N° 8426

THE "REGULATION SCHOOL" AND THE CLASSICS : MODES OF ACCUMULATION AND MODES OF REGULATION IN A CLASSICAL MODEL OF ECONOMIC GROWTH

by

Jan FAGERBERG

L'"ECOLE DE LA REGULATION" ET LES CLASSIQUES : MODES D'ACCUMULATION ET MODES DE REGULATION DANS UN MODELE CLASSIQUE DE CROISSANCE.

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R E S U M E

Ce texte propose une formalisation mathématique simple (modèles de croissance de long terme à un secteur) pour les concepts avancés par l'"Ecole de la régulation". Spécifiant les formes de changement technique et de régulation du salaire réel, trois modèles sont proposés (technique constante et régulation concurrentielle, méthodes tayloriennes de production avec régulation concurrentielle, méthodes fordistes de production avec régulation monopoliste). Les modèles montrent que si la régulation monopoliste du salaire a offert une issue aux tendances à la "crise keynésienne" engendrée par le taylorisme, elle peut être impuissante à enrayer la tendance à la baisse du taux de profit (crise "classique") engendrée par la généralisation du fordisme.

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A B S T R A C T

This text provides a simple mathematical formalization (one sector long-term growth models) for some insights of the "regulation school". Specifications are given on the nature of technical change and on the form of regulation of real wage, and three models are studied (competitive regulation with constant technological level, competitive regulation with "taylorist" methods of production, monopolistic regulation with "taylorist" and "fordist" methods of production). These models suggest that, if monopolistic regulation provided an answer to tendancies towards "keynesian crisis" entailed by taylorist methods of production, on the contrary it can not reverse the tendancy towards a fall in profitability ("classical crisis") entailed by the generalization of fordism.

Content

This paper was written during my stay at CEPREMAP as visitor (march-july 1984). Robert BOYER, Pierre MALGRANGE, Jacques MISTRAL and Alain LIPIETZ, all CEPREMAP, Anton HELLESØY , University of Trondheim and Lars MJØSET, International Peace Research Institute, Oslo, have made helpfull comments, for which I am gratefull, while retaining sole responsibility for the final version.

1. Introduction

Within the tradition of classical political economy economic development was always analyzed as the result of both technological, social and institutional development. The most ambitious attempt in this respect was Marx' distinction between "modes of production and "relations of production", where prosperity and crisis were analysed as either harmony or tension between the technological, social and institutional realities covered by the two concepts. In modern (neoclassical) economics, following the early marginalists, this perspective totally disappeared. It was replaced by a focus on the possibility of an economic equilibrium with an optimal allocation of given resources. The social and institutional prerequisites for this equilibrium to occur, and to a great extent also the role of technological development, were left apart. It is not at all surprising that this kind of thinking resulted in a denial of the possibility of crises, even when they actually occured, as was the case in the thirties. The lessons from the crisis of the thirties, laid down in the works of Keynes and his followers, were soon embodied in the traditional theory as a "special case". When the crisis of the seventies occured, traditional economic theory was unable to explain why and - as it became evident later on - also what to do.

As it has become more and more clear that the economic difficulties of the seventies - and the eighties - are closely connected to the social and institutional development in the postwar period, various attempts have occured - even within traditional theory - to explain the development by refering to social and institutional factors. These attempts, however, tend to treat social and institutional development as exogenously determined "distortions" of the equilibriating forces in the economic system. In our view, an understanding of the problems of contemporary capitalism requires more than this : It is necessary to develop a theoretical framework which treats social and institutional forces as integral parts of the economic system itself. In the search for such approaches, it has been necessary to go back to the methodology of the classical political economy as refered to above. In spite of early attempts to construct such a framework, especially by Kaldor (4,5) and the "post-keynesian school", the most important contributions in this respect are the works by Aglietta (1), Boyer (2), Lipietz (7) and other adherents of what has come to be known as "the regulation school".

In the analyses of "the regulation school", the concepts "mode (or regime) of accumulation" and "mode of regulation" play an important role. The concept "mode of accumulation" covers the essential conditions of reproduction of the productive system, including technology, the organization of work and the relations between the investment-good-sector and the consumption-good sector. The concept "mode of regulation" on the other hand is meant to cover the social and institutional conditions of reproduction, including the credit-system, the system of wage-price-determination and the role of the state in the economic proces. Regarding the "mode of accumulation", two types are usually considered, extensive and intensive accumulation, the former historically preceding the latter. Extensive accumulation is characterized by the incorporation of existing production-activities into a capitalist framework, but without major changes in patterns of production, technology or work-organization, and with a tendency towards unbalanced and cyclical growth. Intensive accumulation, on the other hand, is characterized by continous changes in patterns of demand and production, rapid productivity-growth, and a balanced development of the two sectors of production.

A central element in the analyses of the regulation school is that the transition from the former to the latter necessarily involves the introduction of new technologies and forms of work-organization which, in order to be economically viable, requires mass production, and - hence - mass consumption. Therefore this transition in the long run requires a change in the "mode of regulation" from the original "competitive" regulation, allowing only very slow long-term-growth in real wages, with a tendency towards a cyclical development, to a "monopolistic" regulation, securing constant relative income shares and steady growth in overall demand through the introduction of new institutions (collective bargaining, wage-price-productivity-indexation, increased governemental responsability for the reproduction of the labor-force, demand-management etc.). The crises of the interwar-period, then, is analysed as a "grand" crisis, involving a shift in regulation (in contrast to "minor" or

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"regulation" crises). Also the present crisis is analysed as a "grand" crisis, characterized by a weakening of the growth-potential of the dominant modes of production and work-organization and growing tensions within the existing "mode of regulation". The "way out" of the crisis, then, according to the "regulation school", cannot be the result of technological change alone, but has to involve a change in the "mode of regulation" as well.

This text should be regarded as an attempt to introduce some of the methodological principles developed by the "regulation school" into a formal theoretical framework which follows the classical political economists, especially Marx, and to some extent also the "post-keynesian school". The purpose is partly to explore the possibilities for developing this theoretical framework in a direction more suited for analysis of long term economic development and, hence, crises, incorporating the basic ideas underlying the concepts "modes of accumulation" and "modes of regulation", and partly to highlight some of the problems analyzed by the "regulation school" from a somewhat different, but related, angle. It follows that the models developed in the sections to come in no way should be understood as mere formalisations of the analysis established by the "regulation-school". This should be emphasized also because the analyses of the "regulation school", even when refering directly to models of the type developed here as in Aglietta (1), always contain a lot of arguments and references which are not covered by simple models of the type developed in the following sections.

Some of the more important limitations of the models in this respect may be mentioned at once : Firstly, even if we try to elaborate this point somewhat; the models follow the classical political economists in focusing much more on long term supply-demand —equilibrium growth-paths, than on the relation between short- term economic fluctuations and long term growth. Secondly, the models do not contain financial or credit sectors, thus there is no possibility in the models for inflation. The prices in the model should be interpreted as "long-run real prices", reflecting the development of total factor productivity in the economy as a whole. Thirdly, the models do not contain different production sectors, which excludes from the analysis the possibility of studying the relation between for example the automobile-sector and the economy as a whole ("engines of growth").

It may well be that these limitations make the models unsuited for the purpose for which they are constructed. Leaving this as a matter of discussion, we will in the following section present the basic framework of the models. The third, fourth and fifth sections, then, present different versions of the basic model allowing for changes in the "mode of accumulation" and "mode of regulation".

2. The theorethical framework.

The following symbols are going to be used :

c=depreciation (value)
n=depreciation-rate (assumed constant)
C=capital (value)
K=capital (physical)
W=wages
P=profits
I=gross investment (value)
L=hours worked
Q=gross production (physical)
M=real wage pr hour worked (physical)
ω=wage pr hour worked (value) = workers'share of value added
π=capitalists'share of value added
r=rate of profit
v=capital-labor-ratio (value)
k=technical composition of capital (capital-labor-ratio in physical terms)
p=price pr unit
q=total factor productivity
S=supply (value)
D=demand (value)
t=time

Let us start with the well known two-sector-model developed by Marx in Capital Vol II (8), and let the investment-good and the consumption-good-sector be sector 1 and 2 respectively. We assume that capital can be regarded as "fixed" capital. The equations 2.1-2.2 give the supply of each sector in value terms as the sum of depreciation, wages and profits. The equations 2.6-2.7, on the other hand, state that the demand for sector 1-products consists of gross investment, while the demand for sector 2-products stems from wages. Assuming, as Marx, that supply and demand is in equilibrium in each sector, we can derive equation 2.10, which can be interpreted as an aggregate supply-demand-equilibrium-condition.

2.1 $S_1 = c_1 + W_1 + P_1$

2.2 $S_2 = c_2 + W_2 + P_2$

2.3 $c = c_1 + c_2$

2.4 $W = W_1 + W_2$

2.5 $P = P_1 + P_2$

2.6 $D_1 = I$

2.7 $D_2 = W$

2.8 $D_1 = S_1$

2.9 $D_2 = S_2$

From 2.1-2.9 :

$$c + W + P = W + I, \text{ Letting } \dot{C} = \frac{dc}{dt} = I - c$$

2.10 $P = \dot{C}$

Equation 2.10, then, states that a necessary condition for supply-demand-equilibrium in the overall economy is that profits are equal to net investment. How is this to be understood ? To grasp the full content of this, it is necessary to recall that a concept of time is implicit in the marxian schemes of reproduction, the classical concept of a "period of production". Within a period of production, both consumption, investment and production take place, but the goods that are produced are not consumed or invested within the same period as they are produced, but in a later period. It follows then, that the problem of effective demand forms an integral part of the marxian reproduction schemes, since the demand for the product of one period is a function of plans for periods to come. As may be well known, this is exactly the way Kalecki derived the principle of effective demand in his articles from the early thirties[1)].

This principle applies of course both to wages and investments, but to make things simple, we have assumed that the workers get their wages at the end of the period, and that they follow the classical-kaleckian rule of spending what they get. For the capitalists, however, this does not solve the problem of effective demand. In order to realize the expected value of the goods produced, and hence expected profits, it is necessary that expected profits equalize planned investment, which of course may be - or may not be - the case. In the first case, where profit-expectations and planned investments match each other, one may say that profits are "determined" (or limited) by supply (which is given). This is the "classical" case. But if, on the other hand, planned investments fall short profit expectations, profits will be determined by investment-demand alone. This is the "keynesian", or more accuratly the "kaleckian" case, where "capitalists get what they spend".

Contrary to Kalecki we will retain the basic ricardian-marxian assumption on price-determination, or more precisely, on the determination of value added, "the labor theory of value". In the light of the discussion above, this may be given the following form, where the equality refers to the "classical", and the inequality to the "kaleckian" case.

2.11 $L \geqq W+P$

In the following, which refers to the "classical" case, we will assume that 2.11 is an equality.

The following equations are all merely definitions :

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1) See especially essay 7-8, "The determinants of profits" and "Determination of national income and consumption", originally published in 1933 and 1939 respectively, in Kalecki (6). The importance of Marx for Kalecki's theory of effective demand was fully recognized Joan Robinson, who regarded herself as a pupil of Kalecki : "Kalecki had one great advantage over Keynes - he had never learned orthodox economics (..) The only economics he had studied was Marx", Robinson (13), p.56.

2.12 $c = nC$ 2.17 $k = \frac{K}{L}$

2.13 $\omega = \frac{W}{L}$ 2.18 $p = \frac{1}{q}$

2.14 $\pi = \frac{P}{L}$ 2.19 $q = \frac{Q}{S} = \frac{Q}{nC+L}$

2.15 $r = \frac{P}{C}$ 2.20 $M = \frac{\omega}{p}$

2.16 $v = \frac{C}{L}$ 2.21 $K = \frac{C}{p}$

By substituting 2.14 and 2.16 into 2.10 and 2.15 respectively, we obtain :

2.22 $\overset{\circ}{C} = \frac{\pi}{v}$ where $\overset{\circ}{C} = \frac{\frac{dc}{dt}}{C}$

2.23 $r = \overset{\circ}{C}$

Thus, the growth rate of capital or the rate of accumulation has to equalize the rate between the capitalists share and the capital-labor-ratio if supply and demand are going to match each other, and furthermore the rate of profit has to be equal to the rate of accumulation. Remembering that capitalists are the only savers in the system, so that the saving rate in supply-demand-equilibrium will be identical to the capitaliste share, it follows that this transformed form of the equilibrium condition (2.22) is identical to the equilibrium-condition obtained by Domar in his (post-keynesian) model of economic growth. This result is by no means a mere coincidence, because Domar was to a great extent inspired by Marx[2)].

By inspection we find that the system 2.22-2.23 has two equations and five variables (r,π,v,C,t), thus three degrees of freedom. In the following, the general procedure will be in each case to invoke assumptions on the income-distribution-variable (π) and the technology variable (v), in order to reduce the system to a relation between the rate of profit and time, $r = f(t)$. By studying the properties of this function we will in each case be able to give a description of how the specific combination of "mode

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2) In the introduction to his pathbreaking article from 1946, Domar makes the following remark :
"This paper deals with a problem which is both old and new-the relation between capital accumulation and employment. In economic litterature it has been discussed a number of times, the most notable contributions belonging to Marx. More recently, it was brought fourth by Keynes and his followers". Domar (3), p.137.

of regulation" and "mode of accumulation" shapes the long run supply-demand-equilibrium growth path of the system. This methodology, it may be noted, follows closely the methodology of the classical political economists, the most notable contributions belonging to Ricardo and Marx[3].

But, recalling the distinction made between the "classical" and the "kaleckian" case, how do we know that the study of long run supply-demand-equilibrium-growth-paths is of any interest at all ? This is of course, as everyone after Keynes has to admit, an important objection to the whole classical exercise. The classics tended to assume that insufficient demand in the short run would –at most– produce short and medium-term deviations from the long run trend. The reason for this, however, was not only, as assumed by Keynes, that they –as in the case of Ricardo[4]– relied on the scientific authority of Mr. Say. Firstly, they assumed that capitalists were structurally forced to accumulate in order to remain in business[5]. Investment,therefore,would tend to grow in line with profits in the medium and long run. Secondly, they assumed that insufficient demand, if it occured, would be followed by corrections on the supply side, restoring supply-demand-equilibrium, if not in the short, so in the medium or long run.

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3) The most typical example is probably Ricardos discussion of the "corn-laws" where he showed how a specific combination of trade policy, the system of income distribution and the technology and factors of production available in the agricultural sector, could produce a falling rate of profit and hence stagnation in the long run. For explorations of the properties of this model, see Kaldor (4) and especially Pasinetti (10), ch.1.

4) Ricardo (12), p.291.

5) This assumption may be found in an especially developed form in Marx' writings, where it takes the form of a theory of technological competition by means of investment, where those who do not invest to a sufficient degree get a productivity-level inferior to the average. Therefore their profit-margins will be eroded, and they will be forced to go out of business. See especially Marx (8), Vol I p. 300f, Vol III, p. 265 and Marx (9) Vol II p. 206. This theory was, interesting enough, later picked up by Schumpeter, and is now more and more widely accepted as an accurate description, not of the capitalism Marx studied, but of contemporary capitalism.

While admitting that insufficient demand-problems are treated in an unsatisfactory manner in the classical tradition, we nevertheless hold the two classical arguments refered above to be basically sound. Regarding the former argument, however, we will make one additional assumption, that capitalists will not continue to invest if profits (or what Marx called "the mass of profit") are falling. This may of course be the result of either a sudden (exogenous) cut in overall demand, or a very rapid deterioration in profitability due to the combined characteristics of the "mode of accumulation" and "mode of regulation" (and not as a result of depressed demand-conditions). We will call the first type of crisis "kaleckian" crisis and the second "classical" crisis. Regarding the latter argument, it may be shown[6] that this holds. Thus, in the case of

crisis , the economy will have a tendency to move in the direction of supply-demand-equilibrium again, even if the adjustment period may be rather long. It may, however, be drastically shortened by countercyclical governmental demand policies, as proposed by Kalecki and Keynes. This may be seen by introducing governmental demand as an additional source of demand in the equations 2.1-2.11 :

$$S = nC + L$$

$$D = W + I + G$$

$$S = D$$

$$nC + L = W + I + G$$

2.24[7] $$\boxed{L = \frac{1}{1-\omega}(\dot{C} + G)}$$

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6) See Appendix 1 to this paper.

7) This is identical to the multiplicator developed by Kalecki if we assume that capitalists' consumption is zero, and (as is the case here) that hours worked are identical to net value added. It departs from the keynesian multiplicator by the fact that it is the distribution of income, and not the aggregate saving rate, that determins the effects of expansionary policy (but the keynesian multiplicator can of course be derived from the kaleckian one). See especially Kalecki (6), p.89, 94-96.

While demand-management may be an adequate remedy for "kalecian" crises, and also may be able to prevent persistent excess-supply problems in the case of "classical" crises, it will not be possible to restore growth by the means of demand management if the crisis is of a "classical" type. The reason is , of course, that the root of the crisis in this case is the depressed profitability-conditions, given supply-demand-equilibrium, and not depressed demand. Furthermore, it may be shown that in the absence of successfull governemental demand-management, "kaleckian" and "classical" crises will have a tendency to interfere with each other, since the "period of adjustment" in the "kaleckian" case is an inverse function of the rate of profit.[8] Thus in the times of "classical" crises, where profitability-conditions are depressed, "kaleckian" crises, if they occur, will be of an especially severe nature.

3. "Early capitalism " : Constant technological level and competitive regulation.

As mentioned in the introduction, this version of the model is characterized by "competitive regulation" and a constant technological level(no productivity growth). It may be regarded as a "stone age" - version of capitalism. More precisely, the assumptions regarding the "mode of regulation" and the "mode of accumulation" may be summarized as follows :

(a) Growth of real wages is determined by the balance between growth in demand and supply for labor. We will assume that if growth in the demand for labor (and labor actually employed) is above (below) a given rate α , real-wages per hours will increase (decrease). This implies that the supply of labor is rather elastic in relation to demand if real wages rise. The explanation may for example be the existence of "surplus labor"-sectors of various kinds, at home or abroad.

(b) Technology is given and constant, thus we assume that the technical composition of capital (k) is constant, and - also - that the level of productivity is constant.

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8) See Appendix 1 to this paper.

(c) Prices are, as mentioned in the introduction, assumed to follow productivity. It follows from the assumptions above that prices in this case will be constant too. Further, we have to assume that the constants are chosen in such a way that the system is physically capable of reproducing itself. We will take this for granted also in the sections to come. The model may now be summarized formally in the following way :

3.1. $M = \frac{\omega}{p}$

3.2. $M = M_o \left(\frac{L}{L_S}\right)^{\mu}$, $\mu > 1$

3.3. $L_S = L_{S_o} e^{\alpha t}$, $o < \alpha < 1$

3.4. $v = C/L$

3.5. $v = kp$

3.6. $k = \frac{K}{L}$

3.7. $k = \bar{k}$ (constant)

3.8. $p = \frac{1}{q}$

3.9. $q = \bar{q}$ (constant)

3.10. $\pi = 1 - \omega$

3.11. $\overset{\circ}{C} = \pi/v$

3.12. $r = \overset{\circ}{C}$

By inspection we find that the system 3.1-3.12 contain 13 variables $(M,\omega,p,L,L_S,\pi,v,K,C,k,q,r,t)$ and 12 equations, thus we should now be able to deduct a relation between the rate of profit (or the rate of capital accumulation) and time :

$$\mathring{r} = \mathring{\pi} - \mathring{v} = (- \frac{\dot{\omega}}{\pi} - (\mathring{k} - \mathring{q})) = - \frac{\dot{\omega}}{\pi}$$

$$\dot{r} = - r \frac{\dot{\omega}}{\pi} = - \frac{r}{\pi} (\mathring{M} - \mathring{q})\omega = - \frac{r\omega}{\pi} \mathring{M} = - \frac{r\omega}{\pi} \mu (\mathring{L} - \alpha)$$

$$\dot{r} = - \frac{\omega}{v} \mu (\mathring{C} - \mathring{v} - \alpha)$$

$$3.13 \quad \boxed{\dot{r} = - \frac{\omega}{v} \mu (r - \alpha)} \qquad \dot{r} \gtrless 0_1 \text{ for } r \lessgtr \alpha \quad (\text{assuming } \omega \neq 0)$$

From 3.13 it follows that the system has an equilibrium solution, $r = \alpha$, and further that this will be a stable equilibrium, since the rate of profit (and the accumulation-rate) falls if the rate of profit originally is above, and rises if the rate of profit originally is below, the equilibrium level, as shown in figure 1. It follows from the equation-system 3.1-3.12 that in equilibrium both capital, labor, total wages, profits and production[9] - in physical or value terms - will grow at the same uniform rate, α, identical to the rate of profit.

This very promising development, for the capitalists at least, may of course be disturbed by "kaleckian" crises, since short-run problems of demand-insuffiency may occur at any time in the absence of demand-management by the governement. In this case demand for labor will go down and so will

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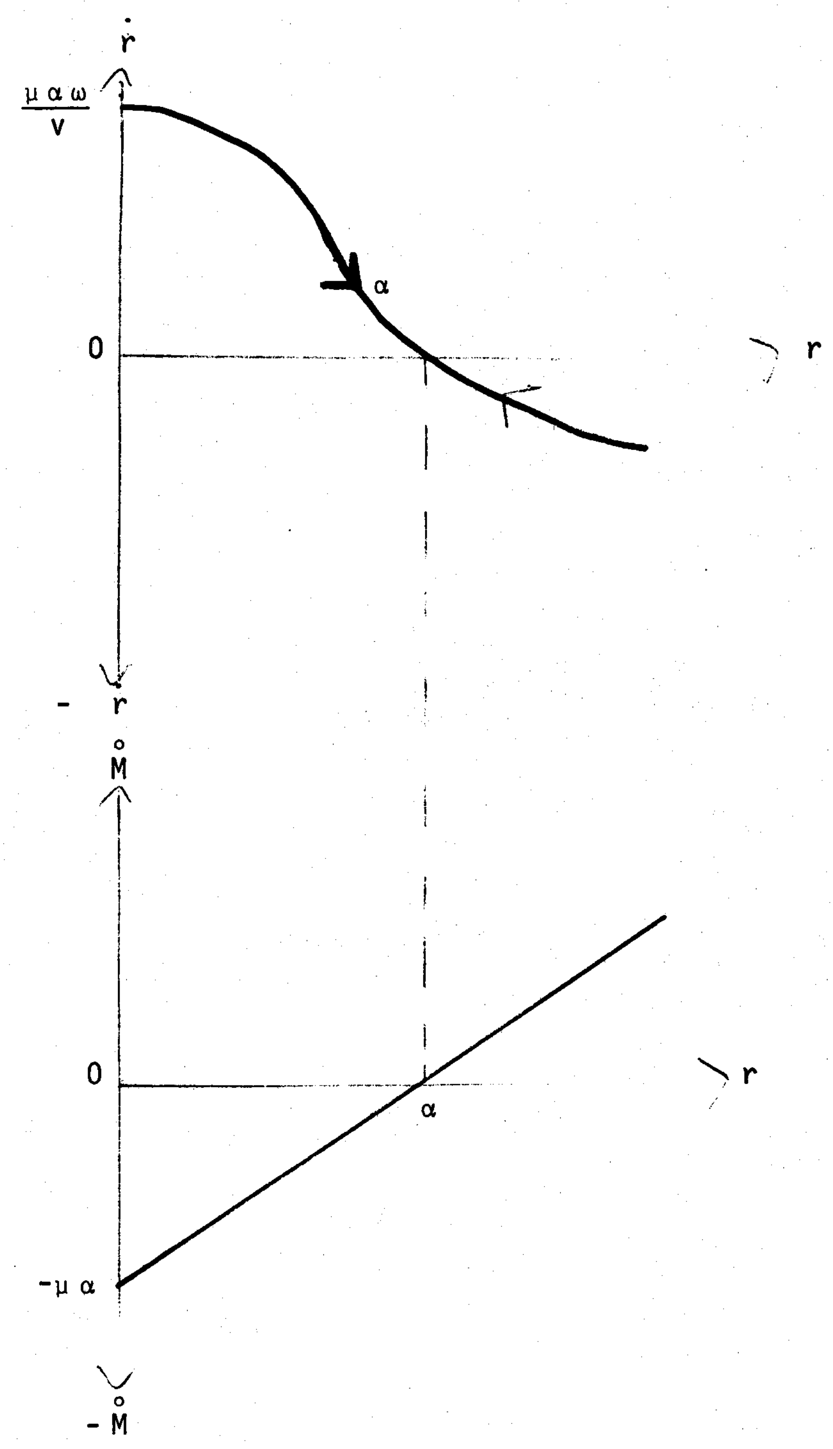
9) This may seem less evident in the case of production than in the other cases :

$$Q = qS = q\ (nC+L) = q\ (n\frac{K}{q} + L) = nK+Lq$$

$$\frac{Q}{L} = nk+q \text{ (constant)}$$

$$\mathring{Q} = \mathring{L} = \alpha$$

FIG. 1. THE EQUILIBRIUM SOLUTION OF THE "EARLY CAPITALISM" - VERSION.



the wage rate, accelerating somewhat the problems of insufficient demand. But the (supply-demand-equilibrium) rate of profit will increase, and this will tend to shorten the adjustment period, since this period is inversely related to the (supply-demand-equilibrium) rate of profit.[10] Furthermore, when supply-demand-equilibrium is restored, the actual rate of profit will be above the equilibrium-value, and as a consequence also the rate of growth, and the wage-rate will increase. In the course of time, however, the equilibrium solution will be restored, and the wage rate will return to its "normal" level. Thus with "competitive regulation" and constant technology/ level of productivity, the most likeley result may be a cyclical development of real-wages and growth, where the level of real-wages fluctuates in the same direction as the overall growth-rate of the economy, as proposed by Boyer (2).

4. Transitory capitalism : Competitive regulation with "taylorist" methods of production.

Things seemed to work quite well for the capitalists in "early capitalism", even if they did not have the possibility of rising their rate of profit above a given level, with the exception of short- and medium-term deviations from the long run trend. The assumptions of constant techniques and no productivity-growth, however, were of course very radical simplifications, which nevertheless made it possible to study some of the mechanisms characterizing the "mode of regulation". But the crucial question remains: What happens when the simplyfing assumptions regarding technical progress and productivity growth are relaxed ? The mechanisms which served as stabilizing forces in an economy with no productivity growth, will they work in the same way when the assumptions regarding technology and productivity are changed ? This is the question we shall try to discuss in this section.

Following the analyses of the regulation-school, we will distinguish between three modes of raising productivity. The first is the taylorian project of work intensification, where productivity is raised by an increased pace of production, elimination of breaks etc, without a change in the relation between physical capital-equipment and living labor. The

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10) See Appendix 1 to this paper.

second way of increasing productivity, which we will take into account here is rationalization, i.e. a reduction of the amount of labor necessary to operate a plant of given size by introducing new forms of work-organisation, specialization etc. A third related way of productivity-increase is the construction of new plants which reduce the amount of labor necessary by mechanizing major parts of the production-process (introduction of assembly-lines etc).These "fordist" types of mechanization, especially assembly-lines, also greatly increase the scope for labor-intensification and rationalization.

Although the three ways of productivity-increase mentioned above are closely related, they do differ in one important respect. While both rationalization and mechanization are accompanied by an increase in the relation between physical capital and labor, or what we have called the technical composition of capital, this is not the case with labor-intensification in its purest form. It follows that the macroeconomic consequences of introducing them into the process of production also may be rather different. In this version we are primarilly going to study the consequence of the introduction of taylorist methods of production, postponing the discussion of the other two to section 5. The reason is, of course, that introduction of these forms of productivity increase on a broad scale historically was accompanied by a shift in regulation.

In this section we are going to keep the equations 3.1-3.12 except one, the productivity-equation (3.9). Since productivity-growth in this case bears no relation to investment, and the technical composition of capital is assumed constant, we are going to let productivity be a function of time alone :

4.9.a $\overset{\circ}{q} = \rho \Leftrightarrow q = q_o e^{\rho t} \quad o < \rho < 1$

We are going to assume that ρ is a constant, but it may also be a function of time, most probably a decreasing one. Together with equations 3.1-3.8,3.10-3.12, equation 4.9.a defines a system of 12 equations and 13 variables, thus it should be possible to deduct a relation between the rate of profit (or capital) and time.

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Let us start with the real-wage-equation, substituting hours worked with capital, technology and productivity :

$$M = M_o \left(\frac{L}{L_S}\right)^{\mu} = M_o \left(\frac{\frac{C}{k} q_o e^{\rho t}}{L_{S_o} e^{\alpha t}}\right)^{\mu} = M_o \left(\frac{C_o}{L_{S_o}} \frac{q_o}{k}\right)^{\mu} \left(\frac{C}{C_o}\right)^{\mu} e^{\mu(\rho - \alpha)t}$$

Assuming, for convience, $L = L_S$ and $C = 1$ for $t = o$, leaves us with :

$$M = M_o C^{\mu} e^{\mu(\rho - \alpha)t}$$

By substituting this expression of the real wage into the rate profit, and invoking the supply-demand-equilibrium condition, i.e. that the rate of profit has to be equal to the rate of capital accumulation :

$$r = \frac{1-\omega}{v} = \frac{1 - \frac{M}{q}}{k} = \frac{q-M}{k} = \frac{1}{k} [q_o e^{\rho t} - M_o C^{\mu} e^{\mu(\rho-\alpha)t}]$$

4.13.a	$\dot{C} = \frac{q_o}{k} e^{\rho t} C - \frac{M_o}{k} e^{\mu(\rho - \alpha)t} C^{\mu+1}$

Thus we have arrived at an equation of the type we have been looking for, although rather complicated. A graphical presentation may help a little. Assume t=o then

$$\dot{C} = \frac{q_o}{k} C - \frac{M_o}{k} C^{\mu+1} = C \frac{M_o}{k} \left(\frac{q_o}{M_o} - C^{\mu}\right)$$

$$\dot{C} \gtrless o \text{ , for } C \lessgtr \left(\frac{q_o}{M_o}\right)^{1/\mu}$$

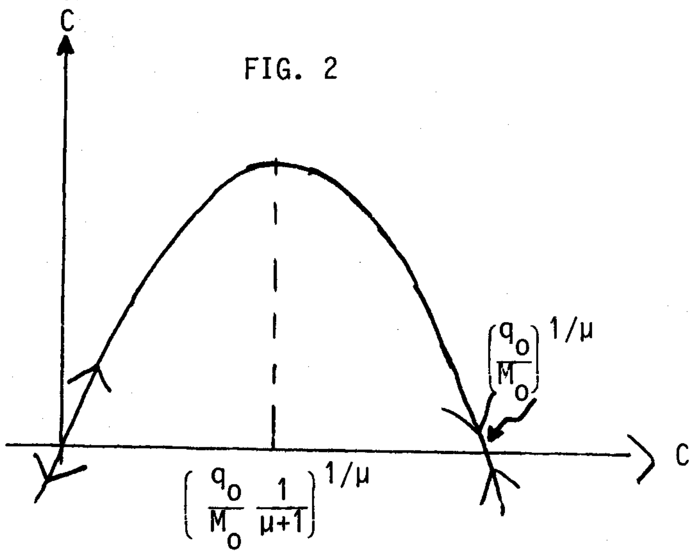
$$\dot{C} = o \text{ , for } C = o$$

$$\frac{\partial \dot{C}}{\partial C} = \frac{q_o}{k} - (\mu+1) \frac{M_o}{k} C^{\mu}$$

$$\frac{\partial \dot{C}}{\partial C} \gtrless o \text{ , for } C \lessgtr \left(\frac{q_o}{M_o} \frac{1}{\mu+1}\right)^{1/\mu}$$

$$\frac{\partial^2 \dot{C}}{\partial C^2} = \mu(\mu+1) C^{\mu-1} > o \text{ , for } C > o$$

FIG. 2



Similar curves can be drawn for other values of t . Assuming, on the contrary that $\dot{C} = o$, leaves us with

$$\dot{C} = o \quad , \quad C = \left(\frac{q_o}{M_o}\right)^{1/\mu} \; e^{(\alpha+\rho\frac{1-\mu}{\mu})t} \; = \; C^*$$

This curve obviously depends very much on the value on the exponent $\alpha + \rho\frac{1-\mu}{\mu}$. Three cases can be distinguished :

a) $\alpha + \rho\frac{1-\mu}{\mu} > o \quad , \quad C^* \to \infty \quad , \quad t \to \infty$

b) $\alpha + \rho\frac{1-\mu}{\mu} = o \quad , \quad C^* = \left(\frac{q_o}{M_o}\right)^{1/\mu}$ for all values of t

c) $\alpha + \rho\frac{1-\mu}{\mu} < o \quad , \quad C^* \to o \quad , \quad t \to \infty$

The function is presented graphically in figur 3a-c. Obviously, an equilibrium will exist in case b) where $\alpha + \rho\frac{1-\mu}{\mu} = o$. In this case the economy tends to a zero rate of profit. This, however, is a rather special case since it presupposes a specific relation between the coefficients of the system, and the result, a zero rate of profit is not very encouraging from a capitalist point of vue. Case c) is not very encouraging either, since the system in this case virtually disappears, the rate of profit being negative. Our main interest, therefore is the case a) where $\alpha + \rho\frac{1-\mu}{\mu} > o$ since this is the only case which may allow for a positive rate of profit in the long run. The growth of employment may very well be above the growth in "normal" supply, as mentioned earlier, but we will assume that growth-rate in hours worked cannot be indefinitely large. For an equilibrium to occur, therefore, the rate of profit has to be positive and constant or at least tend towards a positive and constant level. It is not easy to see from figure 2 whether this may be the case or not. Let us therefore go back to equation 4.13.a and try to answer the question more directly. If the rate of profit is constant, $\partial\mathring{C} / \partial t = o$:

$$\mathring{C} = \frac{q_o}{k} e^{\rho t} - \frac{M_o}{k} e^{\mu(\rho-\alpha)t} C^{\mu}$$

$$\frac{\partial \mathring{C}}{\partial t} = \frac{q_o}{k}\,\rho\, e^{\rho t} - \frac{M_o}{k}\,\mu(\rho-\alpha)\, e^{\mu(\rho-\alpha)t}\, C^{\mu} - \frac{M_o}{k}\, e^{\mu(\rho-\alpha)t}\,\mu\, C^{\mu-1}\,\dot{C}$$

$$\frac{\partial \mathring{C}}{\partial t} = -\frac{M_o}{k}\, e^{\mu(\rho-\alpha)t}\,\mu\, C^{\mu}\left[\mathring{C} - \left((\alpha-\rho) + \frac{q_o}{M_o}\,\frac{\rho}{\mu}\,\frac{e^{\mu(\alpha+\rho\frac{1-\mu}{\mu})t}}{C^{\mu}}\right)\right]$$

$$\frac{\partial \mathring{C}}{\partial t} = o\ ,\quad \mathring{C} = \frac{q_o}{M_o}\,\frac{\rho}{\mu}\left(\frac{e^{(\alpha+\rho\frac{1-\mu}{\mu})t}}{C}\right)^{\mu} + \alpha - \rho = \mathring{C}^{*} = \text{constant.}$$

Again, three cases may be distinguished :

a) $\mathring{C} > \alpha + \rho^{1-\mu/\mu} > o$.

In this case the first term in C^* will vanish and $\mathring{C} = C^*$ seems to approach $\alpha - \rho$. This cannot be the case however, because according to our assumptions $\mathring{C} > \alpha + \rho\frac{1-\mu}{\mu} > \alpha - \rho$ for all values of t . Furthermore for $\mathring{C} = \alpha - \rho$, it follows from 4.13.a that $\mathring{C}$ grows exponentially. The result is contradictory and clearly not the solution we are looking for.

b) $\mathring{C} = \alpha + \rho\frac{1-\mu}{\mu} > o$, $\mathring{C} = \alpha + \frac{q_o}{M_o}\,\frac{\rho}{\mu} - \rho = \text{constant}$

This may seem to fit, but the two expressions of $\mathring{C}$ have to be identical, which will be the case if, and only if, $\frac{q_o}{M_o} = \frac{1}{\omega_o} = 1$

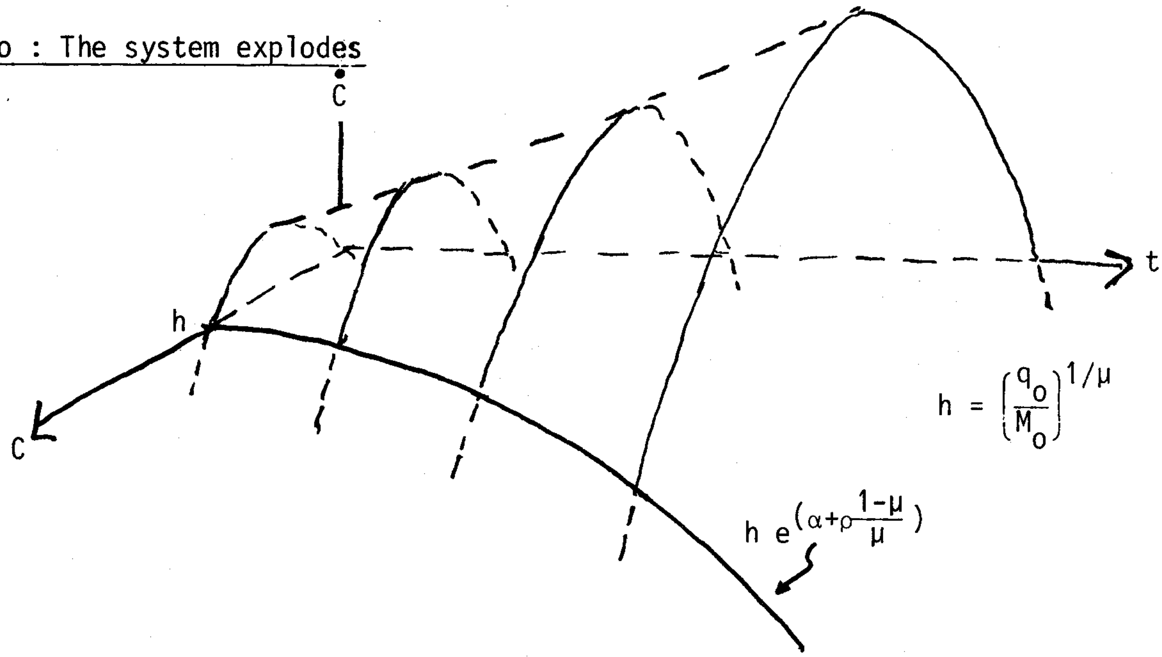
What will happen to ω in this case if $t \neq o$

$$\omega = \frac{M}{q} = \frac{M_o}{q_o}\, e^{\rho t}\, e^{\mu(\rho-\alpha)t} C^{\mu} = \frac{M_o}{q_o}\,\frac{e^{(\alpha+\rho\frac{1-\mu}{\mu})t}}{e^{(\alpha+\rho\frac{1-\mu}{\mu})t}} = \frac{M_o}{q_o}$$

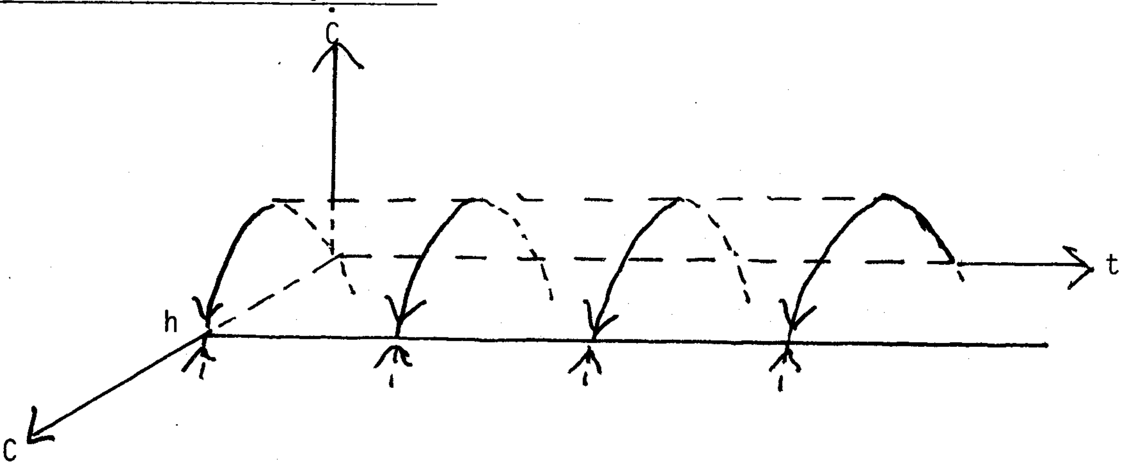
Thus in this case $\omega = 1$ for all values of t and, consequently $\mathring{C} = r = \frac{1-\omega}{v} = o$ for all values of t . Thus $\alpha + \rho\frac{1-\mu}{\mu} = o$.
This is clearly identical to the stationary equilibrium discussed above, characterized by a zero rate of profit and depending on a specific,and therefore unlikely, relation between the coefficients of the system.

FIG.3 - THE SOLUTIONS OF THE "TRANSITORY-CAPITALISM" VERSION OF THE MODEL

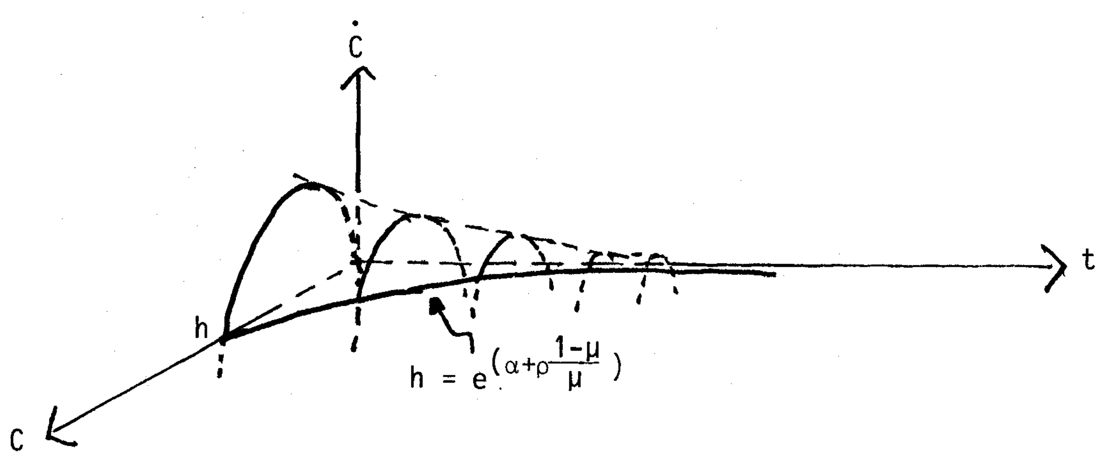
(a) $\alpha+\rho\frac{1-\mu}{\mu} > o$: The system explodes



(b) $\alpha + \rho\frac{1-\mu}{\mu} = o$: The "stationary state"



(c) $\alpha + \rho\frac{1-\mu}{\mu} < o$: The system disappears



c) $o < \overset{\circ}{C} < \alpha + \rho \frac{1-\mu}{\mu} > o$, $\overset{\circ}{C}^{*} \to \infty$, $t \to \infty$ which does not fit either.

The following conclusion seems unavoidable : an equilibrium-solution characterized by, or converging towards, a constant positive rate of profit does not exist with the given specification of the system. It may be noted that this conclusion does not rest on the specific form of the labor-market-function, provided that the basic principle of wage-determination through "demand and supply" is retained[11]. One may ask, however, whether a solution may be obtained if the labor-market-function is skipped, or if the result rests on some other characteristics of the system. To answer this question, we substitute equation 3.1 with a restriction on the growth in hours worked :

4.1.a $\quad \alpha \gtrless \overset{\circ}{L} \lessgtr \gamma$

To make things simple, we assume that 4.1.a is an equality, thus $\alpha \gtrless \overset{\circ}{L} = \gamma$. Substituting this condition into the rate of profit :

$$r = \overset{\circ}{C} = \overset{\circ}{K} - \rho = \overset{\circ}{L} - \rho = \gamma - \rho$$

Thus, this leaves us with a constant, positive rate of profit, provided that γ (or α) is greater than ρ . We are going to look for an equation for the determination of real wages which fits into this :

$$r = \frac{1-\omega}{v} = \frac{1 - \frac{M}{q}}{\frac{k}{q}} = \frac{q - M}{k}$$

4.1.b $\quad M = q - kr = q_o e^{\rho t} - k(\gamma-\rho)$

Which may be used as an alternative to equation 4.1.a.

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11) Different linear and logaritmic versions were tried, retaining $(\frac{L}{L_S})$ or $(L-L_S)$ in the argument of the function. In all cases the system yielded a result comparable to figur 3a-c but all three solutions (a-c) did not exist in every case, and the exponent of the function C^* for $\overset{\circ}{C} = o$ also varied slightly from case to case.

Thus, the problems of the "transitory capitalism" -version of the model rest on the way the labor market is organized. If competitive regulation is abolished, and a system based on indexation of real wages in line with productivity[12], on the basis of a given level of capital-accumulation or growth in hours worked, is introduced, the problems may be avoided [13]. This holds of course, only as long as "kaleckian" crises are avoided too. An institutional reform then, introducing wage-productivity-indexation ("fordism") and demand-management ("keynesianism"), should according the discussion here, be an adequate remedy for the crises of "transitory capitalism". Whether this is a sufficient condition for stability and growth also in a system based on "fordist" method of production, or not, is the question we are going to discuss in the next section.

5. Modern capitalism : Monopolistic regulation with "taylorist" and "fordist" methods of production.

The crises of transitory capitalism were overcome through two major social innovations, demand management and wage-productivity-indexation (in association with collective bargaining). Following the "regulation school" we will use the label "monopolistic" (or "administrated")regulation for this type of institutional framework. In the following we are going to assume that under monopolistic regulation demand-management are pursued by the governments and in a successfull way, so that "kaleckian" crises are avoided, and that real-wage-growth follows productivity-growth. Furthermore we will assume that a part of the wages is given as indirect wages in the form of governmental services, backing

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12) It may be shown that this result holds even when fordist methods of production are introduced, provided that the effect on the development of the capital-labor-ratio is "capital-saving" or "neutral" in value terms.

13) The solution resembles the Kaldor-Pasinetti-solution of the Harrod-Domar-model, letting the distribution of income be the variable to be determined endogenously in the system. Pasinetti makes the following remark : "If the so much feared increasing immiserization of the working class is avoided, and a continually growing level of per-capita wages takes place instead, one can hardly attribute it to any intrinsic merit of a capitalist system. What is taking place is imposed by the requirements of survival. The system could not last otherwise –it would be doomed to slump and collapse" (Pasinetti (10) p. 102. As we are going to see in the next section, however, this conclusion, while valid as long as "taylorist" methods dominates, may be a little bit too hasty for the case when "fordist" methods of production dominates.

the new way of life (mass-consumption), and transfers. In addition, and important in relation to what follows, we assume that the governments pursue full-employment-policies. That is, if the growth of private demand for labor is below the growth of the supply of labor, which is assumed to be given and constant, the workers not employed by the private sector will be employed by the government or receive transfers which are identical to the sum of direct and indirect wages to workers actually employed. Both direct and indirect real wage per hour is assumed to follow productivity. The indirect (governmental) part may of course be assumed to grow faster, but we will leave this possibility aside (as may be seen from what follows, the problems will be great enough without this type of governmental "profit-squeeze"-policies).

Regarding technology, we will allow for both "taylorist" and "fordist" production-methods. We will, however, assume that the effect of work-intensification becomes less important through time. Regarding rationalization/mechanization, productivity growth are in both cases accompanied by increasing technical composition of capital. We will therefore assume that productivity-growth in these cases can be regarded as a function of the growth in this ratio. Furthermore we will assume that the best-practise-techniques in terms of the technical composition of capital move steadily forwards at a constant rate β, which we assume to be rather small, and in every case below one. The coefficient determining the effect of increases in the technical composition of capital on productivity growth, must also be below one. If not, it can be shown that labor will be an inferior factor of production"[14].

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14) This may be seen in the following way :

$$q = \frac{Q}{S} = \frac{Q}{nC+L} = \frac{Q}{n\frac{K}{q}+L}$$

$$Q = nK + qL$$

$$Y = Q-nK = qL$$

$$Y = \phi \; K^{\lambda} \; L^{1-\lambda}$$

$$\frac{\partial Y}{\partial L} = \phi \; K^{\lambda}(1-\lambda)L^{-\lambda} < 0, \text{ for } \lambda > 1$$

We should now be able to give the "modern-capitalism"-version of the model a functional form. First of all, however, we have to reformulate the definition of profit (P) :

L = hours worked in the capitalist sector

L_s = supply of work in hours

g = indirect wage (value) per hour

$$L = \omega L + dC + gL_s + \omega(L_s - L) \quad , \text{ for } L_s > L$$

$$L = (\omega + g)\, L + dC \quad , \text{ for } L_s < L$$

$$P = L - (\omega + g)\, L_s \quad , \text{ for } L_s > L$$

$$P = L - (\omega + g)\, L \quad , \text{ for } L_s < L$$

The whole system is given below :

5.1 $$M = \frac{\omega}{p}$$

5.2 $$M = \phi_1 q$$

5.3 $$\Pi = 1 - (\omega + g)\frac{L_s}{L} \quad , \text{ for } L_s > L \; ,$$
$$\Pi = 1 - (\omega + g) \quad , \text{ for } L_s < L \; , \; g \text{ (constant)}$$

5.4 $$v = \frac{C}{L}$$

5.5 $$v = kp$$

5.6 $$k = k_o\, e^{\beta t} \quad , \; \beta \text{(constant)} \quad , \; o < \beta < 1$$

5.7 $$p = \frac{1}{q}$$

5.8 $$q = q_o\, e^{\ln t^{\rho}} \left(\frac{k}{k_o}\right)^{\lambda} \qquad \rho, \lambda \text{ (constant)}$$
$$0 < \rho, \lambda < 1$$

5.9 $$\overset{\circ}{C} = \frac{\Pi}{v}$$

5.10 $$r = \overset{\circ}{C}$$

5.11 $$P = L - (\omega + g) L_s \quad , \quad \text{for } L_s > L$$
$$P = L - (\omega + g) L \quad , \quad \text{for } L_s < L$$

5.12 $$L_s = L_{so} e^{\lambda t} \quad , \quad \text{for } L_s < L$$

We are going to consider two different cases :

1) $L_s \leqq L$

2) $L_s > L$

In the first case we have a system of 11 equations and 12 variables; which we are going to solve in the same way as in the earlier sections. In this case, it may be noted, where the demand for labor is above or identical to supply, it is assumed that the demand for labor will be satisfied, even when it is above "normal" supply. This may for example be the result of "immigation" to the labor market from sectors characterized by "surplus-labor" at home or abroad, or by increased participation-rates; due to strong demand-pressure in the labor-market. Alternatively we might have assumed that the growth in hours worked always has to be identical to or below the growth in "normal" supply, and that the pace of introduction of new techniques (the growth in the technical composition of capital) adapts to the restriction posed by the limited growth in labor supply,as long as this makes it impossible to introduce new techniques at the optimal rate β . The results regarding the long-term-growth of the system, however, would not be very different.

In the first case :

$$\overset{\circ}{L}_s \leqq \overset{\circ}{L}$$

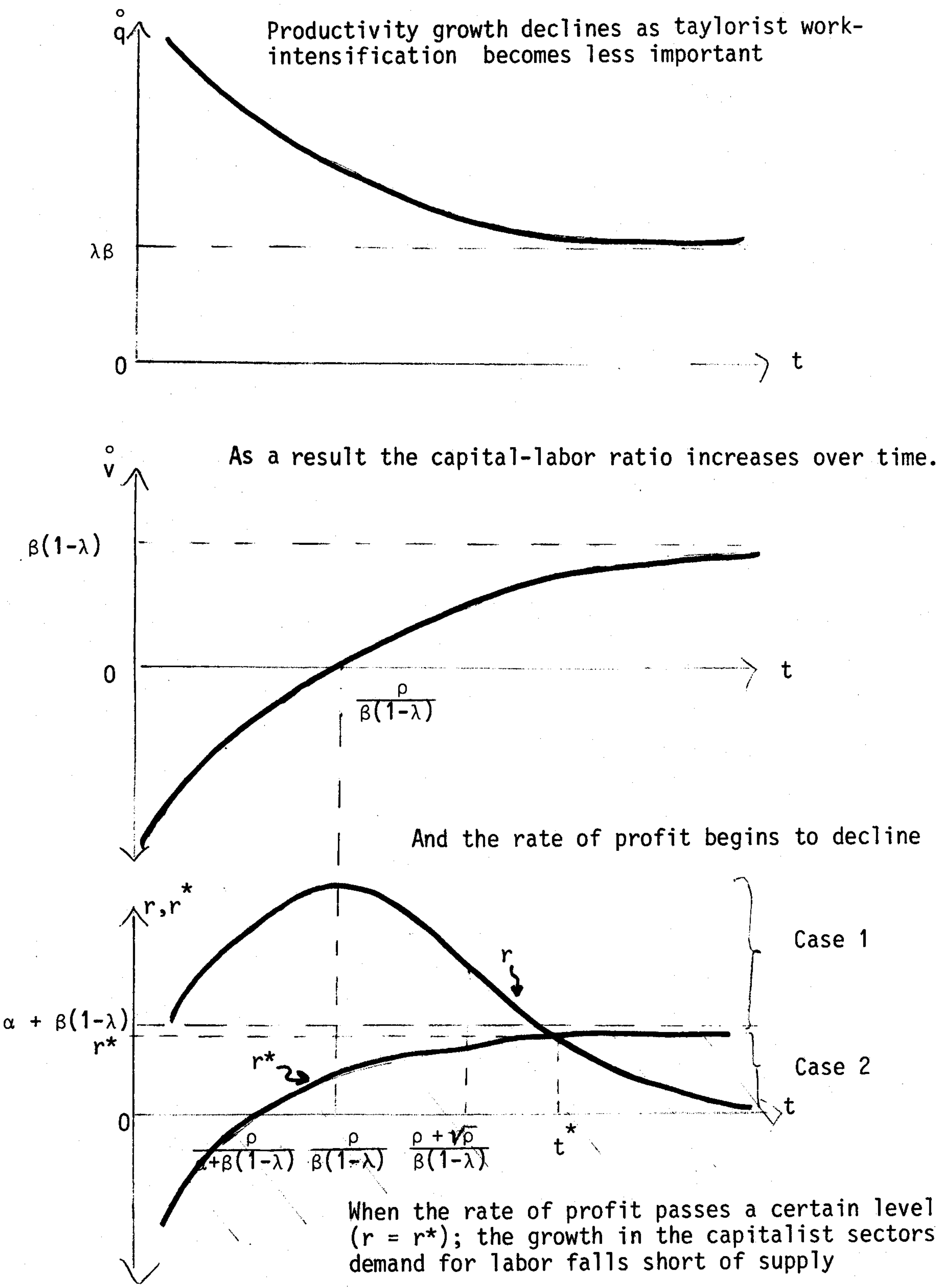
Productivity growth declines as the effect on productivity of taylorist-work intensification vanishes :

$$\overset{\circ}{q} = \frac{\rho}{t} + \lambda \left(\frac{\overset{\circ}{k}}{k_0}\right) = \frac{\rho}{t} + \lambda \beta$$

$$\frac{\partial \overset{\circ}{q}}{\partial t} = - \frac{\rho}{t^2} < 0 \quad , \quad \frac{\partial^2 \overset{\circ}{q}}{\partial t^2} = \frac{\rho}{t^3} > 0$$

$$\lim_{t \to \infty} \overset{\circ}{q} = \lambda \beta$$

FIG. 4 : MODERN CAPITALISM : THE CASE OF FULL EMPLOYMENT SECURED BY THE CAPITALIST SECTOR.



As a consequence, the capital-labor-ratio starts to grow :

$$v = k\,p = \frac{k}{q}$$

$$\overset{\circ}{v} = \overset{\circ}{k} - \overset{\circ}{q} = \beta(1-\lambda) - \frac{\rho}{t} \gtrless 0 \;, \quad \text{for } t \gtrless \frac{\rho}{\beta(1-\lambda)}$$

$$\frac{\partial \overset{\circ}{V}}{\partial t} = \frac{\rho}{t^2} > 0 \;, \quad \frac{\partial^2 \overset{\circ}{V}}{\partial t^2} = -\frac{\rho}{t^3} < 0$$

$$\lim_{t\to\infty} \overset{\circ}{V} = \beta(1-\lambda) > 0$$

Since relative income shares are constant, the rate of profit becomes a declining function of the capital-labor-ratio alone :

$$r = \frac{\Pi}{v} = \frac{1-(\omega+g)}{v} \;, \quad \omega + g = \text{constant}$$

5.14 $$\dot{r} = r\,(-\overset{\circ}{v}) = r\left(\frac{\rho}{t} - \beta(1-\lambda)\right) \gtrless 0 \;, \quad \text{for } t \lessgtr \frac{\rho}{\beta(1-\lambda)}$$

$$\ddot{r} = -r\,\frac{\partial \overset{\circ}{V}}{\partial t} + (-\dot{r}\,\overset{\circ}{V}) = -r\left[\frac{\rho}{t^2} - \left(\frac{\rho}{t} - \beta(1-\lambda)\right)^2\right]$$

$$\ddot{r} = r\left[\left(\frac{\rho}{t} - \beta(1-\lambda) - \frac{\sqrt{\rho}}{t}\right)\left(\frac{\rho}{t} - \beta(1-\lambda) + \frac{\sqrt{\rho}}{t}\right)\right]$$

Since ρ have to be less than one to fit $t = 1$, the first term in brackets will be negative.
Thus :

$$\ddot{r} \gtrless 0 \;, \quad \text{for } \left(\frac{\rho}{t} - \beta(1-\lambda) + \frac{\sqrt{\rho}}{t}\right) \lessgtr 0$$

$$\ddot{r} \gtrless 0 \;, \quad \text{for } t \gtrless \frac{\rho + \sqrt{\rho}}{\beta(1-\lambda)}$$

As the rate of profit decreases towards zero, a level will necessarily be reached where the growth in the capitalist sector's demand for labor falls short of the (given) growth in "normal" supply :

5.4 - 5.10 $$v = \frac{C}{L} \;, \quad \overset{\circ}{L} = \overset{\circ}{C} - \overset{\circ}{v} = r - \overset{\circ}{v}$$

$$\overset{\circ}{L} = r - (\beta(1-\lambda) - \frac{\rho}{t})$$

$$\overset{\circ}{L} > \alpha \quad , \text{ for } \quad r > \alpha + \beta(1-\lambda) - \frac{\rho}{t} = r^*$$

$$\frac{\partial r^*}{\partial t} = \frac{\rho}{t^2} \; , \; \frac{\partial^2 r^*}{\partial t^2} = -\frac{\rho}{t^3} \; , \; r^* \lessgtr 0 \; , \; \text{for } t \gtrless \frac{\rho}{\alpha+\beta(1-\lambda)}$$

$$r^* \rightarrow \alpha + \beta(1-\lambda) \quad , \quad t \rightarrow \infty$$

The working of the model in this case is sketched in figure 4. It follows that the economy necessarily reaches a state where the government has to intervene in order to prevent rising unemployment. In this (second) case unemployment may be avoided, but the effect of the rate of profit will be that it falls even faster than before, since in this case the capitalists share will be falling too.

In this case, $\overset{\circ}{L} < \overset{\circ}{L}_s$. The system 5.1 - 5.12 contains 13 variables and 12 equations, thus one degree of freedom as in the earlier cases. The capitalists share falls if :

$$\overset{\circ}{\Pi} = -(\omega + q)\left[\frac{\dot{L}_s L - \dot{L} L_s}{L^2}\right] = \frac{L_s}{L}(\omega+q)(\overset{\circ}{L} - \overset{\circ}{L}_s) < 0 \text{ for } \overset{\circ}{L} < \overset{\circ}{L}_s$$

$$\overset{\circ}{\Pi} = \frac{L_s}{L}(\omega+q)(r - \overset{\circ}{v} - \alpha) \quad , \text{ assuming } \frac{\rho}{t} \approx 0$$

5.15 $$\dot{\Pi} = \frac{L_s}{L}(\omega+q)\left(r - (\alpha+\beta(1-\lambda))\right) < 0, \text{ for } r < \alpha+\beta(1-\lambda)$$

The rate of profit falls if :

$$\dot{r} = r(\overset{\circ}{\Pi} - \overset{\circ}{v}) = r\left[\frac{1-\Pi}{\Pi}(r-(\alpha+\beta(1-\lambda)) - \beta(1-\lambda)\right]$$

5.16 $$\dot{r} = r\,\frac{1-\Pi}{\Pi}\left(r - (\alpha + \frac{\beta(1-\lambda)}{1-\Pi})\right) < 0 \; , \; \text{for } r < \alpha + \frac{\beta(1-\lambda)}{1-\Pi}$$

The real interesting question in this case, however, is whether or not profits will begin to fall too, producing a "classical crisis" :

$$\overset{\circ}{P} = \overset{\circ}{\Pi} + \overset{\circ}{L} = \overset{\circ}{\Pi} + \overset{\circ}{C} - \overset{\circ}{v}$$

$$\overset{\circ}{P} = \frac{1-\Pi}{\Pi}\left(r - \left(\alpha + \frac{\beta(1-\lambda)}{1-\Pi}\right)\right) + r - \beta(1-\lambda)$$

$$\overset{\circ}{P} = \frac{r}{\Pi} - \left(\frac{1-\Pi}{\Pi}\alpha + \frac{1+\Pi}{\Pi}\beta(1-\lambda)\right)$$

5.17

$$\overset{\circ}{P} = \frac{1}{\Pi}\left(r - ((1-\Pi)\alpha + (1+\Pi)\beta(1-\lambda))\right)$$

$$\overset{\circ}{P} < 0 \quad , \; r < (1-\Pi)\alpha + (1+\Pi)\beta(1-\lambda)$$

It follows that a positive rate of profit can be defined for each level of the income distribution below which profits fall along with the rate of profit and the capitalists'share. We may conclude then, that the characteristics of "modern capitalism" imply a tendency towards "classical crisis" in the long run. When this crisis occurs, the government may successfully prevent the crisis from aggravating through demand-management, but it will not be possible to restore the growth-potential of the economy by those means, since the crisis is caused by depressed profitability-conditions. Furthermore, a reduction in the workers share or in the level of indirect wages, which may restore profitability in the short run, will not change the long-run tendencies towards crisis, stagnation and rising unemployment. A policy aiming at reversing these trends cannot, if the assumptions underlying this model are correct, be based on changes in the system of distribution alone, but have to interfere with the conditions of competition, technological change and organisation of the labor-process as well. Whether or not this is possible without major changes in the social and political structure of society, or the "regulation", rests in the dark.

6. Concluding remarks.

The aim of this paper was partly to explore the possibilities of introducing the concepts of "mode of regulation" and "mode of accumulation" within a framework derived from classical political economy, expecially Marx, and partly to highlight some of the problems discussed by the "regulation-school" from a related, but somewhat different angle.

Regarding the first point, we hope to have shown that the introduction of concepts refering to different "stages" of historical development into the classical framework makes it much more suited for both historical analysis and analysis of present-day capitalism. In our view this seems to be a much more promising way of developing the classical framework than attemps to derive supra-historical "laws of accumulation" for the capitalist epoch as a whole, the most famous example being the discussion within marxian economics of "the law of the falling rate of profit".

Whether the models presented here throw any additional light on the analyses of the "regulation school" or not, may of course be a matter of discussion. This is especially so because of the many simplifications made. The need for further work should be obvious, especially on topics as money, credit and investment-behaviour, which of course are closely related. Without a better treatment of these topics, it will difficult also to treat the possibility of "kaleckian" crises, which now are discussed mostly "ad hoc", in a more satisfactory manner.

If, however, one accepts simple macro-models like the one presented here as helpfull tools in analyses of long term economic development, it is difficult not to draw the conclusion that it gives some support to the analyses of the "regulation-school"[15]. An especially

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15) It may also give support to the type of analysis carried out by Perez(11) from a somewhat different angle. According to Perez, long term economic development must be analyzed as the result of changing technological paradigmes and (lack of) correspondance between these changes and the existing social and institutional framework. "Taylorist" and "fordist" methods, then, could be seen as examples, or parts, of such paradigmes. The analysis of Perez is especially relevant in the present context because she tries to analyse the present crisis not only as the result of the exhaustion of the existing technological paradigme, but also as a result of the inability of the existing social and institutional system to cope with the technological paradigme which is emerging. This is of course a way of thinking which is very close to "regulation-school".

striking result was that it was shown that a determination of real-wages based upon demand and supply for labor, which worked quite well in an economy without technical progress, was incapable of securing a long-term equilibrium when technical progress in the form of taylorist methods was introduced. These problems, however, could be overcome if the supply-demand determination of wages was abandoned, and a system based on productivity-indexation of wages was introduced. This gives strong support to the analyses of the "regulation school" of the crises of the thirties as caused by the inability of the old mode of regulation to secure a balanced growth through a sufficient rate growth in real wages. The crises of the thirties then, according to this interpretation and the models developed here, was not only a crisis of insufficient demand in general (the "keynesian point), but also –and may be more fundamental– a result of a lack of macro-economic balance caused by the tensions by the changing mode of accumulation and the prevailing, "competitive" mode of regulation.

While the change of regulation following the crises of the interwar-period and the second world war may be seen as an adequat remedy for the crises caused by the introduction of taylorist, and to some degree also fordist, methods of production, it is not obvious that the new institutional framework will work in the same stabilizing way when fordist methods of production have become the dominant mode of production. If the assumptions made here are correct, the crises of the seventies and eighties may be seen as the combined result of the reduced significance of taylorist methods of productivity growth, and the generalization of fordist methods of production based on capital-intensive techniques. The consequence then, according to the model of the changes in the mode of accumulation and the existing institutional framework, is a falling rate of profit, and a "classical" crisis in the long run. If this is correct, it implies that a solution of the present crisis cannot be based on a change in regulation alone, contrary to the crises of the thirties, but necessarily presupposes a change in the mode of accumulation, or technical development, as well.

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APPENDIX 1 - THE EFFECT OF INSUFFICIENT DEMAND UNDER CLASSICAL ASSUMPTIONS.

Assume that the actual level of capital-accumulation ($\dot{C}$) is below the supply-demand equilibrium level ($\dot{C}^*$) .

The immediate effect of this will be insufficient demand for investment-goods. In the next period of production, however, the reduced level of investment implies a reduced level of supply compared with the supply-demand-equilibrium-growth-path. But at the same time also the level of demand for consumption-goods will be inferior to the level corresponding to the supply-demand-equilibrium-growth path. The balance of these effects depends to a great extent on whether or not investment-demand picks up again. Below three different cases are considered :

(a) Suppose that $\dot{C} = \dot{C}^* - X$ in period 1, returning to $\dot{C} = \dot{C}^*$ in period 2. Let dD and dS be the induced demand-and supply-effects :

Effect \ Period	1	2	m
dD	-X	$-\frac{\omega}{v}X$	$-\frac{\omega}{v}X$
dS	0	$-(n+\frac{1}{v})X$	$-(n+\frac{1}{v})X$

Thus, in this case, the induced reduction in supply will be greater than the reduction in demand from the second period on, restoring supply-demand-equilibrium.

(b) This, however, may be regarded as a very favourable case. Suppose, on the contrary that the reduction in the level of investment level (X) is "permanent" (X constant) :

Effect \ Period	1	2	m
dD	-X	$-(1+\frac{\omega}{v})X$	$-[1+(m-1)\frac{\omega}{v}]X$
dS	0	$-(n+\frac{1}{v})X$	$-(m-1)(n+\frac{1}{v})X$

In this case the problem of excess supply remains in the second period also[1]. But what will happen in the long run ?

$$|dD_m| - |dS_m| = X\ [1+(m-1)\ \frac{\omega}{v} - (m-1)(n+\frac{1}{v})]$$

$$= X\ [1+(m-1)(\frac{\omega}{v} - \frac{1}{v} - n)]$$

$$= X\ [1+(1-m)(r^*+n)]\ \ (\text{where } r^* = \frac{1-\omega}{v})$$

$$|dD_m| - |dS_m| = 0, \quad \text{for } (1-m)(r^*+n) = -1$$

$$\boxed{|dD_m| - |dS_m| = 0, \quad \text{for } m = 1 + \frac{1}{r^*+n}}$$

It can be seen right away that the number of periods necessary to restore supply-demand-equilibrium is inversely related to the (supply-demand-equilibrium) rate of profit[2] and the depreciation-rate, and that it approaches infinity when the sum of those rates approaches zero. For "reasonable" values of the rate of profit and the depreciation-rate, however, a "reasonable" value of m will exist. If, for example, both the rate of profit and the depreciation rate is 10 %, $m = 1 + \frac{1}{0,2} = 6$, thus, in this case, it will take 6 periods to restore supply-demand-equilibrium.

(c) It may be objected, however, that also this case is too favourabl for the "classical" approach. Let us instead assume that subsequent cuts of t same size (X) occur in each period to come :

Period / Effect	1	2	m
dD	-X	$-(2+\frac{\omega}{v})X$	$-[m+\frac{m}{2}(m-1)\ \frac{\omega}{v}]X$
dS	0	$-(n+\frac{1}{v})X$	$-[\frac{m}{2}(m-1)(n+\frac{1}{v})]X$

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1) The condition for this is $r+n<1$, which we generally are going to assume i: satisfied.

2) Or more precisely, the rate of profit that would have existed it supply-demand equilibrium had been restored, the actual rate of profit may of course lower as long as excess supply prevails.

It should be obvious that excess supply will remain in the first and second period of production, but what happens in the long run ?

$$|dD_m| - |dS_m| = X[m + \frac{m}{2}(m-1)\frac{\omega}{v} - \frac{m}{2}(m-1)(n+\frac{1}{v})]$$

$$= Xm\ [1 + \frac{(m-1)}{2}(\frac{\omega}{v} - \frac{1}{v} - n)]$$

$$= Xm\ [1 + \frac{(1-m)(r^*+n)}{2}] \quad (\text{where } r^* = \frac{1-\omega}{v})$$

$$|dD_m| - |dS_m| = 0, \quad \text{for } \frac{(1-m)(r^*+n)}{2} = -1$$

$$\boxed{|dD_m| - |dS_m| = 0, \quad \text{for } m = 1+\frac{2}{r^*+n}}$$

The conclusion, it may be seen, is rather identical to the previous case, even if the time needed for restoring the equilibrium is prolonged ; with the same values as in the previous example, it will now take $m = 1 + \frac{2}{0{,}2} = 11$ periods before supply-demand-equilibrium is restored.

Thus the classical political economists' belief in the medium — or long-run stability— properties of economic development may seem partly justified.