan 1976 : 17-18), a fall in the intensity of the working day (a rise of its "porosity") is here considered as a reduction in its actual length, i.e. as a fall in the amount of absolute surplus value produced (as argued convincingly e.g. by De Vroey 1977 : 35-36, and in spite of Marx's ambiguous remarks on the matter : see 1867 : 547-548). Such a fall is sometimes emphasized as an important aspect of the profit squeeze (see e.g. Crotty & Rapping 1975 : 463-464, Weisskopf 1978 : 248).
- (3) This is the promised justification for assuming a constant B/T (A51).
- (4) See Ricardo (1917: 71-74). In spite of Marx's (1863: 440-470) severe critique, this type of account (in terms of falling productivity) is occasionally revived, e.g. with an emphasis on the growing costs of distribution, advertissing, etc. (e.g. Shibata 1939: 55) or on the exhaustion of the world's natural resources (e.g. Steedman 1977: 129).

His claim - the claim of proposition (ii) - is that, although productivity keeps increasing (i.e. values keep falling), the rate of profit must fall when the organic composition of capital rises. We can therefore assume as a reasonable empirical claim :

$$(A68) \quad \lambda_I \text{ and } \lambda_{II} \text{ fall,} \quad (\text{rising productivity})$$

where λ_I and λ_{II} are indexes of the values of K-goods and W-goods, respectively.

After having thus ruled out all alternative sources of downward pressure on the equilibrium rate of profit (1), we can now turn to a critical examination of proposition (ii), i.e. to the question : why should a rise in the organic composition of capital necessarily lead to a fall in the equilibrium rate of profit ? As in the case of proposition (i), let us take first the textbook variant and then the modern one.

3. The textbook variant can most conveniently be formulated in terms of the concept of rate of exploitation (e), defined by

$$(D69) \quad e = s/v, \quad (\text{Definition of the rate of exploitation})$$

i.e. the rate of exploitation is the ratio of the (daily) flow of surplus value to the (daily) flow of variable capital. Using this definition leads to the following transformation of the relationship between rate of profit and VCK given previously (T64) :

$$(T70) \quad \pi^* = e/(q+1), \quad (\text{From 64, 62, 23, 69})$$

i.e. the equilibrium rate of profit is equal to the rate of exploitation divided by the VCK plus one. Bearing in mind that the discussion of proposition (i), in its textbook variant, is supposed to have established that the VCK must rise (T52), it is obviously enough to assume the constancy of the rate of exploitation, or

$$(A71) \quad e \text{ is constant,} \quad (\text{constant rate of exploitation})$$

in order to be able to assert that the equilibrium rate of profit must fall :

- (1) The factors considered here obviously do not exhaust all possibilities, as far as falls in the actual rate of profit are concerned. Overproduction, in particular, whatever its form (absolute lack or misallocation of effective demand) and its ultimate cause (underconsumption, overaccumulation, etc.), cannot but induce - other things remaining equal - a fall in the average rate of profit. But this is only because, due to the accumulation of unsold commodities, the latter falls below the equilibrium rate of profit, the only one considered in the text.

(T72) π^* falls.

(From 70, 52, 71)

The trouble, however, is that we cannot legitimately make this assumption (A71), because it contradicts the conjunction of the three previous assumptions we have just made (A66-68). This is made obvious when the definition of the rate of exploitation (D69) is expanded as follows :

$$(T73) \quad e = T / (\lambda_{II} \cdot B) - 1. \quad (\text{From 69, 62, 23})$$

Assuming a constant working day (T), a rising productivity for W-goods ($1/\lambda_{II}$) and a constant real wage (B) clearly implies a rising rate of exploitation :

(T74) e rises.

(From 73, 66, 67, 68)

Therefore, if we want to show that a rising VCK leads to a falling rate of profit even if T and B are constant and productivity rises - which is the claim of proposition (ii) -, then we cannot assume a constant rate of exploitation (1).

4. This is not the end of the story for the textbook variant, for instead of A71 we can make a weaker assumption which would still enable us to derive a fall in the equilibrium rate of profit. We can assume that the ratio of the increase in the rate of exploitation (de) to the increase in the VCK (dq) is bound by an upper limit $e/(q+1)$:

$$(A75) \quad de/dq < e/(q+1) \quad (2). \quad (\text{Limited increase in the rate of exploitation})$$

(1) The fact that a constant rate of exploitation can only be assumed if hourly real wages (B/T) grow at the same rate as productivity ($1/\lambda_{II}$) is another way of stating the same point (see e.g. Sweezy 1942: 100-102, Robinson 1942 : 36 & 1966 : XIII, Samuelson 1957 : 892). The fact that a rise in the rate of exploitation cannot be dealt with as just a "countertendency" is argued e.g. by Bortkiewicz (1907 : 465), Dickinson (1957: 123) or Meek (1960: 130). It has been forcefully (and, I think, convincingly) claimed, however, that Marx did not really mean to assume a constant e , nor to dismiss e 's rise as a contingent countertendency (see e.g. Rosdolsky 1956 : 209-213 & 1968 : 467-472, Meek 1960 : 131-133, Cogoy 1973 : 56-59). How this can preserve the cogency of the argument will become clearer as we examine the modern variant of the theory.

(2) Variants of this condition are discussed by Sweezy (1942 : 102) and by Stamatis (1976a : 106-107, 1976b : 109-110).

Indeed, this assumption is equivalent to

$$(T76) \quad \dot{e} < (q+1), \quad (\text{From } 75)$$

which directly implies :

$$(T77) \quad \pi^* \text{ falls.} \quad (\text{From } 70, 76)$$

The new assumption (A75), unlike the old one (A71), is compatible with a rising rate of exploitation (T74). But this is not enough to make it plausible.

The most defensible attempt (1) to establish the plausibility of assumption A75 runs as follows. Given our assumption on the rate of turnover of variable capital (A3), the only difference between $e (= s/v)$ and $q (= C/V)$ lies in their denominators (s and C). Now, whereas e 's denominator has a finite upper limit - the daily flow of surplus value (s) cannot exceed the daily flow of value ($v+s = N.T$, by T61) -, q 's denominator (C) can grow without limits. Clearly, this should tell us something about the (eventual) inability of increases in e (de) to offset the negative influence of increases in q (dq) on the rate of profit. The trouble is that, however much q increases, it is always possible (in principle) for e to increase by an even larger amount : it may be true that s cannot tend towards infinity, but v can tend towards 0, and $e (= s/v)$,

(1) Much less defensible attempts have also been made. Wright (1975: 16, 37), for instance, argues correctly that the increase in the rate of profit induced by a given increase in the rate of exploitation becomes smaller and smaller as the VCK increases ($d\pi^*/de$ is a decreasing function of q). But he infers incorrectly that, as capitalism develops (as reflected in the level of VCK), it becomes increasingly easy for an increase in VCK to overcompensate the impact on the rate of profit of a given rise in the rate of exploitation. What he does not notice is that the impact on the rate of profit of a given increase in the VCK can similarly be shown to decrease as the VCK rises ($d\pi^*/dq$ is a decreasing function of q). Yaffe (1972 : 25-27), on the other hand, argues correctly that $\dot{e} = (1+e) \cdot \dot{s}$. But he infers incorrectly that, as capitalism develops (as reflected in the level of surplus value s), it becomes increasingly difficult for increases in s to induce a sufficient rate of increase in e to compensate a given rate of increase in q . What he does not notice is that, by replacing e with its definition (s/v) in his formula, he would get : $\dot{e} = \Delta s/s + \Delta s/v$. With a limited flow of output in value terms ($v+s = N.T$), a rising s (due to rising productivity) will mean a falling v (with constant $N.T$). As s tends towards $N.T$, therefore, v will tend towards 0. And the above formula then shows that, far from falling (with a given Δs) as productivity increases (higher s , lower v), the rate of increase in the rate of exploitation ($\dot{e}$) will rise, like $\Delta s/v$, towards infinity. This is just another reflection of the basic fact that the rate of exploitation has no upper limit, and any attempt to get around this fact is doomed to failure.

therefore, can increase indefinitely. This crucial fact cannot but undermine any attempt to provide the weaker assumption A75, indispensable to establish the link between a rising VCK and a falling rate of profit, with more than a very shaky foundation (1).

What the previous argument was trying to get at, however, is a valid and important point. It is precisely the failure of the textbook variant to catch that point adequately, which led to the elaboration of the modern variant of the theory, to which we now turn.

5. The modern variant of the theory tries to derive, from a rise in the ratio of dead to living labour (T58), the necessity of a fall in the equilibrium rate of profit. We shall see that it does not quite succeed in doing so. But it comes as close to it as is possible, by taking full account of the following trivial mathematical fact (2):

$$(T78) \quad s/(C+V) \leq (v+s)/C, \quad (\text{tautology})$$

i.e. whatever the (positive) values taken by C, V, s and v, the ratio obtained by adding v to the numerator of s/C cannot possibly be smaller than the ratio obtained by adding V to its denominator. Using previous results, this tautology can immediately be transformed into the following inequality :

(1) This "most defensible" line of argument is repeatedly used (not always very clearly) by Marx himself (see e.g. 1858 : 335-336, 340, 389 ; 1867 : 444-445 ; 1894 : 257-258). Attempts at rephrasing it more satisfactorily can be found e.g. in Meek (1960 : 133-135), Mandel (1962 : 1, 212-213 & 1964 : 49-50), Mattick (1969 : 62-63), Bader & al. (1975 : 400-401), Bullock & Yaffe (1975: 20), Lebowitz (1976 : 242-243). The decisive objection (that e can anyway rise without limits) is clearly stated e.g. by Robinson (1942 : 38-40), Glyn (1972: 100) and Hodgson (1974: 60-61). It is quite true, as is sometimes retorted (e.g. by Mandel 1964: 50 or Mattick 1969: 63), that the necessary labour time (v) will never be equal to 0 (nor, therefore, e equal to infinity). But will the value stock of constant capital (C) (and, therefore, q) ever be equal to infinity ?

(2) The crucial role of this tautology is clearly emphasized e.g. by Okishio (1961: 89 & 1972: 5), Glyn (1972: 100-101), Himmelweit (1974: 2), Hodgson (1974: 80-82), Itoh (1975: 6), Bader & al. (1975: 404), Shaikh (1978b: 239).

$$(T79) \quad \pi^* \leq 1/r,$$

(From 78, 44, 61, 27)

i.e. the equilibrium rate of profit cannot possibly be larger than the ratio of living to dead labour, or the reciprocal of the RDL. Therefore, we can define the maximum rate of profit as

$$(D80) \quad \pi_{\text{Max}} = 1/r.$$

And it could not be more obvious that, if the RDL (r) rises, the maximum rate of profit must fall :

$$(T81) \quad \pi_{\text{Max}} \text{ falls.}$$

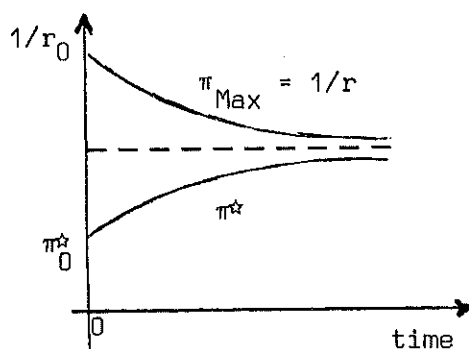
(From 58, 80)

6. However, the maximum rate of profit is not the equilibrium rate of profit, and a fall in the former does not have any straight-forward implication as far as the latter is concerned (1). This difficulty can be overcome, providing we are willing to lower our ambitions and rest content with deriving the necessity of an eventual fall, rather than of an actual fall, in the equilibrium rate of profit :

$$(T82) \quad \pi^* \text{ eventually falls,} \quad (\text{From 79, 80, 81, 83})$$

(1) Unless of course one takes the idealized situation in which productivity has reached such a level that Λ_{II} and, therefore, $V (=v\Lambda_{II}.B.N)$ are down to 0. In such a situation, the equilibrium rate of profit $(=s/(C+V))$ is identical to the maximum rate of profit $(= (v+s)/C)$, and a fall in the latter then obviously implies a fall in the former. However, such a situation, in which no labour time is required to produce W-goods, is not only highly unrealistic. It is also one in which the equilibrium rate of profit, far from falling, would be indeterminate. For, if no labour time is required to produce W-goods ($\Lambda_{II}=0$), no labour time must be required either to produce K-goods ($\Lambda_I=0$), since otherwise the dead labour entering W-goods would not be zero nor, therefore, their values. As a result, however large the mass (K) of means of production, the stock of constant capital ($\Lambda_I.K$) will be equal to 0. We would then have to say that the equilibrium rate of profit $(s/(C+V) = s/(0+0))$ is infinite, if it was not absurd to speak about surplus value (s) and, indeed, about value when no labour is socially necessary to produce commodities. We cannot, therefore, meaningfully postulate that the equilibrium rate of profit has reached its upper limit, even if this must mean that we cannot say anything (on the basis of the behaviour of the RDL) about its actual (as opposed to eventual) behaviour.

i.e. at some future time x , π_x^* is smaller than the current equilibrium rate of profit π_0^* . This is still not enough (1), however, because it is perfectly possible for the maximum rate of profit to fall forever (in agreement with T81), while the equilibrium rate of profit keeps rising (contrary to T82), as illustrated in the following diagram :



Therefore, if we want to derive correctly the necessity of an eventual fall in the equilibrium rate of profit, we must be able to assert, not only that the RDL must rise (T58) or that the maximum rate of profit must fall (T81), but that, necessarily,

(A83) The RDL rises sufficiently, (sufficient fall in π_{Max}^*)

i.e. that, at some future time x , the RDL (r_x) must have become larger than the reciprocal of the current equilibrium rate of profit (π_0^*), or, in other words, that the maximum rate of profit must necessarily fall, at some point, below the current equilibrium rate (2).

(1) Contrary to what is implicitly assumed e.g. by Okishio (1961: 89), Hodgson (1974: 82), Itoh (1975: 6), Armstrong (1975: 10), Shaikh (1978a: 233, 1978b: 240). The same point (that an actual fall in the maximum rate of profit does not imply an eventual fall in the equilibrium rate) is also made e.g. by Holländer (1974: 114), Stamatis (1976a: 107-109, 1976b: 113), Steedman (1977: 126-127).

(2) A particular specification of this condition corresponds to the assumption that, as time tends towards infinity, the RDL tends towards infinity. Under this stronger assumption, suggested e.g. by Steedman (1977: 127) and claimed by Armstrong & al. (1978: 25), to be generally assumed in the discussion, the eventual fall in the equilibrium rate of profit (T82) can be derived, whatever the initial rate of profit. The trouble, with such an assumption, is that it can be shown (see e.g. Künzel 1976: 270-271, Stamatis 1976a: 127-129) that, with N.T constant, the RDL can tend towards infinity (and the maximum rate of profit towards 0) only if productivity in Department I ($1/\lambda_I$) stops growing. Otherwise, the RDL has a (positive) finite upper limit equal to $-1/\lambda_I$ (and the maximum rate of profit a strictly positive lower limit equal to $-\lambda_I$).

It is only in this strengthened form that the assumption of a rising RDL can warrant the claim that, eventually, the rate of profit must fall. For the modern variant of the theory, therefore, proposition (ii) - which asserts that a rise in the RDL necessarily leads to a fall in the equilibrium rate of profit-, can only be vindicated if its premise (r rises) is strengthened and its conclusion (π falls) weakened (1).

Chapter 6 : The outcome of the traditional debate

1. Let us sum up our discussion so far. The first part of this paper has tried, as briefly as possible, to specify the conditions under which the equilibrium rate of profit can be formulated in value terms, as the ratio of surplus value to total capital advanced ($s/(C+V)$). And the second part has discussed two variants of the theory according to which, under capitalism, this ratio must necessarily fall because the organic composition of capital necessarily rises.

The first variant (or textbook variant) of the theory interprets the organic composition of capital as its value composition (VCK). It attempts to show (i) that the VCK must rise, and (ii) that, when the VCK rises, the equilibrium rate of profit must fall. We have seen above (Ch.4), that the VCK will rise if the technical composition of capital (TCK) rises, providing one can assume that productivity does not increase faster in Department I than in Department II and that the hourly real wage does not rise. Even if we permit these two assumptions, therefore, the necessity of a rise in the VCK remains contingent upon the necessity of a rise in the TCK, for which we could find no cogent grounds. Furthermore, we have also seen (ch.5) that, with a stable hourly real wage (B/T) and an increasing productivity ($1/\lambda_{II}$), a rising VCK only implies a falling rate of profit if its effect is not overcompensated by a rising rate of exploitation (e). And for this condition again, as e can tend

(1) Dissatisfaction is sometimes expressed with this reformulation, on the grounds that Marx meant more than an eventual fall (see e.g. Stamatis 1976b : 113 & 1977: 8-9) and that claiming an eventual fall is empirically vacuous, as it is compatible with an actual rise for any finite length of time, however long (see e.g. Stamatis 1976a : 108-110). The reply, I suppose, is that it is better to be revisionist and vacuous than wrong.

towards infinity, no compelling justification can be provided. In other words, the textbook variant cannot establish (i), basically because the VCK may not rise enough. And it cannot establish (ii), basically because the rate of exploitation may well rise too much.

The second variant (or modern variant) of the theory interprets the organic composition of capital as the ratio of dead to living labour (RDL). It attempts to show (i) that the RDL must rise, and (ii) that, when the RDL rises, the equilibrium rate of profit must fall. We have seen above (ch.4) that the necessity of a rise in the RDL is not only contingent upon the dubious necessity of a rise in the TCK. This rise in the VCK must also be such as not to be overcompensated by the increasing productivity in Department I - an assumption for which there is an even slimmer rationale. Furthermore, we have also seen (ch.5) that a rising RDL does not guarantee a fall in the equilibrium rate of profit, though it does guarantee a fall in the maximum rate of profit. Therefore, only an "eventual" fall in the equilibrium rate of profit can be derived, and only in so far as the increase in the RDL is "sufficient". In other words, the modern variant of the theory encounters even more difficulties than the textbook variant in establishing its proposition (i). And it can only establish its proposition (ii) in a form which requires a stronger antecedent and a weaker consequent : when the RDL rises sufficiently, the equilibrium rate of profit must eventually fall.

2. What emerges from this discussion is that it does not seem possible to derive logically the necessity of a rise in the organic composition of capital and (thereby) of a fall in the equilibrium rate of profit from the nature of the capitalist mode of production. But if logic does not work, why not turn to the facts? After all, if in all capitalist economies it turns out that the organic composition grows and that the rate of profit falls, this may count as good evidence for propositions (i) and (ii). We may have good reason to believe that what happens always is necessary, even if we cannot say why it is that it is necessary. We would of course have to admit that what happens necessarily must happen always, while what happens always need not happen necessarily. In other words, we would have to admit that empirical arguments are in principle

capable of disproving the theory conclusively, while not being able to prove it conclusively. However, if as a matter of fact the organic composition of capital consistently rises and the rate of profit consistently falls in capitalist economies, we may be able to justify our sticking to the theory in spite of the theoretical difficulties discussed above.

As it turns out, however, and as is well known, the evidence available is far from being consistently favourable to the theory. Does this mean that the latter is decisively refuted? This would be too simple. If in a given (capitalist) country, in a given (capitalist) period, the organic composition fails to rise and/or the rate of profit fails to fall, it may first be possible to claim that these facts are irrelevant to the theory as it is intended. If the theory is intended to provide an explanation of crises (by showing their necessity under capitalist conditions), one need not be committed to the existence of secular trends in the organic composition and in the rate of profit. All one needs to claim is that in a period leading to a crisis, the organic composition rises and the rate of profit falls, however much these trends are offset by what happens during the crisis. On the other hand, if the theory is intended to provide a prediction of the breakdown of capitalism (by showing its eventual necessity), then there is no need to claim anything about the actual behaviour of the rate of profit : a consistent rise in the organic composition will bring about its eventual fall, however long the period during which it keeps rising.

3. Suppose, however, that - as is actually the case - (1), the available evidence shows that the organic composition does sometimes fail to rise and the rate of profit to fall in inter-crisis periods and that the organic composition, at least in some capitalist economies, does not display a consistent upward secular trend. Does this mean that the theory, in the appropriate sense (i.e. either as a theory of crises or as a theory of breakdown), is refuted? Not yet. For at this stage various types of ad hoc strategies can be used. First of all, it may be possible to claim that the embarrassing evidence does not really prove that (at a particular place, at a particular time) the organic composition actually falls or that the equilibrium rate of profit actually rises. This may be simply because of defects in the collection of the data, or because no

(1) For a discussion of empirical data, see e.g. Gillman (1957), Glyn & Sutcliffe (1972), Hodgson (1974), Cassiers (1975), Alle (1977), Weisskopf (1979).

distinction was made between a "productive" sector (the only one which must come into consideration for the estimation of constant and variable capital) and an "unproductive" sector (the public sector and, perhaps, the financial sector of the services, all of which "live off" surplus value) (1), or else because prices and wages can temporarily fall below or rise above their equilibrium positions (2).

Secondly, it may be possible to concede that (at a given place, at a given time) the organic composition is actually shown to fall and/or the equilibrium rate of profit shown to rise, while claiming that the economies considered are not purely capitalist. The embarrassing behaviour of the organic composition and/or of the equilibrium rate of profit could then be attributed to pre-capitalist or, possibly, to socialist elements in the economy (3).

Finally, it may perhaps even be possible to accept both that the organic composition falls and/or the equilibrium rate of profit rises and that the economy in which this happens is purely capitalist, while still maintaining that rising organic composition and falling equilibrium rate of profit are necessary, intrinsic features of the capitalist mode of production. The fact that these features do not reach the "level of appearances" can be explained by the fact that the capitalist system "makes efforts", "mobilizes countertendencies" to prevent them from coming into the open (4).

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- (1) Yaffe (1973: 50, 57), for instance, emphasizes the importance of this distinction in testing the theory.
 - (2) Ad hoc strategies stressing the difference between price concepts and value concepts, (e.g. Fine & Harris 1976b : 104fn11) or the influence of capacity utilization fall under this heading. A general discussion of these issues can be found in Shaikh (1978c).
 - (3) It may be argued, for instance, that the rate of profit is prevented from falling by the spreading of capitalism into non-capitalist areas (see e.g. Mattick 1969: 91) or by an increase in State intervention.
 - (4) This strategy of theory immunization is used e.g. by Mattick (1969: 61), Wygotski (1972: 232-235), Cogoy (1972: 407-408, 1973: 54-55, 61-62), De Vroey (1977: 39-40), Holloway & Picciotto (1977: 91). It may of course sometimes be useful to dichotomize causal influences into (endogenous) tendencies and (exogenous) countertendencies. But pushing this procedure to the extreme (by isolating just one causal variable as "really intrinsic") leads either to a position which is only verbally distinct from the defeatist one - see Fine & Harris's (1976b: 162-163, 167) reformulation of the law as the "law of the tendency for the rate of profit to fall and the tendency for counteracting influences to operate"- , or to an empirically vacuous metaphysical claim about what is "fundamental" in capitalism.

4. If one rejects this third type of strategy as empirically vacuous - there is no way, not even in principle, of testing its claims -, one may well have to face the existence of true counterinstances, i.e. of adverse evidence which cannot be disposed of by an ad hoc strategy of the first ("not really falling/rising") or of the second ("not really capitalist") type. Most Marxist writings on the subject now seem to agree that such true counterinstances actually exist. Their empirical claim - in full harmony with the theoretical discussion of the previous chapters is that there may well have been periods, in the history of capitalist economies, in which consistent rises in the organic composition coincided with consistent falls in the rate of profit. But there were also periods in which this was not the case. Neither the rise in the organic composition nor the fall in the rate of profit, therefore, can be said to be intrinsic necessary features of the capitalist mode of production, though they may be fairly typical of certain periods in its development (1).

What are the implications of this (increasingly popular) defeatist attitude, which seems to be the natural outcome both of the traditional theoretical debate (surveyed in the previous two chapters) and of a critical discussion of the empirical evidence (alluded to above)? In so far as the theory is meant to provide a "scientifically grounded" prediction of breakdown, there is no way in which its ambition can be reconciled with such a defeatist attitude: if capitalism is doomed to collapse, this cannot be because a (necessary) rise in the organic composition necessarily leads to a (necessary) fall in the rate of profit, since these features have been shown to be contingent features of capitalism.

(1) This defeatist or "functionalist" (see Stamatis 1977: 12-17) position was already defended by Moszkowska (1929: 71-72, 83-84, 118), who insisted that Marx's law had to be understood as a "dynamic law" (i.e. a functional relationship between variables), not a "historical" law, and that it was a matter of statistics, not of theory. Similar views were expressed later e.g. by Sweezy (1942: 102, 1973: 48-49), Blaug (1969: 249-251), Habermas (1963: 253-260, 1973: 81-82), Robinson (1966: XIII), Purdy (1973: 20), Morishima (1973: 141, 160-163), Emmanuel (1974: 133), Cassiers (1975: 237-238, 263), Steedman (1977: 132, 1979: 11), Alle (1978: 278), Gouverneur (1978: 171), etc. An epistemological rationalization of this position - the "law of tendency" is "just one possibility in the Discourse of Capital" - is offered by Cutler & al. (1977: 160-165). Attempts at periodizing capitalism in terms of whether the "tendency" is operative or not (e.g. Wright 1975: 5-6, Stamatis 1976a: 129-135 & 1977: 287-290) must presuppose a similar position.

The theory's ambition to explain capitalist crises, on the other hand, is not necessarily affected by a defeatist attitude. After all, one may argue, a rise in the organic composition of capital need not be "intrinsic to capitalism" in order to bring about a fall in the rate of profit, which in turn need not be "intrinsic to capitalism" in order to generate crises. Even those who adopt a defeatist position in the traditional debate (about necessity vs. contingency), therefore, usually leave open the possibility that the so-called "falling rate of profit" approach may play a very important role in the explanation of crises (1).

5. In the last part of this paper, I shall attempt to reconstruct other (non-"traditional") aspects of the debate which tend to show that the assumption on which such an "open-minded" attitude rests is doubly wrong. First, it will be argued that however much the rate of profit falls as a result of a rising organic composition, such a fall cannot, as such, generate crises (ch.7). Secondly and more radically, it will be argued that, under capitalist conditions, a rise in the organic composition is anyway incapable of causing a fall in the rate of profit (ch.8). Open-mindedness, in other words, is not on : it is impossible (not just contingent) for the rate of profit to fall as a result of a rising organic composition, and impossible (not just contingent) for crises to be generated by such a fall. The theory of the falling rate of profit is not only unable to show that crises are a necessary feature of capitalism (the defeatist position) : it is completely irrelevant to their explanation.

(1) See references in the previous footnote.

III. THE FATAL ISSUES : POSSIBILITY VERSUS IMPOSSIBILITY

Chapter 7 : The generation of crises

1. The second part of this paper has discussed the first two propositions of the "falling rate of profit" theory of crises (as stated on p.1). Let us now turn to proposition (iii) : a fall in the equilibrium rate of profit induced by a rise in the organic composition of capital necessarily leads to crises. In conformity with standard usage, I shall take "crisis" to refer to a crisis of overproduction, i.e. to a situation in which production, employment and capacity utilization fall sharply as a result of commodities being unable to find buyers at the going prices (1). And the question we must ask is : what makes the occurrence of such a crisis necessary when the rate of profit falls for the reasons mentioned in propositions (i)-(ii)?

2. A first kind of reply to this question is in terms of functional necessity. Roughly the argument runs as follows (2). By powerfully counteracting the tendency for the equilibrium rate of profit to fall, crises of overproduction perform a vital curative function for the capitalist mode of production (3). The way in which they push the equilibrium rate of profit up is not by physically destroying part of the constant capital (4), for this would kill the latter's use value (and its ability to produce surplus value) as well as its exchange value.

(1) Similar definitions of capitalist crises can be found e.g. in Marx (1885: 409), Mandel (1962: III, 6-7, 1977: 167-169), Salama & Valier (1973: 114-117), Howard & King (1975: 212-213). Broader concepts of "capitalist crisis" have been elaborated e.g. by Habermas (1973: 9-15) and Poulantzas (1976: 20-30).

(2) See e.g. Marx (1894: 268), Boccara (1971: 297) and, more explicitly, Cogoy (1973: 60) or Fine & Harris (1976a: 94, 110-111), for similar arguments in terms of "functional necessity".

(3) This "curative function" of crises is emphasized e.g. by Marx (1894: 259-265), Mattick (1969: 69-71), Yaffe (1972: 29-32), Cogoy (1973: 61), Bullock & Yaffe (1975: 22), Itoh (1975: 17-18), Wright (1975: 14), De Vroey (1977: 40-41).

(4) Contrary to what is suggested e.g. by Mattick (1969: 70) or Bullock & Yaffe (1975: 37).

Nor is it by depressing the prices of both means of production and labour power below their values (1), because this temporary advantage for the capitalists who can afford to buy them at the right time disappears as soon as the end of the crisis brings prices back into line with values and restores the equilibrium rate of profit. The only way in which crises can counteract the tendency for the equilibrium rate of profit to fall is by decreasing the value of means of production and/or of labour power, i.e. by increasing productivity in departments I and/or II. And this is achieved both through the elimination of the least efficient capitalists and through the pressure exerted on the remaining ones to introduce (labour- and capital-saving) technical innovations as well as to reorganize, concentrate and rationalize the production process (2).

However, showing that crises have the "beneficial" effect of keeping in check the falling tendency of the equilibrium rate of profit does not amount to showing that crises are made necessary by such a tendency. Firstly, one may want to argue that crises, though possibly sufficient, are not necessary to keep the fall in the equilibrium rate of profit in check (i.e. that there are "functional alternatives") and, furthermore, that such a fall is perfectly compatible with the survival of the capitalist system (i.e. that keeping it in check is not a "functional prerequisite"). Secondly and more radically, functional necessity (to the survival of a system) should not be confused with causal necessity (within the structures of that system). Even if we discard the previous objection and take it for granted that crises of overproduction are functionally necessary to the survival of capitalism, this does not imply that they will necessarily occur, unless some omniscient, omnipotent agent makes whatever the system "needs" (i.e. whatever is functionally necessary to its survival) unavoidable (i.e. causally necessary).

(1) Contrary to what is suggested e.g. by Mattick (1969: 70), Yaffe (1972: 30-31), Bullock & Yaffe (1975: 21-22), Wright (1975: 14), Groupe Yenan (1976: 27). Denying that such a depression of prices and wages affects the equilibrium rate of profit does not imply denying its having any curative function at all.

(2) The fact that such a "devalorization" process is an important mechanism (in counteracting the fall in the equilibrium rate of profit) is stressed e.g. by Mattick (1969: 70-71), Yaffe (1972: 30), Bullock & Yaffe (1975: 22), Itoh (1975: 17). That it is the only possible one is convincingly argued by Glyn (1972: 101-102). Boccara's (1971: 298-299) systematic application of the term "devalorisation" to other processes, which do not involve a fall in the amount of socially necessary labour, is very misleading on this point.

If such an assumption is unplausible - and nobody seems to claim the contrary -, considerations of "functional necessity" cannot help us to show that a fall in the rate of profit makes the occurrence of crises (causally) necessary (1).

3. A second kind of argument, the one most frequently used, does not conflate functional and causal necessity. It first proceeds to show that a fall in the equilibrium rate of profit implies a fall in the rate of accumulation, defined as the rate of increase of the capital advanced :

$$(D84) \quad \alpha = (C+V) \quad (\text{Definition of the rate of accumulation})$$

i.e. the (value) rate of accumulation is equal to the ratio of the amount of (constant and variable) capital newly accumulated ($\Delta C + \Delta V$) to the total capital advanced ($C + V$). The second step in the argument must then try to show that a fall in the rate of accumulation must lead to crises of overproduction.

First then, why should the rate of accumulation fall when the equilibrium rate of profit falls ? Since the flows of constant and variable capital (c, v) correspond to those fractions of the value of the gross product (y) which serve to reproduce the parts of the stock of constant and variable capital (C, V) used up, it follows from the definitions of surplus value that the latter constitutes the upper limit to the amount by which the stock of capital can be increased :

$$(T85) \quad \Delta C + \Delta V \leq s, \quad (\text{From 42})$$

i.e. the amount of value used to increase (rather than just reproduce) the stock of capital cannot possibly be larger than the amount of surplus value produced. This obviously implies that :

$$(T86) \quad \alpha \leq \pi^*, \quad (\text{From 85, 84, 44})$$

i.e. that the equilibrium rate of profit is the upper limit of the rate of accumulation.

(1) A critique of the "functional necessity" type of argument is also given by Itoh (1975: 10, 1978a: 20, 1978b: 3).

Of course, a fall in the maximum rate of accumulation (i.e. in the equilibrium rate of profit) need not mean a fall in the actual rate, if it is compensated by an increase in the proportion of surplus value which is accumulated. But we have already assumed above (A1) that capitalists do not consume. If we further assume - also in agreement with Marx's ideal-typic image of the capitalist (1) - that

(A87) Whatever is not consumed is accumulated,

then it immediately follows that all the surplus value produced is accumulated and, therefore, that the rate of accumulation is equal to its maximum value :

(T88) $\alpha = \pi^*$ (From 86, 1, 87)

If the equilibrium rate of profit falls, then, clearly, the rate of accumulation must fall :

(T88) α falls. (From 88, 77)

4. How do we get now from such a fall in the rate of accumulation to the emergence of "realization problems", i.e. of crises of overproduction ? The standard view seems to be that at some point - the "definite point" at which the law of the falling rate of profit becomes a "barrier" to the capitalist mode of production - the amount of surplus value produced becomes insufficient to purchase (for the sake of accumulation) all the commodities produced which are not consumed (2). Exactly where this point lies is usually left indeterminate. There are some suggestions, however, that it will be reached - crises of overproduction will break out - as soon as the amount of surplus value begins to decline, not only in relation to capital advanced, but also in absolute terms (3). The trouble is that, under the very assumptions of the theory, (1°) such a point cannot be reached, and (2°) even if it were reached, this would not trigger off a crisis. Let us examine why this is so.

(1) See esp. Marx (1867: 617-636). Sometimes in the discussion, however, this ideal-typic image is interpreted as implying that the proportion of surplus value which is accumulated increases (instead of being equal to 1) (see e.g. Stamatis 1977: 233-235).

(2) This kind of argument seems to be advanced by Marx (1894: 251-252, 268), Mattick (1969: 66-68, 75-79), Cogoy (1973: 64), Gamble & Walton (1976: 131-132), Shaikh (1978a: 231).

(3) See e.g. Jacoby's (1975: 35) reading of Grossmann (1929), or Shaikh (1978b : 237).

First, a rise in the amount of surplus value produced is not only compatible with the theory of the falling rate of profit, as is often acknowledged (1). It is also implied by the very assumptions we have had to introduce in order to discard alternative sources of downward pressure on the equilibrium rate of profit. Providing we assume that, previous to the crisis, there is no fall in the overall level of employment, i.e.

(A89) N does not fall, (non-decreasing number of workers)

it follows from the assumption of a constant real wage, of a constant working day and of a rising productivity, that :

(T90) s rises. (From 62, 66, 67, 68, 89)

In spite of a falling rate of profit (due to a rising organic composition), therefore, each period of production does not only make a positive amount of value available for accumulation (on top of what is required for simple reproduction), but the amount thus made available is larger than during the previous period (2).

In any case, however, whether the amount (s) available for accumulation increases or not is irrelevant to the question of whether or not overproduction crises must appear. Apart from inter-industrial disproportionalities, swiftly corrected under the law of value, overproduction can only arise from a lack of effective aggregate demand. But we have assumed (A87) that all the net value produced which does not enter the workers' consumption is accumulated by the capitalists. There is no discrepancy, therefore, between savings and investment, between the output produced and the (consumption and accumulation) demand for it. Say's law holds. There is no room for a lack of aggregate demand, no room for a crisis of overproduction (3).

(1) For instance, by Marx (1894: 227-228), Mattick (1969: 63-64), Bullock & Yaffe (1975: 20), Bader & al. (1975: 406-408), Itoh (1975: 5-6, 1978a: 11), Gamble & Walton (1976: 108, 134), Fine & Harris (1976b: 159).

(2) In other words, an increasing marginal increase in the stock of capital (or of an other variable) is compatible with a decreasing rate of increase of that stock.

(3) The point is clearly made e.g. by Robinson (1942: 85), Harrison (1978b: 56-57), Berger (1979: 8) and, indirectly, by Howard & King (1975: 214-215). See also Robinson's (1948: 115) claim that, whichever branch of Marx's crisis theory one follows, it is necessary to call in Keynes's analysis of effective demand to complete it. However, one might perhaps imagine an alternative strategy to show that a falling rate of profit must generate overproduction : if the falling rate is an average rate (rather than a general one), the closer it comes to zero, the higher the probability that some capitalists will go bankrupt (thus reducing demand, etc). But, as pointed out by Elster (1978: 105-106), this assumes without justification that, as the average falls, the dispersion will not fall as well.

5. The failure of this standard argumentation does not mean that there is no way in which a fall in the equilibrium rate of profit (induced by a rise in the organic composition) can be understood as potentially relevant to the explanation of crises of overproduction. But pointing out such a way necessitates our giving up a claim which often accompanies the theory as a justification of its alleged superiority. It necessitates our giving up the claim that the behaviour of the rate of profit is relevant to the generation of crises to the extent that it determines the amount of value objectively available for accumulation, not to the extent that it determines the capitalists' subjective expectations of profitability and, thereby, their subjective propensity to invest. In other words, if we want to make sense of the claim that a fall in the equilibrium rate of profit may generate crises of overproduction, we must assume the operation of a "Keynesian" mechanism rather than of a "Marxian" one (1).

Within this altered perspective, it is at least possible to conceive that the rate of profit may become so low that capitalists will lose any incentive to accumulate and, thereby, generate a lack of demand for capital goods as well as (via a fall in the level of employment) for wage goods. In other words, if the capitalists' propensity to invest is taken into consideration, it seems possible to understand how a fall in the equilibrium rate of profit (due to a rising organic composition of capital) can induce crises of overproduction. However, there remain a number of difficulties.

6. First of all, providing the labour force is growing, a fall in the equilibrium rate of profit induced by a rise in the organic composition is self-limiting. It has a strictly positive lower limit which prevents it from tending towards zero. This can be shown as follows (2). As has already been noted above, a constant real wage, a constant working day and a rising productivity guarantee that surplus value per man increases :

(1) The fact that an emphasis on available (as opposed to expected) profits is the characteristic feature of a Marxian (as opposed to a Keynesian) approach, is claimed e.g. by Robinson (1942: 29, 50-51, 54, 61-62, 85), Mattick (1969: 21, 54-55), Yaffe (1972: 42), Cogoy (1973: 64-65), Wright (1975: 24), Itoh (1975: 10), Alcaly (1978: 19), Shaikh (1978a: 230), Harris (1978: 277-278). However Marx sometimes seems to give some role to expectations of profitability (see esp. 1863: 469, 1867: 633, 1894: 266, 269).

(2) This proof is given e.g. by Elster (1978: 105) and, in a somewhat different version, by Ganssmann (pers. communic.).

(T91) s/N rises. (From 62, 66, 67, 68)

If in spite of this the equilibrium rate of profit ($s/(C+V)$) falls - which the theory claims -, its denominator, when divided by N , must increase even more than s/N . Therefore, we certainly have :

(T92) $(C+V)/N$ rises (From 44, 77, 91)

In other words, the rate of increase of the amount of capital advanced (which, by definition, is equal to the rate of accumulation) is larger than the rate of growth of the labour force :

(T93) $\alpha > \dot{N}$. (From 92, 84)

By multiplying each side by π^* , this is easily shown to be equivalent to :

(T94) $\pi^* > \dot{N}/(\alpha/\pi^*)$, (From 93)

i.e. the equilibrium rate of profit must remain larger than the rate of growth of the labour force divided by the proportion of surplus value which is accumulated (or by the ratio of the rate of accumulation to the rate of profit). As we have assumed that capitalists neither consume (A1) nor save (A87), we can be more specific :

(T95) $\pi^* > \dot{N}$, (From 94, 88)

i.e. if the labour force grows and if the rate of profit falls because of a rising organic composition of capital, its fall is limited by a strictly positive lower limit given by the rate of growth of the labour force. Therefore, it may be argued, nothing guarantees, in a growing economy, that the equilibrium rate of profit will ever fall below a level which remains quite acceptable to the capitalists.

The second difficulty is more serious. Technical change takes time. A rise in the organic composition of capital, therefore, must be a slow, long-run phenomenon. And so must be the resulting fall in the equilibrium rate of profit. In the long run, however, capitalists have plenty of time to adjust their level of expectation, i.e. their definition of what constitutes a "reasonable" rate of profit. If the fall in the rate of profit under consideration were a short-run one, it would of course be relevant to explain the interruption of investment as some threshold value - e.g. the rate of interest on bonds or the rate of profit

abroad - is reached. But in a long-run perspective, such an interruption would only be part of the short-run adjustments which contribute to the formation of the equilibrium rate of profit. Showing that there is a long-run tendency for the equilibrium rate of profit to fall (as a result of a rising organic composition), therefore, is of no relevance to the explanation of crises of overproduction, even if one allows for the operation of a "Keynesian" mechanism (1).

7. Let us sum up. It has been argued in this chapter that proposition (iii) of the theory is false, i.e. that a fall in the rate of profit induced by a rise in the organic composition does not make crises of overproduction necessary. This is so, firstly, because, even if we can show that it makes them functionally necessary, this does not show them to be causally necessary. This is so, secondly, because, even if we admit that a fall in the equilibrium rate of profit depresses the rate of accumulation, there is no way in which this can lead to realization problems unless the capitalists' propensity to invest is brought in. And this is so, finally, because a fall in the equilibrium rate of profit induced by a rising organic composition has a strictly positive lower limit and can only be a long-run phenomenon - in such a way that it will not generate an abrupt interruption of the accumulation process, even if the role of the propensity to invest is acknowledged.

This shows that it is impossible for a fall in the equilibrium rate of profit (due to a rise in the organic composition) to generate crises. But it still assumes that it is possible (though not necessary, as shown in ch.5 above) for a rise in the organic composition to generate a fall in the equilibrium rate of profit. The next chapter turns to an argument which shows that this too is impossible.

(1) The connection between the theory of the falling rate of profit and crisis theory is challenged e.g. by Robinson (1948: 114), Itoh (1978a: 13) and, with a specific reference to the long-run character of the former, by Sweezy (1942: 148), Sowell (1967: 64), Sherman (1967: 492), Berger (1979: 8).

Chapter 8 : The "choice of technique" argument

1. The "choice of technique" argument is the most devastating of all objections ever formulated against the theory of the falling rate of profit. It applies whether the theory is meant as a theory of crises or a theory of breakdown, whether it is formulated in terms of value composition (textbook variant) or in terms of the ratio of dead to living labour (modern variant), and whether the equilibrium rate of profit can be simply expressed in value terms or not. Although the argument first appeared - albeit in a sketchy formulation - only a few years after the publication of Volume III of Capital, it is not until the 1970's that it really entered the Marxist discussion (1).

The central idea of the argument is that, under competitive capitalism, a technical change which raises the organic composition of capital, far from depressing the equilibrium rate of profit, can only increase it (if it affects it at all), providing the real wage rate remains unchanged. And the fundamental reason why this is so, according to the argument, is that the capitalists' choice between available techniques is dictated by profit maximization.

2. The proof of the validity of this claim - sometimes labelled "Okishio's theorem" - can be intuitively restated as follows (2). Suppose that a new, capital-intensive technique is introduced by a particular capitalist, in such a way that the (average) organic composition of capital in the economy becomes higher than before. The very fact that the capitalist has decided to introduce the new technique implies

(1) The first formulation of the argument (in the particular case in which there is only one kind of product) is due to Tugan-Baranowsky (1901: 212-215). A more general formulation is given by Bortkiewicz (1907: 454-470). The argument then sporadically reappears but is hardly noticed : see e.g. Moszkowska (1929: 77-80, 105-107, 1935: 46-49), Shibata (1934: 65-71, 1939: 50-52, 56-61), Samuelson (1948: 748-749, 1957: 892-895, 1972: 54-56), Okishio (1961: 91-99). But it is only in the 1970's that it really entered the Marxist discussion, both in Britain and in Germany : see e.g. Glyn (1973: 104-107), Himmelweit (1974: 2-5), Nutzinger & Wolfstetter (1974: 171-172), Howard & Hunt (1975: 207-209), Schefold (1976: 192-193), Steedman (1977: 127-129), Robinson (1978: 13-17), Harrison (1978a: 116-117), Shaikh (1978b: 240-242), etc. The most comprehensive and rigorous presentation of the essential mathematical results is Roemer (1977).

(2) A formal proof can be found in Okishio (1961: 98-99), Glyn (1973: 106-107) or Roemer (1977: 417-418).

(assuming profit maximization : see A30) that the innovating capitalist's new, transitional rate of profit is higher than the initial equilibrium rate, because his production costs (with unchanged output and at the ruling prices) are lower than before. And the same holds true for the transitional rate of profit of the whole industry, once the new technique has been generalized.

As has often been pointed out (1), however, showing that the transitional rate of profit must be higher than the initial equilibrium rate does not prove, as such, that the new equilibrium rate must also be higher. And it is this equilibrium rate, not the transitional rate, which the theory of the falling rate of profit is concerned with. Okishio's theorem too, however, is about the new equilibrium rate. For what happens when, due to technical progress, a particular industry makes extra profits (i.e. has a transitional rate higher than the initial equilibrium rate)? Under perfect competition, new capital moves in, expands output and bids prices down, until profit rate differentials are abolished. If the innovating industry produces K-goods or W-goods, this process of competitive price reduction necessarily involves a fall in the cost of the other industries' means of production and/or (with a constant real wage) of labour power. If the innovating industry produces luxury goods (i.e. goods which are neither W-goods nor K-goods for W-goods industries), only (capitalist) consumers will benefit from the price reduction, and the equilibrium rate of profit will remain at its previous level (2). But whatever the industry affected, no viable innovation (3), whether it raises the organic composition or not, can induce a fall in the equilibrium rate of profit. The very core of Marx's "theory of the falling rate of profit" seems to have been destroyed.

(1) For instance by Bortkiewicz (1907: 456-457, 466), Sweezy (1942: 104-105), Samuelson (1972: 55), Glyn (1973: 104-105), Steedman (1977: 128), Shaikh (1978b: 235) : they all insist that what they are concerned with is the socially imposed rate of profit.

(2) This is connected with the so-called Bortkiewicz solution of the transformation problem. A proof of the proposition that changes in the organic composition in Department III (luxury goods) cannot possibly affect the equilibrium rate of profit is given e.g. by Shibata (1939: 56-57).

(3) In some special cases (e.g. when two industries produce K-goods for each other), the newly introduced technique may cease to be the most profitable one, once competitive price-cutting has established a new pattern of equilibrium prices. The industry may then switch back to the old technique, and so on, ad infinitum.

3. A subtle attempt at refuting this powerful objection has recently been made by Shaikh (1978b). He correctly points out that, as soon as one ceases to assume the absence of fixed capital (which is generally assumed in the proofs of Okishio's theorem), it is crucial to distinguish between the rate of profit, given by

$$(D9) \quad \pi = (p.Y - (p_I.k + W.N)) / (p_I.K + (W/T).L),$$

and the profit margin, defined by

$$(D96) \quad \mu = (p.Y - (p_I.k + W.N)) / (p_I.k + W.N).$$

The numerator is the same in both cases : it is given by the excess of (daily) receipts ($p.Y$) over the cost of the means of production ($p_I.k$) and of labour power ($W.N$) used up (daily). But the denominator is different. Given our assumption about the rate of turnover of variable capital (see T7 : $L=N.T$), the difference boils down to whether one considers the cost of the total stock of means of production (K) or only the fraction (k) of K which enters current production (as raw materials or depreciation). Therefore, it is perfectly conceivable for a technical innovation to increase the (transitional) profit margin while decreasing the (transitional) rate of profit : it only needs to introduce more fixed capital in such a way that, although current costs ($p_I.k + W.N$) are reduced, the stock of means of production ($K = k/t_C$) increases sufficiently to reduce the rate of profit (1).

Now, if what capitalists care about is their (transitional) rate of profit, such a technical innovation will never be introduced, and a variant of Okishio's theorem (which takes fixed capital into account) would then show that the equilibrium rate of profit cannot fall. However, if it can be made plausible that capitalists may be forced to care about their profit margins rather than about profit rates, then such a technical innovation may be perfectly viable, and no Okishio theorem would prevent (in principle) any fall in the equilibrium rate of profit. Suppose, for

(1) See Stamatis (1977: 186-189) and Shaikh (1978b: 242-244). Suppose, for instance, that at time 1 receipts ($p.Y$) are equal to 10, costs ($p_I.k + W.N$) to 5, and capital advanced ($p_I.K + W.N$) to 50. The rate of profit (π_1) is then equal to $(10-5)/50 = 1/10$, while the profit margin (μ_1) is $(10-5)/5 = 1$. Suppose now that new machinery is introduced, which halves the cost (from 5 to $2\frac{1}{2}$) but doubles the amount of capital advanced (from 50 to 100). The rate of profit (π_2) then drops to $(10 - 2\frac{1}{2})/100 = .75/10$, while the profit margin (μ_2) rises to $(10 - 2\frac{1}{2})/2\frac{1}{2} = 3$.

instance, that one individual capitalist attempts to increase his sales by introducing a capital-intensive technique of the type just mentioned (leading to a lower transitional π , but a higher transitional μ). This would allow him to cut prices in such a way that his profit margin would remain positive, while his competitors (if they want to keep their prices competitive) would start making losses because the techniques they use imply higher unit costs. The whole industry would then be left with little option but to adopt the new technique and accept the rate of profit it yields (1). In other words, distinguishing the rate of profit from the profit margin seems to make room for viable cost-reducing innovations which lead to a lower transitional rate of profit. Therefore, the "choice of technique" argument sketched above must have been wrong in taking it for granted that the transitional rate of profit cannot but be higher than the initial equilibrium rate. And without this crucial premise, the whole argument collapses.

4. Such a conclusion is unwarranted, however, because Shaikh's scenario is incompatible with the framework in which the whole discussion on the "theory of the falling rate of profit" has been conducted : perfect competition (A29) and profit maximization (A30). This can briefly be shown as follows. Under competitive capitalism, profit maximization leads to the formation of an equilibrium general rate of profit. Why should a capitalist want to invest in a capital-intensive technology which will reduce his rate of profit below the general rate, rather than invest at the general rate elsewhere in the economy ? Shaikh's answer is : because the new technology, by reducing his unit costs, will enable him to reduce prices in such a way that his competitors will be driven out of business and that his own sales will increase considerably. However, under perfect competition, this cannot possibly be a profit-maximizing strategy even if competitors do not follow suit. Indeed, although the increase in sales may mean an increase in the flow of profits accruing to the innovating

(1) See Shaikh (1978b: 245-246). Consider again the previous example. By adopting the new technique and halving the price of the product (thus reducing his receipts from 10 to 5), a capitalist could easily drive his competitors out of business unless they imitate him. For, with the new price, the innovating capitalist would still book positive profits ($\pi'_2 = (5 - 2\frac{1}{2})/100 = 2.5\%$; $\mu'_2 = (5 - 2\frac{1}{2})/2\frac{1}{2} = 100\%$), while his competitors would be on the verge of making losses ($\pi'_1 = (5-5)/50=0 = (5-5)/5 = \mu'_1$).

capitalist, this increase would necessarily be smaller than if he had invested elsewhere at the general rate of profit. And although having driven his competitors out of business may allow him to raise his prices again, this rise can never be such as to give him the general rate of profit, because before this stage is reached the old technique will become profitable again and competitors will move back in. Under competitive capitalism, therefore, the kind of technological innovation which Shaikh needs is not viable (1). And the "choice of technique" argument - which claims that capitalistically viable technical changes can only raise the equilibrium rate of profit - remains unaffected.

5. However, counterattack is possible. If one admits that the theory is irrelevant in the case of perfect competition (with reference to which it was conceived and is usually discussed), one may want to reformulate it in such a way that it applies to the average rate of profit under oligopolistic (or monopolistic) competition. In a capitalist economy of this kind, one will expect to have more than one "equilibrium" rate of profit and, therefore, no equilibrium general rate. In such a situation, one may think of the lowest in the hierarchy of equilibrium rates of profit as the competitive "equilibrium" rate, from which the other rates can deviate upwards through the operation of barriers to entry of various "heights". This sets a framework within which the profit-maximizing course of action, for a capitalist enjoying a higher than competitive rate of profit, may be to introduce a profit-rate-reducing profit-margin-increasing innovation. For he may be barred access to industries with a higher rate of profit, and the profit rate in more competitive industries may be too low in comparison with his own. The best way of increasing the flow of his profits, in such a case, may well be to introduce more expensive machinery which would enable him to produce at a lower unit cost.

(1) Somewhat different arguments purporting to point out the incompatibility of Shaikh's scenario with perfect competition, are defended in unpublished discussion notes by Bleaney (1978), Armstrong & Glyn (1978), and Steedman (1978).

With Shaikh's scenario, this would then lead to price competition in the innovating industry - which would further depress its rate of profit but (assuming a constant real wage) increase the rate of profit in other industries. A more plausible scenario, under oligopolistic competition, is that, in spite of falling (unit) costs, prices will not be altered. While the rate of profit falls in the innovating industry, the rates in other industries then remain unchanged, and the average rate unambiguously falls. This clearly shows that, if one is prepared to move sufficiently far away from the ideal competitive world which is generally taken for granted in the discussion, some room can be made for the possibility (just the possibility) of a fall in the average (not the general) rate of profit. This is the valid core in Shaikh's point.

6. Non-perfectly competitive capitalism is one case in which equilibrium rates of profit are allowed to fall (with a constant real wage). Perfectly competitive socialism is another, if by this one means an economic system in which techniques of production are chosen by a central authority according to a productivity-maximizing principle, while a freely operating market determines prices and allocates factors once this choice is made (1). The fundamental reason for this is that, while all profit-increasing (or cost-reducing) innovations are productivity-increasing (or labour-time-decreasing), not all productivity-increasing innovations are profit-increasing: if the real wage rate is low, there may be productivity-increasing innovations (of a capital-using, labour-saving kind) which are not profit-increasing, because the reduced cost of living labour they involve cannot compensate for the increased cost in dead labour (on which a rate of profit has to be paid to the "capitalists" from whom means of production are bought). Under "perfectly competitive socialism", therefore, the choice of techniques cannot guarantee that the equilibrium rate of profit must rise.

7. Let us now recapitulate this last step in our rational reconstruction of the debate on the theory of the falling rate of profit. Its starting point was: even if we recognize that the rise in the organic

(1) For a formal proof of this point, see e.g. Roemer (1977: 411, 414), who speaks of a "market-socialist" or "Lange-type" economy. The underlying point is also made by Shibata (1939: 58-60) in a reply to Tsuru.

composition of capital and the resulting fall in the rate of profit are both contingent phenomena (ch.4-6), even if we admit that such a fall cannot generate crises (ch.7), one may still think it possible to claim that a rising organic composition may, under capitalism, induce a fall in the general rate of profit. But this presumption has been shown to be unwarranted. The introduction of a technique which raises the organic composition can only depress the rate of profit either if there is no general equilibrium rate (for lack of perfect competition) or if the economy is not capitalist (because techniques are chosen by a central authority).

What this implies is that, if we have good grounds for believing that the economy we are considering can be reasonably pictured as being both capitalist and perfectly competitive, there can be no doubt about the cause of a fall in the equilibrium rate of profit : it can only be due to a rise in the real wage rate, whatever the empirical evidence (at the macro-level) (1). In particular, suppose that, in an economy which we know to be both capitalist and perfectly competitive, we observe a fall in the (equilibrium) rate of profit which corresponds exactly to a rise in the value composition of capital, with a constant rate of exploitation. It is an empiricist fallacy to infer that, in this case, the fall in the rate of profit can be explained by the rise in the value composition, however beautifully correlated the two phenomena are. For the reasons explained in this chapter, we can be certain, in this case, that the fall in the rate of profit is due, instead, to a rise in the real wage rate, which would have depressed the rate of exploitation if it had not been exactly offset by an increase in productivity (itself the result of technological changes which have also increased the organic composition of capital). Nothing, I think, could illustrate more effectively the importance of a theoretical debate, than such a crucial impact on the interpretation of empirical evidence.

(1) This is forcefully asserted (not always with the necessary emphasis on the "if") e.g. by Nutzinger & Wolfstetter (1974: 171-172). Similar points are made by Bortkiewicz (1907: 469), Shibata (1934: 71-73, 1939: 60-61), Okishio (1961: 96), Himmelweit (1974: 6), Roemer (1977: 415).

May this insight reward the reader for some of the pains he took to read this paper.

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