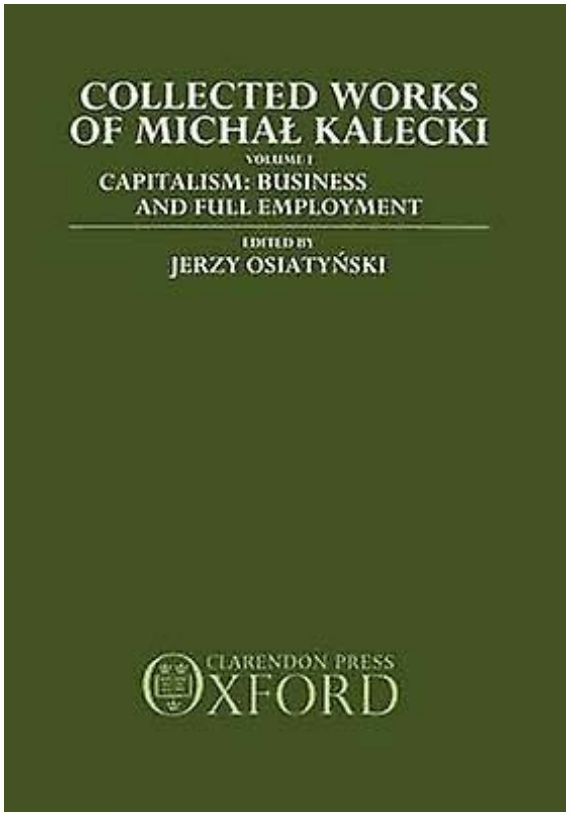

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Three Systems

(1934)

Introduction

In this essay we take up the problems of how equilibrium is established within the *already existing* capital equipment, with special emphasis on the production of investment goods and the rate of interest. We distinguish three types of economic system, differing in their essential characteristics. In System I, the principle of preservation of purchasing power is pushed to the extreme: all income must be spent immediately on consumer or investment goods. This model in fact is accepted by all classical economists.

In System II, however, which corresponds better to reality, we shall show that, in the circulation of money, whose velocity may change, there is 'creation' and 'destruction' of purchasing power, even if there is no credit inflation *sensu stricto*. However, the creation and destruction of purchasing power is responsible only for a different course of perturbations from that in System I, while the final position arrived at is the same as under the principle of preservation of purchasing power, even when credit inflation *sensu stricto* takes place in System II.

By introducing friction to System II, made possible by the existence of a reserve army of the unemployed, we obtain System III. For this system, which no longer tends toward full equilibrium, we define the concept of a *quasi-equilibrium.* The creation and destruction of purchasing power (in contrast to System II) not only influences the course of perturbations, but also the final position—causing a shift from one quasi-equilibrium to another.

Assumptions

We make a number of assumptions here concerning the economic processes to be examined. These assumptions do not change, regardless of whether the processes being examined take place against the preservation of purchasing power, or against the possibility of creating and destroying it.

1. We assume that only workers and capitalists (entrepreneurs and rentiers) exist; workers consume all their incomes. As regards the consumption of capitalists, we assume that its volume S depends neither on changes in their income nor on the rate of interest. Hence capitalist consumption can change only with saving habits; except for this we treat it as a constant.

The equivalent of the remaining part of the total income of capitalists, including depreciation charges, is the production of capital goods and increase in stocks. We assume here that stocks are small in relation to existing fixed capital and hence we ignore their changes. As a result, the equivalent of the saved income of capitalists, including depreciation charges, is the output of investment goods. The sum of capitalist consumption S and the output of investment goods i (understood as aggregated values of these goods calculated at constant prices) can be called real gross profits, since $S + i$ is the equivalent of the total income of capitalists including depreciation charges.

Among our assumptions, only the absence of workers' savings must be regarded as fundamental, whereas the stability of capitalist consumption with changes in their income and the rate of interest, as well as omission of the influence of changes in stocks on the course of economic processes, are only simplifications to allow a clearer presentation of the gist of the problems considered. Rejection of these assumptions would not have essentially changed our results, but would have complicated the basic line of argument exceedingly, often obscuring it.

2. We assume that existing capital equipment produces with increasing marginal costs, i.e. the more fully employed it is, the greater the additional costs of producing the final unit of output. Obviously in these conditions prices equal the respective marginal costs.

It seems that, in reality, marginal costs are generally increasing. In many industrial plants the additional outlays connected with producing the final unit already begin to increase at a rather low level of utilization, while the night shift is almost universally subject to progression of costs. But even when there is a degression of marginal costs of each plant of a given branch, the branch as a whole has a rising curve of marginal costs on account of differences in manufacturing costs in individual plants. (In each branch there is always a number of 'generations' of plants that differ in their technique of production.)[2]

With the assumption of increasing marginal costs, the capital equipment of individual industries will not generally be fully utilized.

The rate of this utilization depends on the ratio of price of the output of a given industry to prices of its respective inputs. Hence in capital equipment with increasing marginal costs, which we constantly have in mind here, there will be production reserves. These make it possible to carry out restructuring of output or—where there is an additional supply of labour—to increase total output without prior reconstruction or expansion of fixed capital. These changes in the structure and volume of output against the background of the *existing capital equipment* characterized by rising marginal costs—which occur either under conditions of the preservation of purchasing power, or when its creation or destruction is possible—are the main subject of this essay.

3. We divide the stock of capital equipment into two departments: production of consumer goods and production of investments goods; in each, production of the required raw materials is also included. Since we leave out changes in stocks, the output of the consumer goods department is always fully consumed.

With our assumptions, the rate of employment of each of these departments depends only on their respective relations of prices to wages. Obviously, the relation of prices of consumer goods to prices of investment goods has no influence on the rate of employment of the *existing* capital equipment. Neither does the rate of interest have any effect on the rate of employment. The interest on existing fixed capital is naturally irrelevant to its employment. On the other hand, the influence of changes in interest on working capital can be ignored in accordance with our assumption that stocks are an insignificant fraction of the total fixed capital.

System I

1. This is a system in which the principle of preservation of purchasing power rules without exception. We can best imagine it as follows. Let us assume that all payments take place through the participation of all economic agents in one huge cheque-clearing centre. All participants are required to keep their balances unchanged: if someone at any given time has received more, he must also pay more into other accounts. Naturally, in this system all income is immediately spent—directly or indirectly—for the purchase of consumer or investment goods.

2. Let us first examine the process of absorption of labour supply in System I, i.e. under conditions of the preservation of purchasing power.

We assume that there are no changes in saving habits, and hence, in accordance with our assumptions, that capitalist consumption will remain constants.

Let us imagine that an excess supply of labour appears in the market. Wages fall, and capitalists—in accordance with the principle of preservation of purchasing power—immediately spend the additional sums on investment goods.

Immediately after the wage reduction, the prices of consumer goods will fall in the same proportion as wages. In fact, the purchasing power of workers has been reduced, while the supply of consumer goods for them will remain unchanged in accordance with the assumption of the stability of capitalist consumption. With this equal fall in prices and wages, the production of consumer goods for the present will stay on the same level; however, on account of the increased demand for investment goods, the relation between their prices and wages will increase. Along with this, employment in consumer goods and investment goods industries respectively will also increase by utilization of previously idle capital equipment, which absorbs the excess supply of labour.

However, the hiring of new workers for the investment goods industry now increases purchasing power directed towards consumer goods, which causes an increase in their prices above the previously lowered level, and hence an increase in the relation between these prices and wages. As a result there is also increased employment of capital equipment in the consumer goods industry, which also absorbs part of the excess supply of labour.

Thus we see that with the reduction in money wages, real wage rates also fall, since the relation of consumer goods prices to wages has increased. On the other hand, real gross profits (i.e. the total aggregate of goods consumed by capitalists and goods invested) have increased, on account both of the fall in real wages and of expansion of total output. With capitalist consumption constant, this increase in real profits consists in expansion in output of investment goods.

One can conclude that, given the saving habits (which, in line with our assumptions, means unchanged capitalist consumption), output of investment goods increases along with the supply of labour.

3. In accordance with our assumptions, any given saving habits correspond to a certain constant level of capitalist consumption S. So far we have considered the case of constant S. Now we shall examine

the effect of a change in saving habits at a given supply of labour. Let us assume that capitalists begin to consume less, so that S is reduced. Then, in accordance with the principle of preservation of purchasing power, they must spend correspondingly more for the purchase of investment goods.

Increased demand for investment goods and reduced demand for consumer goods causes a rise in prices of the former and a fall in prices of the latter. As a result, the most expensively producing part of the capital equipment (i.e. that part where the unit cost of production is highest), which turns out consumer goods, comes to a halt, while equipment producing investment goods is more fully utilized, hiring workers dismissed from the consumer goods industry. Hence a reduction—on account of a change in saving habits—in capitalist consumption S, with a given supply of labour R, causes an increase in the output of investment goods i.

Connecting this with the argument of the preceding section, for the production of investment goods we obtain:

$$i = f(R,S) \tag{1}$$

where f is an increasing function of the supply of labour R and a decreasing function of capitalist consumption S, which in turn depends on saving habits. The function f obviously depends on the volume and composition of existing capital equipment in which the processes examined here take place.

4. Investments are generally made, not by the rentier, who saves, but by the entrepreneur, who borrows the rentier's purchasing power at a certain rate of interest. None the less, the output of investments goods in System I is determined, not by entrepreneurs, but by rentiers. If entrepreneurs wish to increase their investments, demand increases for purchasing power lent by rentiers (there are no other sources of purchasing power for investment goods in System I) and the rate of interest rises. But since the rate of saving does not depend—in accordance with our assumptions—on the rate of interest, the amount of savings cannot change; hence neither can purchasing power allocated to the output of investment goods increase, and so there is no reason to expand this output. The rate of interest will rise by so much as to make a number of projects no longer profitable, thereby causing the volume of investment plans to be reduced to the existing output of capital goods.

Thus the volume and structure of output here do not depend at all on the investment decisions of entrepreneurs. These decisions only influence the rate of interest. The formula which we now introduce, and which expresses equality between the volume of investment decisions and accumulation of capital, will therefore determine the level of the rate of interest p, while the output of investment goods i is already determined by equation (1).

The number of investment projects which pass the profitability test depends on the mutual relation at a given moment between prices of consumer goods, prices of investment goods, and wages (which are determinants of the expected gross profitability), and on the rate of interest p. Since from the previous argument it follows that the supply of labour R and capitalist consumption S entirely determine the relation of prices and wages, the volume of investment projects can be presented as the function $\psi(R, S, p)$. This function will naturally depend on 'new production combinations' (e.g. technological inventions), since they have a decisive influence on expected profitability. If, for instance, a great invention is made, the function ψ changes in such a manner that a greater number of projects will correspond to the same values of R, S, p.

Making the volume of investment projects, $\psi(R, S, p)$ equal the output of investment goods i we get:

$$\psi(R, S, p) = i \tag{2}$$

enabling us to determine the rate of interest p at a given supply of labour R and capitalist consumption S, since the output of investment goods is already determined by these two factors through equation (1).

ψ is naturally a declining function of the rate of interest p, which simply means that an increase in the rate of interest *ceteris paribus* reduces the volume of investment projects.

If, under the influence of new production combinations, function ψ changes into function ψ_1, such that:

$$\psi_1(R, S, p) > \psi(R, S, p)$$

i.e. a greater volume of investment projects now corresponds to the same values R, S, p, then the rate of interest rises to the level at which the equation $\psi_1(R, S, p) = i$ is satisfied. The rising rate of interest eliminates a number of old projects in favour of new production combinations, thereby adjusting the volume of investment projects to the output of investment goods, which is entirely determined by the supply of labour R and capitalist consumption S.

The interest rate p, determined by equations (1) and (2), we call the equilibrium rate of interest. The essence of this rate, adjustment of the demand by entrepreneurs for purchasing power to its supply by rentiers, is strictly connected with System I, in which the principle of preservation of purchasing power rules.

System II

1. We now examine a system with normal circulation of money issued by the central bank. For simplicity's sake we ignore money created by other banks (e.g. their cheques and endorsements), which in no way reduces the generality of our argument. We initially consider a case in which the central bank maintains a constant volume of money in circulation during the entire course of the processes examined here, in order to show that the typical behaviour of System II does not at all consist in credit inflation *sensu stricto*. Only in the final section of this chapter do we come closer to reality, assuming that the central bank increases money in circulation when the demand for money increases and reduces it in the opposite case (all of this is naturally effected by the bank's properly manipulating its rate of interest).

In contrast to System I, individual economic agents in System II hold cash reserves which can be increased or decreased. A cash reserve is necessary to run an enterprise at a given turnover smoothly. The volume of this reserve depends not only on the turnover of the enterprise, but also on the rate of interest. The higher the rate of interest, the smaller the cash reserve held by an enterprise at a given turnover. Hence if sales increase while the volume of money in circulation remains constant, that is, if the velocity of money circulation increases, the rate of interest rises, since there will be a tendency to increase reserves in the same relation, which must be counteracted by an increase in the rate of interest. The rate of interest in System II is determined in this way by the velocity of money circulation.

2. The rate of interest of System II, dependent on velocity of circulation—which we shall henceforth call the money rate—is naturally not the same as the equilibrium rate of interest, i.e. the rate which would be set if the principle of preservation of purchasing power were in force in this economic system. We must still explain whether and

how the money rate deviates from the equilibrium rate, and whether this deviation is permanent.

Let us assume that at a certain moment the money rate equals the equilibrium rate. Let us further imagine that the demand for purchasing power directed towards investment goods increases on account of new production combinations. In System I this would cause an increase in the rate of interest to a level at which this demand would be reduced to the former level, i.e. the equilibrium rate would rise.

Let us now examine whether the money rate will immediately follow the equilibrium rate. As soon as the money rate rises somewhat, the owners of money reserves offer small parts of these reserves to entrepreneurs making investments. We now assume, not to get lost in side issues, that entrepreneurs finance their investments continuously, i.e. they do not accumulate reserve funds but raise credits in small instalments as their respective investment projects advance, and spend the sums received. Money borrowed by the entrepreneur from the reserves of money-owners thereby immediately returns to the latter, who can offer entrepreneurs the next instalment of credit.

Hence a more rapid circulation of money creates additional purchasing power, making it possible to increase investment activity. This is naturally combined with an increase in the money rate of interest, which is an increasing function of velocity of circulation. However, if this function increases at a sufficiently low rate (i.e. if a sufficiently small rise in the money rate corresponds to a given change in the velocity of circulation), the money rate will still not reach equilibrium rate, and investment activity will remain at a higher level than before. But—as we shall show below—this increase in investments through the creation of additional purchasing power must cause a cumulative increase in prices and wages, owing to which the velocity of circulation in the end will increase by so much as to make the money rate equal the equilibrium rate. Then the system will reach the same final position as it would have achieved directly under the preservation of purchasing power.

3. We shall now examine more thoroughly the process which we outlined in section 2 above. Let us again assume that demand for purchasing power for investment purposes increases in connection with new production combinations, and that this purchasing power is created by increasing the velocity of money circulation. Apart from the old stream of purchasing power, an additional stream now flows

through money reserves, financing increased investment activity. The detailed course of this process is as follows:

Increased demand for investment goods causes an increase in their prices and there appears an increased demand for labour in the respective branches of industry. Wages go up and some workers are 'poached' from the production of consumer goods to the production of investment goods. (There is no reserve army of the unemployed here; this factor is only introduced in System III.) Since the production of consumer goods has now declined, their prices must rise to a level at which their smaller volume will suffice for the same number of workers now receiving higher money wages. The profits of capitalists increase here by the sum of additional purchasing power. Part is earned directly by the investment goods industry, part falls to capitalists from the consumer goods industry, whose incomes increase by the volume of increase in the wage bill in investment industries. (Indeed, the revenues of the consumer goods industry rise by the increase in the total wage bill, while its costs rise only by the increase in the wage bill of workers employed in it.) Thus the more is taken from money reserves for investments, the more returns in the form of realized profits.

This state of affairs does not last, however. On account of the increase in prices of consumer goods, there is now increased demand for labour in the consumer goods industry. Wages go up, and a number of workers now return to this industry from the investment goods sector. Production of the latter falls. In this way we return to the initial position, except that the general level of prices and wages has risen.

If investment activity had remained unchanged, these processes would have repeated themselves continuously, with successive 'poaching' of workers by the consumer and investment branches of industry endlessly pushing up the level of wages and prices. This does not happen, however, since velocity of money circulation increases on account of the rise in money value of sales, and, together with velocity, the money rate of interest also rises, sooner of later reaching the equilibrium rate. Then the volume of investment projects is reduced to the initial level (and naturally new production combinations are realized by cancelling other projects which are unprofitable at a higher rate of interest). The production of investment and consumer goods correspondingly establish themselves at their former levels.

System II—by the creation of purchasing power, a cumulative increase in prices and wages, and an increase in the velocity of money circulation and with it the money rate of interest—reaches the same

final equilibrium as is directly determined in System I as a consequence of an increase in the equilibrium rate of interest. We should note that in System II a definite overall level of prices corresponds to a given amount of money in circulation in the final position. This price level is determined by the condition that the velocity of money circulation must attain a level at which the money rate equals the equilibrium rate of interest.

4. Now we shall examine processes taking place in System II following a change in saving habits. Let us assume that at a given moment capitalists begin to consume less. In System I, as follows from its definition, the entire purchasing power thereby freed must immediately be allocated to the purchase of investment goods. In System II, on the other hand, processes opposite to those described in the last two sections take place, i.e. there is a destruction of purchasing power. If capitalists begin to consume less and do not immediately purchase more investment goods but temporarily retain these money reserves to subsequently offer them on the money market, it turns out that in the next moment they no longer have anything to offer, since the less they spend on consumption, the less flows to their money reserves.

The detailed course of this process is as follows. The consumer goods industry does not find customers for articles previously consumed by capitalists, and hence the prices of consumer goods must fall to a level at which workers will also be able to purchase this remainder from their wages. As a result, profits in the consumer goods industry fall by an amount previously obtained for part of capitalist consumption, from which the latter have now resigned. Hence the total profits of capitalists decline by the sum of their additional savings. The less capitalists spend on consumption, the less profit also flows to them.

This is not all, however. The fall in the prices of consumer goods with temporarily unchanged money wages leads to a reduction of employment in the consumer goods industry. The cut in wages against this background makes possible the hiring of workers dismissed from the consumer goods industry by the investment goods industry. Now, however, the production of the latter does not find customers and the prices of these goods fall. This causes workers to be dismissed from the investment goods industry, a further reduction in wages, a fall in the prices of consumer goods, renewed hiring of workers in the investment goods industry, a fall in prices of these products, etc. In short, there is a cumulative fall in prices and wages, which would last

without end if increased demand for investment goods did not supervene.

This does, indeed, happen: falling sales on account of the cumulative drop in prices and wages causes a fall in the velocity of circulation of money and, together with this, in the money rate of interest. This encourages entrepreneurs to make investments.[3] When the creation of purchasing power now necessary for this equals its 'destruction' which took place in previous processes, System II attains a position which would have been established immediately in System I. In this way equilibrium is reached with respect to the division of the labour force between the consumer goods industry and the investment goods industry corresponding to changed saving habits—the only equilibrium possible, since any other division of the labour force would cause perturbations similar to those described above. The money rate here equals the equilibrium rate in this final position. Indeed, the money rate is now at a level at which entrepreneurs make investments on a scale corresponding to the aforementioned equilibrium in the division of the labour force, and this is the level of the equilibrium rate, which is determined by equations (1) and (2). The first of these equations gives the volume of production of investment goods i with equilibrium in the division of the labour force between the consumer goods and investment goods industries, and the second determines the rate of interest at which entrepreneurs make investments at this level i.

5. We now move on to examine the process of absorption of labour in System II. Let us assume that an excess supply of labour appears in the market. Wages fall. In System I the purchasing power appropriated by capitalists must be spent immediately on investment goods. In System II, on the other hand, a process of destruction of purchasing power takes place similar to that described in section 4, except that the purchasing power previously directed to consumption, not by capitalists, but by workers is not lost. Just as in the case of increased savings, the sums appropriated from workers and not immediately spent on the purchase of investment goods reduce the inflow of money reserves by the amount not spent on workers' wages.

The detailed course of this process will be as follows. The prices of consumer goods fall in the same relation as wages, for the purchasing power of workers has been reduced in this proportion, while the consumption of capitalists has remained unchanged. The total revenues of the consumer goods industry fall by the total sum of

reductions in workers' wages, its costs are reduced by the sum of wage reductions of the workers it employs, and hence profits are reduced by the sum of wage cuts in the investment goods industry. Since profits in the latter industry rise by the same amount, and as a result the total profits of capitalists remain unchanged as a consequence of wage cuts, the gross revenues of capitalists fall by the same amount equal to the reduction of wages.

What happens in the meantime with the excess labour? Employment has remained unchanged in the consumer goods industry, since prices there have fallen in the same proportion as wages. The investment goods industry, on the other hand, whose prices for the time being remained at the former level with reduced wages, begins to hire new workers. But increased production is not sold; hence the prices of investment goods also drop, which leads to the dismissal of the newly hired workers. Now there is another reduction in wages, a fall in prices of consumer goods, rehiring of workers in the investment goods industry, a fall in the price of its products, etc. This cumulative fall in prices and wages could go on endlessly were it not for the fact that, on account of the falling money value of sales, the velocity of money circulation declines and with it also the money rate of interest, which encourages entrepreneurs to make investments. When the purchasing power necessary for investment purposes equals the 'loss' of workers' purchasing power, System II attains a position which would have been established immediately in System I. In this way the excess supply of labour is completely absorbed. One can show, as at the end of the preceding section, that the money rate here reaches the level of the equilibrium rate of interest in this final position.

6. As we see, System II reacts to a change of parameter values with much more complicated perturbations than System I, reaching in the end, however, the same position of new equilibrium. Hence the output of investment goods i in this final position is determined by equation (1), and the money rate of interest p by equation (2). This is the essential meaning of the proposition that the money rate in this final position equals the equilibrium rate of interest.

It follows from the above that, at a given volume of money in circulation, to this position of equilibrium in System II there corresponds a definite general level of prices. This must be a level at which the relation of the money value of sales to the volume of money in circulation (and hence velocity of circulation) is sufficiently high for the money rate of interest to satisfy equations (1) and (2).

We shall now outline the differences between the course of perturbations in System I and II. System I reacts to a change in the value of parameters either by a shift in purchasing power from consumption to investments (with a cut in wage rates or a change in saving habits), or only by adjusting the volume of investment decisions to the existing division of labour (a rise in the equilibrium rate of interest with the appearance of new production combinations).

In System II a change of parameter values mainly causes creation or destruction of purchasing power. As a result, there is a shortage or excess of labour, which leads to the cumulative rise or fall of prices and wages, hence also of the money value of sales and velocity of money circulation. But the money rate of interest—which is its rising function—moves in the same direction as velocity of money circulation, and this movement restores equilibrium. In the creation of purchasing power for investment purposes an increase in the money rate to the level of the equilibrium rate of interest reduces the volume of investment projects to the former level. In cases of the destruction of purchasing power with increased savings or a cut in wages, a fall in the money rate encourages entrepreneurs to invest, creating purchasing power in the amount previously 'lost'; in this way purchasing power is ultimately shifted from consumption to investments.

7. So far we have assumed that the amount of money in circulation does not change, i.e. that the central bank, always adjusting its rate to the market money rate, neither increases nor reduces its credits. We now abandon this assumption and consider the possibility of expansion and contraction of credits by the central bank. First of all, we must note that this changes nothing in the dependence of the money rate of interest on the velocity of circulation of money. In fact, we introduced this dependence with the following argument: when sales increase, there is a tendency to increase cash reserves in the same proportion, and hence with a constant volume of money in circulation the money rate must rise sufficiently to balance this tendency. But the same argument can be applied when reserves increase, but more slowly than sales; the money rate must rise then also.

Hence, if the central bank keeps its rate constant with increasing overall volume of sales, money in circulation, i.e. bank credits, must increase in the same proportion. If the bank expands its credits more slowly, however, it must increase its rate, but less than the rate would rise when credits, and hence money in circulation, remain constant. One can assume that the central bank indeed pursues such a policy:

with an increase in sales it will increase the amount of credits, simultaneously increasing its rate of interest.

Then, however, the expansion and contraction of credits changes nothing in our previous argument, since the basic premiss—increasing the money rate of interest with an increase in money volume of sales—still holds. Let us examine, for example, the creation of purchasing power for investment purposes. This is now effected by increasing both the velocity and volume of money in circulation. There follows a cumulative increase in prices and wages, hence also in the money volume of sales, accompanied by an ever greater expansion of credits by the central bank, as well as an increase in its rate of interest. Hence in the end it must reach the level of the equilibrium rate.

But what would happen if the central bank persisted in keeping its rate of interest unchanged? Then the cumulative increase of prices, wages, and money value of sales would last indefinitely, and together with this credits would also increase without end: credit inflation would turn into hyper-inflation.

However, if we leave out this case, which is inconsistent with our assumption concerning the policy of the central bank, we can say that credit inflation in System II does not essentially change either the course of perturbations or their final result. The latter must still satisfy the equations:

$$i=f(R, S) \tag{1}$$

$$\psi(R, S, p)=i \tag{2}$$

which say that the money rate p (naturally coincident with the rate of the central bank) then equals the equilibrium rate of interest.

If the policy of the central bank is known, i.e. if we know how it raises its interest rate with the increase in money volume of sales, then a strictly determined general level of prices will correspond to this position of equilibrium. This must be a level for the money volume of sales to reach the value at which the rate of interest of the central bank equals the equilibrium rate of interest.

System III

1. Every excess supply of labour in System II causes a fall in money wages and thereby touches off a mechanism eliminating unemployment. The main transmission gear here is the money rate of interest, which falls along with the money volume of sales. This is the essence of

arriving at equilibrium identical with the one which would be established in System I. In reality, however, we observe that, as long as it remains unchanged, existing unemployment does not 'pressure' the market. Without going into the reasons for this, we shall continue to study System II, except that now it permits the existence of some reserve army of the unemployed. This we call System III.

2. As before, we denote the total available supply of labour by R. Let us assume that the actual employment is r, while $R-r$ will be unemployment *not* pressuring the market. We call quasi-equilibrium that position of System III which is identical with the position of equilibrium in System II at a level of available labour force equal to r. Hence for a position of quasi-equilibrium the following equations are satisfied:

$$i=f(r, S) \tag{1a}$$

$$\psi(r, S, p)=i \tag{2a}$$

where i is the production of investment goods, S the constant consumption of capitalists, and p the money rate of interest. From the fact that p satisfies equation (2a), in which the production of investment goods i has a value determined by equation (1a), it follows that there is no creation or destruction of purchasing power here. We can describe this state of affairs by saying that the money rate here equals the quasi-equilibrium rate of interest, i.e. the rate satisfying equations (1a) and (2a).

Quasi-equilibrium is determined only when the actual employment r is given. Hence in System III an infinite number of quasi-equilibria may correspond to any given supply of labour R. This indeterminateness can be eliminated by introducing an additional assumption corresponding to reality. We assume that, when moving from one possible quasi-equilibrium to another at which unemployment will be smaller, money wage rates rise in a particular way. Namely, while the *existing* unemployment does not exert any pressure on the market, we postulate that *changes* in unemployment cause a definite increase or fall in money wages, depending on the direction and volume of these changes.

It follows from this assumption that a strictly determined level of money wages corresponds to every level of employment r at a given total supply of labour R. However, since any given set of values r, S will determine the relation of prices of consumer and investment goods to wages as well as the respective volumes of output of these goods, the

money volume of sales is a function of R, r, S. But, given the policy of the central bank, the money rate of interest is again a function of the volume of these sales, so that one can write the equation:

$$p = \eta\ (R,\ r,\ S) \tag{3}$$

where η is an increasing function of employment r, since with its increase the level of money wages, the relation of prices to wages, and the money volume of sales all simultaneously rise.

Equation (3), together with equations (1a) and (2a), enables us to determine employment r, the production of capital goods i, and the rate of interest p, if we know the total supply of available labour R and the consumption of capitalists S—i.e. with its help quasi-equilibrium is strictly determined.[4]

3. Let us imagine that new production combinations appear, leading to the tendency to undertake a greater number of investment projects. Just as in System II, purchasing power will be created in System III for investment purposes by increasing the velocity and volume of money in circulation. A detailed course of this process is as follows.

The increased demand for investment goods leads to their prices rising in relation to wages. Consequently, demand for labour appears in the investment industries, which is met, not, as in System II, by 'poaching' workers from the consumer goods industry, but from the reserve of the unemployed. Demand for consumer goods rises due to increased employment, their prices rise in relation to wages (i.e. real wage rates fall), and the consumer goods industry increases its output, drawing from the reserve of the unemployed. Money wages—in line with our assumptions—also increase during these processes in connection with the reduction in unemployment. This naturally affects the movement of prices: besides the initial increase, which caused a rise in the relation of prices to wages, making the increase in employment possible, prices must now rise additionally in the same proportion as wages.

The profit of capitalists increases on account of these processes by the sum of purchasing power created for investment purposes: part of it is earned directly by the investment goods industry, the rest—equal to the sum of wages in this industry—by the consumer goods industry. (Indeed, the revenues of the consumer goods industry increase by the same amount as the increase in the total sum of wages, but its cost only by the sum of wages of workers employed by it.) In this way the greater

the flow of purchasing power to output, the more returns in the form of earned profits.

Together with the execution of a greater number of projects than before, i.e. with an increase in the production of investment goods, a factor appears, however, which restrains this increase. With the rise in prices and volume of total output, the money rate also increases, and this inhibits the completion of some projects. A new quasi-equilibrium is established when the production of investment goods reaches a level i_1, that is 'permitted' by the corresponding (through the money value of sales) money rate p_1. If the output of investment goods i were less than i_1, then the money value of sales would also be less. Thus the money rate p would be lower than p_1 and would permit a volume of investment projects greater than i_1, and therefore still greater than i, and so expansion would continue. In other words, the expansion will last as long as the money rate does not reach the new quasi-equilibrium rate of interest.

This outline of the mechanism of quasi-equilibrium is not precise owing to omission of one important factor: the increased output and rise in prices in relation to wages in turn increase profitability, which additionally stimulates investment activity (on top of 'new production combinations'). Therefore, quasi-equilibrium will be established at a higher level of output of investment goods i and interest rate p than that which follows from the earlier argument.

We see that—in contrast to System II—the appearance of new production combinations causes a permanent increase in the output of investment goods in System III. This takes place with an increase of employment and simultaneous rise in the output of consumer goods. The real profit of capitalists increases on account both of the expansion of total output and of the fall in real wage rates (prices of consumer goods rise more than money wages). With constant capitalist consumption, this increase in real profits is equal to the increase in the output of investment goods.

4. Let us now examine the effects of increased saving in System III. Just as in System II, reduced capitalist consumption, S, generates a loss in purchasing power. The prices of consumer goods decline to a level at which workers can purchase goods not consumed by capitalists. As a result, capitalist profits fall by the amount previously spent by them on consumption which they have now relinquished. The less capitalists spend on consumption, the smaller profits they earn.

The fall in prices of consumer goods in relation to wages causes a reduction of employment in the consumer goods industry. Unemployment rises and money wages fall accordingly, thus giving rise to an additional reduction in the prices of consumer goods (which hence fall still more than wages). But this fall in prices, wages, and output, and thus in the money value of sales, is followed by a reduction in the money rate of interest, which encourages expansion of investment activity. A new quasi-equilibrium is established as follows: such a number of workers dismissed in the consumer goods industry enter the reserve of the unemployed that the accompanying reduction of the money rate of interest (together with a fall in the money volume of sales) suffices to increase the output of investment goods to a level allowing absorption of the rest of those dismissed.

One should also note that profitability will decline along with the reduced volume of output and with a sharper fall in prices than wages. This restrains the expansion of investment activity and hence works in the direction of establishing quasi-equilibrium at a lower level of output of investment goods i, employment r, and the rate of interest p than follows from the above argument. The output of investment goods may even establish itself at a level lower than before the change in saving habits.

As we can see, on account of increased savings System III moves to a new quasi-equilibrium which is characterized by a lower aggregate employment and output. In some cases output of investment goods may also decline. Even in the case of an increase in the output of investment goods i, however, this increase does not compensate in real profit $S+i$ for the fall in capitalist consumption S: the fall in total output and the increase in real wage rates (due to a sharper decline in the prices of consumer goods than wages) means that real profit is less than in the former quasi-equilibrium.

Conclusion

In accordance with the aim of the present essay, we have only examined the formation of equilibrium (or quasi-equilibrium) within the *already existing capital equipment of definite but essentially arbitrary volume and structure.* The level and direction of investment activity which follow the establishment of equilibrium in general will not support the previous volume and structure of this capital equipment: investments in individual industries on the whole will not be

equal to the wear and tear of fixed capital in these industries. But the resulting change in the volume and structure of capital equipment transforms the functions f, ψ, and η, which appear in our basic equilibrium (or quasi-equilibrium) equations, and hence it affects the new position of equilibrium. Thus there will be a continual movement through a series of equilibria (or quasi-equilibria) until the final equilibrium is attained, i.e. a position in which investment activity no longer changes the volume and structure of capital equipment.[1] Indeed, this is not the only possibility, if we still consider the *time of construction* of new investment goods. Then it may also turn out that the movement through a series of successive quasi-equilibria will be cyclical, and hence the position of final equilibrium will never be attained. In my opinion these are proper business fluctuations.[2] A detailed analysis of all these questions is beyond the scope of this essay.[5]

[1] If growth in population and technical progress are taken into account, then this definition should be modified accordingly.

[2] See M. Kalecki, *Essay on the Business Cycle Theory* [this volume].