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Abstract

Monetary analysis requires the introduction of monetary variables into the determination of the equilibrium values of real variables such as production, income, distribution, and accumulation. Contrary to Keynes's research program of a „monetary theory of production", neither the older post-Keynesian models of growth and distribution (Kaldor, J. Robinson) nor the models based on the work by Kalecki and Steindl take account of monetary variables in a sufficient way. Starting from a Kaleckian effective demand model by Bhaduri & Marglin, the first part of this paper deals with the effects of an exogenous variation in the monetary interest rate on the real equilibrium position of the economic system. Different regimes of accumulation are derived and it is shown that a negative relation between the interest rate and the equilibrium rates of capacity utilisation, accumulation and profit usually expected in post-Keynesian theory only exists under special conditions. The second part of the paper applies the model to the data of some major OECD-countries and studies the effects of the monetary interest rate on distribution and investment within different regimes of accumulation, the „golden age"- and the „post-golden-age"-„social structure of accumulation". This discussion also gives an explanation for stagnating capital formation and rising unemployment since the mid 1970s.

JEL classification: E22, E 25, E40, E44

1. Introduction

In monetary analysis, as defined by Schumpeter (1954), monetary variables cannot be reduced to have merely temporary and out-of-equilibrium effects on the real variables of the economic system: production, employment, distribution and growth. Contrary to classical and neoclassical real analysis which reduces the relevance of monetary variables to determine only the level of prices in equilibrium, Keynes's main achievement was the research program of a „monetary theory of production" in which the monetary sphere, especially the monetary interest rate, is the major determinant of the real equilibrium of the economy. With this approach Keynes became the founding father of monetary analysis (Rogers, 1989).

However, the impacts of monetary variables have rarely been considered to be relevant for the equilibrium solution in the post-Keynesian and Kaleckian models of growth and distribution after Keynes. In the models by Kaldor (1956, 1957, 1961) and J. Robinson (1962) the income shares are determined by investment which itself is influenced by the expected rate of profit. If the propensity to save out of profits exceeds the propensity to save out of wages changing income shares allow for the adjustment of savings to investment also in the long run, when the capital stock is fully utilised.[1] In the more recent models by Amadeo (1986, 1986a, 1987), Dutt (1984, 1987), Kurz (1994, 1995), Rowthorn (1981), and Taylor (1983) that are based on the work by Kalecki (1954) and Steindl (1952) the rate of capacity utilisation is considered to be an endogenous variable of the accumulation process and is determined by investment, when the propensi-

[1] If a classical savings hypothesis is assumed we get the Cambridge-equation which relates the rate of profit *(r)* to the rate of capital accumulation *(g)* for a given propensity to save out of profits (s_π): $r=g/s_\pi$. For the older post-Keynesian model see also Marglin (1984).

ties to save out of profits and wages are given.[2] Income distribution depends on the firms' mark-up-pricing in oligopolistic markets with the mark-up as an indicator of the firms' capacity to enforce a certain claim on profits against labourers and competitors. In these Kaleckian models the rate of capacity utilisation is introduced as a major variable influencing investment.

Lavoie (1992, 1995) has recently tried to introduce monetary variables into the Kaldorian and Kaleckian variants of the post-Keynesian model. His attempts, however, are not fully convincing because of the investment function used. In Lavoie (1995) the decisions to invest are assumed to depend on the difference between the rate of profit and the interest rate; in Lavoie (1992, pp. 362) the rate of capacity utilisation is also integrated. Both variants do not consider that a shifting of increasing interest rates to prices affects income shares and hence the real wage. This should be taken account of in the investment function. The same objection applies to the model by Dutt & Amadeo (1993), in which the decisions to invest are assumed to depend solely on the interest rate and the rate of capacity utilisation, and to the model by Dutt (1992) in which capacity utilisation and the difference between the rates of profit and interest are introduced as the variables determining investment. Taylor (1985) also introduces monetary elements only into an underconsumptionist model and makes the decisions to invest depend on the difference between the rates of profit and interest and on an accelerator term.

Lavoie (1993) has been the only paper to briefly sketch a model which also considers the effects of interest rate variations on distribution and costs of production in the investment function. This aspect will be further elaborated in the first part of this paper, which will build on some ideas developed by Bhaduri & Marglin (1990), who derive different regimes of accumulation in a non-monetary aggre-

[2] The following reasons are given for a deviation of capacity utilisation from full utilisation in the long run. On the one hand, the long run accumulation path only is a centre of gravity for cyclical fluctuations. Full utilisation of capacity is only achieved in the boom of the trade cycle. On average over the cycle, the rate of capacity utilisation will be well below full utilisation (Kalecki, 1971, p. 137). On the other hand, especially Steindl (1952, pp. 76) has made the argument that in oligopolistic markets firms deliberately hold excess capacity in order to meet unforeseen fluctuations in demand and to prevent potential competitors from market entry.

gate demand model. A monetary interest rate will be integrated into their model, the consequences of variations in the interest rate for the equilibrium rates of capacity utilisation, accumulation and profit will be analysed and different accumulation regimes will be derived. It will be shown that a negative relation between the interest rate and the rates of capacity utilisation, accumulation and profit usually expected in post-Keynesian theory only exists under special conditions.

After having developed the real effects of the monetary interest rate theoretically in the first part of the paper, the second part will then apply the model to the data of some major OECD-countries. The effects of the monetary interest rate on distribution and investment within different regimes of accumulation will be studied comparing the „golden age"- and the „post-golden-age"-„social structure of accumulation". This discussion will also give an explanation for stagnating capital formation and rising unemployment since the mid 1970s.

2. A simple model of monetary interest rates, income shares and accumulation

The effects of interest rate variations on income distribution and investment will be studied in an aggregate demand - aggregate supply model for a closed economy with a constant-coefficient-technology and without economic activity by the state. The model builds on the work by Bhaduri & Marglin (1990) and Marglin & Bhaduri (1991). Into their non-monetary aggregate demand model an exogenously determined monetary interest rate is introduced. Following the post-Keynesian „horizontalist" monetary theory[3] by Kaldor (1970, 1982), Moore (1988, 1989), and Lavoie (1984, 1992, pp. 149, 1996) we assume that the interest rate is an exogenous variable for the investment process and is determined by the policy of the central bank and by the liquidity preference of commercial banks and mone-

[3] A survey of post-Keynesian monetary theory is given by Cottrell (1994), Pollin (1991), Rousseas (1998), and Wray (1990, 1992, 1992a).

tary wealth holders.[4] We suppose that the central bank's interest policy controls the real long-term interest rate, i.e. the nominal interest rate corrected by the inflation rate. In the long run the pace of accumulation therefore has no direct feedback on the interest rate.[5] The pace of accumulation is determined by the entrepreneurs' decisions to invest. But investment as the causal force of accumulation has to be financed by credit independently of savings, because investment precedes income and hence savings.[6] Credit is supplied by commercial banks and by those households with disposable monetary wealth. Only the banking sector, however, is capable of supplying any creditworthy demand for credit at a given interest rate. The resulting volume of credit is thus an endogenous variable of the accumulation process and is determined by the volume of debt financed investment. We further assume that the monetary circuit will be closed in every period, i.e. there is no varying demand for liquidity by private households.[7] Therefore, we do not have to distinguish between short-term finance of production and long-term finance of investment and only have to deal with the latter.[8] Under these conditions, we may assume a uniform interest rate.

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[4] Therefore, the central bank does not directly control the market rates of interest. These are determined by the mark-ups on the central bank's base rate according to risk, period of validity and degree of liquidity of promises to pay when liquidity preference is given.

[5] The position taken here differs from those post-Keynesian views which assume that a decreasing liquidity position of commercial banks and rising lender's and borrower's risk finally lead to rising interest rates when the volume of credit is expanding in the accumulation process (Minsky, 1986, Palley, 1996, Rousseas, 1998, Wray, 1990). If an accommodating policy of the central bank is supposed, however, there will be no decreasing liquidity position of commercial banks when credit is expanding. If we further suppose that commercial banks only supply credit to creditworthy borrowers there will also be no increasing borrower's or lender's risk when credit is increasing. For the economic system as a whole, increasing credit means increasing expenditures and hence increasing revenues from which credit can be repaid. There is therefore good reason to assume that the interest rate is the exogenous variable of the accumulation process and that the volumes of money and credit are endogenous variables. If interest rates are rising when the volume of credit is expanding this is due to restrictive monetary policies chosen by the central bank (Lavoie, 1996).

[6] Kaldor (1939) assumes that firms may finance investment by means of issuing bonds. But the demand for those bonds has to be financed by credit, because the income corresponding to investment has not been created when the demand for those bonds arises.

[7] A model of a monetary circuit can be found in Graziani (1989) and Hein (1997, pp. 227).

[8] For the distinction between short-term finance of production often called „finance" or „initial finance" and long-term finance of investment usually labelled „final finance" or „funding" see Graziani (1989) and Carvalho (1992, p. 151). Credit is created in order to supply the demand for „finance" or „initial finance" of production. „Final finance" or „funding" is supplied out of the income generated by production and describes the use of saved income for holding the property rights in the investment goods newly produced.

The aggregate demand-aggregate supply model can be written as follows:

1) $$r = \frac{\pi}{K} = \frac{\pi}{Y}\frac{Y}{Y^*}\frac{Y^*}{K} = hu\frac{1}{v},$$

2) $$h = h(i), \qquad \frac{\partial h}{\partial i} \geq 0,$$

3) $$\sigma = \frac{S}{K} = \frac{\pi - Z + s_Z Z}{K} = r - (1 - s_Z)i, \qquad 0 < s_Z < 1,$$

4) $$g = \frac{I}{K} = \alpha + \beta u + \tau h + \theta i, \qquad \alpha, \beta, \tau > 0,\ \theta < 0, \quad g > 0 \text{ for } r > i,$$

5) $$g = \sigma.$$

Equation 1) defines the profit rate *(r)* as the relation between the annual flow of profits *(π),* including imputed and actual interest payments, and the value of the capital stock in money terms *(K)*. The profit rate depends on the profit share *(h)*, the endogenously determined rate of capacity utilisation *(u)* as the relation between actual output *(Y)* and potential output *(Y^*)*, and the capital-potential-output-ratio *(v)* which is a constant in our model. The profit share in this Kaleckian type model with constant unit labour costs up to full capacity output is assumed to be determined by the firms' mark-up-pricing.[9] According to Arestis (1996) the mark-up is generally influenced by the substitution effect of price changes, the market entry effect, the threat of administrative price controls, and the strength of unions to answer increasing prices by increasing wages.

The mark-up and hence the profit share may respond to variations in the exogenously determined real monetary interest rate *(i)* as equation 2) specifies. Discussing the distribution effects of interest rate variations we can consider two cases: the interest-inelastic or rigid mark-up and the interest-elastic or flexible mark-up. If an interest-inelastic mark-up prevails changing interest rates do not affect the distribution of income between wages and profits but only cause a redistribution between profits of enterprise and interest. This view can be found in

[9] Writing *w* for the nominal wage rate, *a* for the constant labour-coefficient and *m* for the mark-up, we get the pricing equation: $p = (1+m)\,wa$. From this follows for the profit share: $h = m/(1+m)$.

Marx's theory of interest (Marx, 1967, pp. 338) that considers interest payments a part of surplus value produced by productive labourers (Pivetti, 1987) and in Kaleckian and post-Keynesian theories of cost-plus-pricing.[10] If an interest-elastic mark-up dominates, changing interest rates will directly affect the distribution of income between profits and wages. This position that considers interest a part of firms' costs of production can be found in recent neo-Ricardian work (Panico, 1985, Pivetti, 1985, 1988, 1991). There it is assumed that the exogenously given interest rate determines the rate of profit and closes the degree of freedom of the production price model by Sraffa (1960).[11] Our analysis, however, will demonstrate that in a Kaleckian framework - with an endogenous rate of capacity utilisation - an unambiguous change in the rate of profit cannot be deduced a priori, even if variations in the interest rate are completely shifted to prices.

Equations 3) - 5) determine the goods market equilibrium. Introducing the interest rate into the savings and investment function of the model the following aspects have to be considered. First, interest payments by firms are an income for households that will affect households' expenditures and thus consumption demand and the rate of capacity utilisation. Second, in the case of a flexible mark-up interest rate variations have an impact on the wage share and hence on the wage-costs of production. Third, interest payments are a cost for firms that will directly affect their decisions to accumulate.

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[10] Neither in Kalecki's model of pricing (Kalecki, 1954) nor in Eichner's model (Eichner, 1980) a direct relation between interest rate and mark-up exists. Kalecki considers the mark-up to be determined by the degree of monopoly. Eichner assumes that the target rate of return is given by the internal means of finance required for an intended rate of accumulation. There is hence no direct influence of the interest rate on mark-up, real wage and the rate of profit. But there are indirect effects. If we follow Lavoie (1995) and assume an accumulation function that makes the decisions to invest depend on the difference between the rate of profit and the interest rate, we will get for Eichner's model, that - like the other older post-Keynesian models - assumes a normal rate of capacity utilisation in the long run, a reduction in the rates of accumulation and profit and a rising real wage after an increase in the interest rate. In Kalecki's model - with a variable equilibrium rate of capacity utilisation - the rates of accumulation, profit, and capacity utilisation will show a negative reaction when the interest rate rises, whereas the real wage will remain constant.

[11] According to this neo-Ricardian position, lasting changes in the interest rate cause changes in the price level in the same direction. As the rate of profit of enterprise is considered to be given by the risks and troubles of real investment and the nominal wage rate is also taken as given, the interest rate determines the rate of profit and the real wage becomes a residual variable.

In equation 3) for the savings rate *(σ)* which relates total savings *(S)* to the capital stock we assume a classical savings hypothesis, i.e. labourers do not save. The part of profits retained by firms is completely saved by definition. The relation of profits distributed to capital owner households, the rentiers' income *(Z)*, to the capital stock is given by the rate of interest.[12] Rentiers' income is used by capital owner households according to their propensity to save *(s_Z)* for consumption and savings. Total savings therefore comprise retained profits and savings out of rentiers' income (Lavoie 1995, 1992, pp. 362). With the propensity to save out of rentiers' income given, the savings rate depends on the relation between the profit rate and the interest rate. The higher the interest rate at a given rate of profit the lower will be the savings rate, because income is transferred from firms that do not consume to rentiers' households who consume at least a part of their income.

The investment function 4) makes the rate of accumulation *(g)* that describes net investment *(I)* as a proportion of the capital stock depend on the expected profit rate and the interest rate. Assuming the technical conditions of production to be constant, the profit rate is decomposed into the profit share reflecting the development of unit cost and the rate of capacity utilisation indicating the development of demand. Firms have to finance at least a part of their investment by credit. We shall assume that the commercial banks' willingness to supply credit is positively correlated with the firms' internal means of finance.[13] The higher the amount of own capital of the firm the higher the amount of debt capital that can be obtained for investment.[14] This position supposes that there is a maximum degree of indebtedness that banks are willing to tolerate in order to minimise borrower's risk and that firms are willing to accept because of lender's risk. From this follows,

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[12] Rentiers' income contains the interest on credit, the dividends on shares, and the imputed interest on own capital.

[13] For a more complete post-Keynesian theory of credit rationing based on asymmetric expectations between lenders and borrowers in a world of fundamental uncertainty see Wolfson (1996).

[14] A similar view was taken by J. Robinson (1962, p. 86) and by Kalecki (1971, p. 106). Recent empirical work has shown that the interest rate has important effects on investment through its impacts on internal funds and hence on the access to external borrowing in imperfect capital markets. The direct effects of interest rate changes on investment, however, are rather small or insignificant (see Fazzari, Hubbard & Peterson, 1988, Schiantarelli, 1996).

that the higher the retained earnings the greater the prospects for expansion of the firm. As retained earnings depend on the difference between the rate of profit and the interest rate, the interest rate becomes an additional argument in the accumulation function. On the one hand, the higher the difference between the realised profit rate and the interest rate the higher the amount of the firm's internal means of finance and the higher the amount of credit the banks are willing to supply and firms are willing to lend without approaching the maximum degree of indebtedness of the firm given by borrower's and lender's risk. On the other hand, the higher the difference between the expected profit rate and the interest rate the higher the maximum degree of indebtedness banks and firms are willing to tolerate. The parameter α in the investment function stands for the motivation to accumulate which derives from the competition of firms independently of the development of distribution, effective demand or monetary policy. The intensity of the influence of effective demand is indicated by β, whereas τ shows the weight of distribution struggle and θ the impact of the interest rate. To induce investors to demand real capital goods instead of financial assets, the expected rate of profit on real investment has to exceed the rate of interest in financial markets. Equation 5) defines the goods market equilibrium.

The Keynesian stability condition for the g-σ-equilibria in the goods markets requires that the decisions to save respond more elastically to a variation in the rate of capacity utilisation than the decisions to invest:

$$6) \qquad \frac{\partial \sigma}{\partial \mathrm{u}} - \frac{\partial \mathrm{g}}{\partial \mathrm{u}} > 0,$$

$$\frac{\mathrm{h}}{\mathrm{v}} - \beta > 0.$$

As equations 7) - 9) show, the effects of a variation in the exogenous interest rate on the equilibrium position of the system, i.e. on the equilibrium rates of capacity utilisation, accumulation and profit depend on the values of the parameters β, τ and θ in the investment function and s_Z in the savings function:

7) $$\frac{du}{di} = \frac{(\tau - \frac{u}{v})\frac{dh}{di} + (1 - s_Z) + \theta}{\frac{h}{v} - \beta},$$

8) $$\frac{\mathrm{dg}}{\mathrm{di}} = \beta \frac{\mathrm{du}}{\mathrm{di}} + \tau \frac{\mathrm{dh}}{\mathrm{di}} + \theta,$$

9) $$\frac{\mathrm{dr}}{\mathrm{di}} = \frac{\mathrm{h}}{\mathrm{v}} \frac{\mathrm{du}}{\mathrm{di}} + \frac{\mathrm{u}}{\mathrm{v}} \frac{\mathrm{dh}}{\mathrm{di}}.$$

If only stable equilibria are considered we can distinguish nine potential regimes of accumulation in our simple model. In the case of a rigid mark-up we get three possible regimes of accumulation, the regimes 1 to 3 in table 1. Only regime 1 shows the consequences usually associated with a rising interest rate in post-Keynesian models: the rates of capacity utilisation, capital accumulation and profit are decreasing.[15] This regime is dominated by a high responsiveness of investment to a change in the interest rate and a high propensity to save out of rentiers' income. If investment, however, is hardly affected by the interest rate and the propensity to save out of rentiers' income is relatively low, there may arise regimes of accumulation with positive responses throughout the rates of capacity utilisation, accumulation and profit to an increasing interest rate.

Considering the case of a flexible mark-up, six further regimes of accumulation can be distinguished: the regimes 4 to 9 in table 1. Only regime 4 shows the typically post-Keynesian results for a rising interest rate, when firms raise the mark-up. This regime is also caused by a high direct responsiveness of investment to the interest rate, by a high propensity to save out of rentiers' income, and additionally by the redistribution at the expense of labour income which causes a loss of consumption demand, because the propensity to consume out of wages exceeds the propensity to consume out of rentiers' income. If the responsiveness of investment to interest changes, however, declines and the propensity to save out of rentiers' income also shows lower values, regimes of accumulation with a positive reaction of the rates of capacity utilisation, accumulation and profit

[15] For a survey of the integration of the interest rate into post-Keynesian models of growth and distribution see Lavoie (1995).

throughout can be derived - as expected by some authors in the classical and neo-Ricardian tradition.[16]

Table 1: Responses of the profit share, the rate of capacity utilisation, the rate of accumulation and the rate of profit to a variation in the interest rate: possible regimes of accumulation

Regime	$\frac{dh}{di}$	$\frac{du}{di}$	$\frac{dg}{di}$	$\frac{dr}{di}$
1	0	-	-	-
2	0	+	-	+
3	0	+	+	+
4	+	-	-	-
5	+	-	-	+
6	+	-	+	-
7	+	-	+	+
8	+	+	-	+
9	+	+	+	+

We may conclude the theoretical part of our paper with the result that the integration of the monetary interest rate into the simple aggregate demand-aggregate supply model has shown that this exogenously determined variable has a major influence on the real equilibrium position of the economic system. The effects of an interest rate variation on the equilibrium position, however, are not unique but depend on the values of the parameters in the accumulation and the savings function. Variations in the interest rate affect the equilibrium position of the system through different channels: Consumption demand is influenced by a redistribution

[16] Introducing the interest rate into a classical production price model Franke (1988) gets the result that a decline in the interest rate causes a decline in the level of prices and therefore a rising real wage, a decreasing rate of profit and a decline in the rate of accumulation. These results are based on the neo-Ricardian relationship between changes in the interest rate and distribution and on the classical assumption that accumulation is determined by savings out of profits. Pivetti (1985), however, concludes also in a neo-Ricardian framework which does not rely on the determination of investment by savings that the effects of a variation in the interest rate on the level and the composition of effective demand and therefore on output and employment are rather vague.

of income between wages and profits on the one hand and between rentiers‘ income and profits of enterprise on the other hand. Investment demand is affected directly by interest rate changes but there are also indirect impacts through the consequences interest rate variations have for the rate of capacity utilisation and for income distribution.

Taking these effects into account, different reactions of the equilibrium position of the system to an interest rate variation have been derived. Therefore, no generally valid statement about the consequences a changing interest rate has for the equilibrium rates of capacity utilisation, accumulation and profit can be made. Neither the post-Keynesian view of a negative relation nor the neo-Ricardian view of a positive relation can claim general validity. Following our model, assessing the effects of interest rate changes on capacity utilisation, accumulation and the profit rate requires some knowledge about the parameters in the accumulation and savings function and about the response of distribution. In other words, in a post-Keynesian framework we need a concrete historical analysis in order to judge the effects of monetary policy. Some preliminary efforts towards such an analysis will be made in the next part.

3. Interest rates, income shares, effective demand, and investment: the empirical evidence for some OECD-countries

3.1. General trends

In order to assess the influence of interest rate variations on income shares and capital accumulation the development of the real long-term interest rate is consulted, i.e. the nominal long-term interest rate corrected for the change in the price level. The real long-term rate is used because a change in this rate cet. par. indicates an alteration in distribution between rentiers’ income and profits of enterprise or wages. The decisions to accumulate are also affected by the expected real long-term interest rate and not by the nominal rate. As central banks’ policies

affect the real long-term interest via variation of the nominal short-term interest rate (i^n) the development of this rate is considered as well.

The analysis of income shares and capital accumulation is done for the economy as a whole and for the manufacturing sector of the economy. In the profit share depreciation allowances for capital are are not included, but this variable still contains imputed and actual interest payments. In the calculation of the profit shares in manufacturing changes in the shares of employed and self-employed in the labour force are not eliminated due to a lack of data. This seems to be acceptable because the share of the self-employed is rather low in manufacturing and remains quite stable in the course of time. The profit share for the economy as a whole, however, has been corrected for changes in the shares of employed and self-employed in the labour force, i.e. it does not include the labour income of the self-employed which was assumed to be equal to the average income of all employees. The development of the capital stock is measured by the rate of growth of the real gross capital stock. For the economy as a whole only the capital stock in the private sector (agriculture, industry and services) is considered; dwellings and the capital stock of producer of government services are excluded.

As reliable data for the rate of capacity utilisation are not available for international comparisons, the rate of growth of gross domestic product (GDP) in the economy and in manufacturing $(\tilde{y})$ is used as an indicator for the development of demand. As the values of the relevant variables are markedly influenced by the trade cycle, whereas we are interested in long-term trends, average values for the respective cycles are calculated in tables 2 and 3 for France, Germany[17], the United Kingdom (UK) and the USA as major OECD-economies.[18]

[17] In what follows Germany refers to the former West Germany.
[18] The end of a trade cycle is given by a local minimum of economy wide GDP-growth.

Table 2: Nominal short-term and real long-term interest rates, profit shares, GDP-growth rates and rates of accumulation in the economy on average over the business cycle (in %)

France	**1960-1969**	**1970-1975**	**1976-1981**	**1982-1993**
Nom. s. int. (i^n)[1]	4.9	8.3	11.2	9.4
Real l. int. (i)[2]	2.0 [6]	0.5	1.4	5,2
Profit share (h)[3]	17.3	18.8	12.6	16.8
GDP-growth ($\tilde{y}$)[4]	5.5	3.4	2.3	1.8
Rate of ac. (g)[5]	5.4 [7]	5.7	3.8	2.7
Germany	**1960-1967**	**1968-1975**	**1976-1982**	**1983-1993**
Nom. s. int. (i^n)[1]	4.5	7.3	7.1	6.5
Real l. int. (i)[2]	3.3 [8]	2.4	3.7	4.2
Profit share (h)[3]	20.0	17.6	15.1	18.8
GDP-growth ($\tilde{y}$)[4]	3.8	3.3	1.7	2.6
Rate of ac. (g)[5]	6.4	4.9	3.2	2.8
UK		**1963-1974**	**1975-1980**	**1981-1991**
Nom. s. int. (i^n)[1]		7.7	11.6	11.8
Real l. int. (i)[2]		2.2	-3.3	4.5
Profit share (h)[3]		18.1	13.8	13.6
GDP-growth ($\tilde{y}$)[4]		2.9	1.8	2.6
Rate of ac. (g)[5]		4.0	2.7	2.3
USA	**1961-1970**	**1971-1975**	**1976-1982**	**1983-1991**
Nom. s. int. (i^n)[1]	4.4	5.9	9.1	7.4
Real l. int. (i)[2]	1.7	-0.8	1.7	5.7
Profit share (h)[3]	18.3	17.2	16.9	18.7
GDP-growth ($\tilde{y}$)[4]	4.0	2.3	1.8	2.8
Rate of ac. (g)[5]	3.7	3.9	3.9	2.9

Notes: [1] Nominal short-term interest rate (3 months), [2] Real long-term interest rate: Nominal long-term interest rate (more than 7 years) corrected by the growth rate of the GDP price index, [3] Net operating surplus/Net value added, profits include imputed and actual interest payments, [4] Annual growth rate of real gross domestic product, [5] Annual growth rate of the real gross capital stock in agriculture, industry and services, [6] 1961-1969, [7] 1960-1964 without capital stock in services, [8] 1961-1967. Restrictions of time periods because of a lack of data.

Sources: Europäische Kommission (1996), OECD (1982-1997), OECD (1986-1996), OECD (1980-1997), OECD (1998), authors' calculations.

Table 3: Nominal short-term and real long-term interest rates, profit shares, GDP-growth rates and rates of accumulation in manufacturing on average over the business cycle (in %)

France	**1960-1969**	**1970-1975**	**1976-1981**	**1982-1993**
Nom. s. int. (i^n)[1)]	4.9	8.3	10.4	10.1
Real l. int. (i)[2)]	2.0 [6)]	0.5	1.4	5.2
Profit share (h)[3)]	25.5	26.2	19.8	22.4 [8)]
GDP-growth ($\tilde{y}$)[4)]	8.0 [7)]	4.1	1.7	0.3
Rate of ac. (g)[5)]	5.9	5.2	2.6	2.1
Germany	**1960-1967**	**1968-1975**	**1976-1982**	**1983-1993**
Nom.s. int. (i^n)[1)]	4.5	7.3	7.1	6.5
Real l. int. (i)[2)]	3.3 [9)]	2.4	3.7	4.2
Profit share (h)[3)]	29.1	25.2	18.4	16.4
GDP-growth ($\tilde{y}$)[4)]	3.7 [9)]	3.1	0.7	1.1
Rate of ac. (g)[5)]	7.2	4.6	1.6	1.6
UK		**1963-1974**	**1975-1980**	**1981-1991**
Nom. s. int. (i^n)[1)]		7.7	11.6	11.8
Real l. int. (i)[2)]		2.2	-3.3	4.5
Profit share (h)[3)]		21.9	14.4	15.7
GDP-growth ($\tilde{y}$)[4)]		3.1	-1.0	2.2 [10)]
Rate of ac. (g)[5)]		3.4	2.0	0.9
United States	**1961-1970**	**1971-1975**	**1976-1982**	**1983-1991**
Nom. s. int. (i^n)[1)]	4.4	5.9	9.1	7.4
Real l. int. (i)[2)]	1.7	-0.8	1.7	5.7
Profit share (h)[3)]	21.1	17.7	16.4	20.4
GDP-growth ($\tilde{y}$)[4)]	4.8	2.0	1.0	2.8
Rate of ac. (g)[5)]	4.4	4.0	4.0	2.2

Notes: [1)] Nominal short-term interest rate (3 months), [2)] Real long-term interest rate: Nominal long-term interest rate (more than 7 years) corrected by the growth rate of the GDP price index, [3)] Net operating surplus/Net value added in manufacturing, profits include imputed and actual interest payments, [4)] Annual growth rate of real gross domestic product in manufacturing, [5)] Annual growth rate of the real gross capital stock in manufacturing, [6)] 1961-1969, [7)] 1963-1969, [8)] 1982-1992, [9)] 1961-1967, [10)] 1981-1986. Restrictions of time periods because of a lack of data.

Sources: Europäische Kommission (1996), OECD (1982-1997), OECD (1986-1996), OECD (1980-1997), authors‘ calculations.

Some general trends can already be deduced from tables 2 and 3. The „golden age"-period of post-war capitalism from the 1950s until the late 1960s and early 1970s, which is only partly covered by our data, was characterised by real interest rates considerably below GDP-growth rates and high rates of capital accumulation in every economy investigated here. Moderately increasing labour income shares seem to have been a precondition for high rates of capital accumulation due to effective demand considerations of investors.[19] The social and institutional conditions for this period of prosperity with low rates of unemployment were given nationally by a capital-labour-accord and internationally by the hegemonic currency-system of Bretton Woods.[20]

In the face of high rates of productivity growth the capital-labour-accord allowed for rising real wages and moderately increasing labour income shares in the 1950s and 1960s and hence for mass-production and mass-consumption (fordism). The hegemonic currency-system of Bretton Woods with fixed exchange rates and the US-Dollar as the uncontested world money reduced the level of uncertainty for cross-border economic transactions. With an undisputed hierarchy of currencies expansionary US-monetary and fiscal policies could act as a stimulus for growth in the world economy without endangering the world money role of the US-Dollar.[21]

These two pillars of the „golden age"-period began to crumble in the late 1960s and early 1970s. The capital-labour-accord eroded when full-employment was reached and productivity growth slowed down. Falling profit shares accompanied by rising inflation rates were the consequences in the early 1970s. Rising inflation induced central banks to increase interest rates in order to protect their national currencies after the hegemonic currency system of Bretton Woods had collapsed

[19] See Marglin & Bhaduri (1991) and Hein & Krämer (1997) on the development of distribution and capital formation in the economies discussed here.

[20] The social and institutional conditions for the „golden age"-period are analysed by the „Social Structures of Accumulation"-approach (Kotz, McDonough & Reich 1994). According to this approach periods of prosperity in capitalism require a certain set of social and economic institutions which foster capital accumulation but which may themselves be undermined by lasting periods of prosperity.

[21] See Herr (1988, 1992) on different currency systems.

in the early 1970s.[22] A hegemonic currency system was replaced by a tendency towards a multi-currency system with no unique world money. Different economies have been competing for the world money role since then using restrictive monetary and fiscal policies as tools in order to improve the qualities of their currencies in the opinion of monetary wealth holders. Volatile exchange rates, higher levels of uncertainty and higher interest rates have been the results.

Under these conditions short term interest rates directly controlled by central banks increased during the cycle of the early 1970s without immediately affecting real long-term interest rates due to high inflation rates in the first half of the 1970s. Not before the cycle of the second half of the 1970s and the early 1980s could inflation be stopped by restrictive monetary policies and real long-term interest rates increased considerably, with the exception of the UK where high inflation rates still caused a negative real long-term interest rate. It was in this period that profits of enterprise in the economy as well as in manufacturing were compressed between rising wage demands and rising contributions to rentiers' households in France, Germany, the USA, and by rising wage demands alone in the UK. As a consequence capital accumulation and GDP-growth slowed down, because investment decisions seem to have been dominated by the development of wage costs, interest rates and uncertainty in the international sphere in this period and not by rising consumption demand accompanying the redistribution towards wage earners and rentiers. An exception were the USA where capital accumulation remained constant in manufacturing as well as in the economy as a whole instead of falling profit shares and rising real long-term interest rates.

During the cycle of the 1980s until the early 1990s also the US-economy and US-manufacturing witnessed a considerable reduction in the rate of capital formation. In the other economies the slowdown in capital accumulation continued. After a period of disinflation nominal short-term interest rates slightly decreased in France, Germany and the USA, but still remained at a high level in these countries, and increased a little in the UK. This translated into the highest real long-

[22] For the reasons of this collapse see also Herr (1988, 1992).

term interest rates since 1960 in all economies investigated here. High real interest rates were now associated with redistributions towards the profit share in France, Germany and the USA at the economy level and in France, the UK and the USA at the manufacturing level. Only in German manufacturing and in the UK economy the profit share decreased once again.

High real interest rates together with falling labour income shares and hence shrinking consumption demand seem to be the main reasons for stagnative capital accumulation and rising unemployment in this period in the economies of France, Germany and the USA as well as in France, the UK and the USA at the manufacturing level.[23] The restrictive effects on GDP-growth were moderated by decreasing savings propensities in the USA and the UK, especially during the 1980s (Armstrong, Glyn & Harrison, 1991, p. 235, p. 257) and by improving export surpluses in Germany. In German manufacturing and the UK economy the stagnation in capital formation and growth in this cycle still seems to be caused by high interest rates and rising labour costs.

3.2. Some econometric evidence

Some of these empirical results can be reinforced by linear regressions for annual data of the variables under discussion. In the first step the effects of real long-term interest rates on distribution are analysed. In the second step the determinants of investment shall be investigated.[24] We hence deal with the two main

[23] Glyn (1997) suggests that structural change contributed to the slowdown in capital accumulation in the manufacturing sectors during the 1980s. Indeed, the capital stock growth in services exceeds that in manufacturing in the economies under investigation according to his data. But in the 1980s and early 1990s the growth rates of the capital stock in services have also fallen below their values in the late 1960s and early 1970s in Germany and France. And in the UK and the USA capital stock growth in services did not accelerate in the 1980s and early 1990s. Therefore, structural change cannot be the main cause for the slowdown in capital formation in manufacturing in the 1980s and early 1990s. Stagnative capital formation seems to be a general feature in this period as our data for the economy as a whole also show.

[24] The theoretical assumption that the overall savings rate of the economy depends on income shares is not tested empirically. Here we rely on the empirical evidence given by Marglin & Bhaduri (1991) and by Bowles & Boyer (1995) who find a significantly higher propensity to save out of profits than out of wages.

channels of influence of the monetary interest rate on the real equilibrium as discussed in our theoretical model.

Real long-term interest rates and income shares

Assessing the effects of real long-term interest rates *(i_t)* on the profit share *(h_t)* the following regression was run for the economy as a whole and for the manufacturing sector:

10) $$h_t = \beta_0 + \beta_1 i_t + \varepsilon_t .$$

In tables 4 and 5 the results are given. The regression was run for the whole period under investigation and for two subperiods, the „golden-age"- and the „post-golden-age"-period of accumulation in order to grasp alterations in the effects of interest rates on distribution between these periods.

For the whole period under consideration there is only a significantly inverse relation between real long-term interest rates and the profit share in German manufacturing. This may suggest that interest rates did not affect the profit share through the variations in costs or mark-ups but rather through effective demand channels, low interest rates acting as a stimulus for investment and effective demand and hence for prices and the profit share in manufacturing. This result, however, is not supported by the examination of the investment function in German manufacturing below. For the other economies there is no significant impact of the real long-term interest rate on distribution, neither for the whole economy nor for manufacturing.

Considering subperiods there is a significantly positive effect of interest rates on the profit share during the „golden-age"-period in France and the UK at the economy level and in the UK and the USA at the manufacturing level. Falling

Table 4: Regression results for the effects of real long-term interest rates on the profit share in the economy (OLS)

$$h_t = \beta_0 + \beta_1 i_t + \varepsilon_t$$

Country	**France**			**Germany**			**UK**			**USA**		
Period	1961-1993	1961-1975	1976-1993	1961-1993	1961-1975	1976-1993	1963-1991	1963-1975	1976-1991	1961-1991	1961-1975	1976-1991
$\hat{\beta}_1$	0.3260	0.6718*	0.9553**	-0.1839	0.0792	-0.1059	0.2180	0.5908**	0.0070	0.0785	0.1546	0.1151
t-Value	1.3203	2.1051	2.8522	-0.6282	0.1851	-0.2201	1.4565	4.8598	0.0464	0.7414	0.5238	0.8303
p-Value	0.1964	0.0553	0.0115	0.5345	0.8560	0.8286	0.1568	0.0005	0.9636	0.4644	0.6092	0.4203
F-Value	1.7432	4.4316	8.1352	0.3947	0.0343	0.0484	2.1215	23.6174	0.0022	0.5496	0.2744	0.6893
F-critical	0.1964	0.0553	0.0115	0.5345	0.8560	0.8286	0.1568	0.0005	0.9636	0.4644	0.6092	0.4203
Stnd.error	0.0341	0.0223	0.0315	0.0242	0.0224	0.0258	0.0292	0.0173	0.0191	0.0157	0.0177	0.0146
Adj. R^2	0.0227	0.1969	0.2956	-0.0193	-0.0741	-0.0593	0.0385	0.6534	-0.0713	-0.0152	-0.0547	-0.0211
Dur.-Wat.	0.1767	0.4841	0.4418	0.2589	0.2969	0.2150	0.3581	1.4204	0.9228	0.6287	0.5735	0.7515
N	33	15	18	33	15	18	29	13	16	31	15	16

**) significant with an error probability < 0.05, *) significant with an error probability < 0.1

Sources: see table 2.

Table 5: Regression results for the effects of real long-term interest rates on the profit share in manufacturing (OLS)

$$h_t = \beta_0 + \beta_1 i_t + \varepsilon_t$$

Country	**France**			**Germany**			**UK**			**USA**		
Period	1961-1992	1961-1975	1976-1992	1961-1993	1961-1975	1976-1993	1963-1991	1963-1975	1976-1991	1961-1991	1961-1975	1976-1991
$\hat{\beta}_1$	0.0285	0.5282	0.7516*	-1.4529**	-0.0331	-0.1507	0.3752	0.8417**	0.1908	0.0383	0.9846**	0.0345
t-Value	0.0981	1.5683	1.9363	-2.2242	-0.0490	-0.2624	1.4753	4.3200	0.5596	0.1763	2.5910	0.0999
p-Value	0.9225	0.1408	0.0719	0.0336	0.9617	0.7963	0.1517	0.0012	0.5846	0.8613	0.0224	0.9219
F-Value	0.0096	2.4596	3.7494	4.9471	0.0024	0.0689	2.1766	18.6620	0.3131	0.0311	6.7140	0.0100
F-critical	0.9225	0.1408	0.0719	0.0336	0.9617	0.7963	0.1517	0.0012	0.5846	0.8613	0.0224	0.9219
Stnd.error	0.0400	0.0236	0.0364	0.0540	0.0355	0.0308	0.0495	0.0278	0.0432	0.0322	0.0228	0.0364
Adj. R^2	-0.0330	0.0944	0.1466	0.1098	-0.0767	-0.0579	0.0403	0.5954	-0.0480	-0.0334	0.2898	-0.0707
Dur.-Wat.	0.4494	1.8094	0.5979	0.2612	0.3850	0.4972	0.4363	1.2404	0.7647	0.4312	1.0374	0.3932
N	32	15	17	33	15	18	29	13	16	31	15	16

**) significant with an error probability < 0.05, *) significant with an error probability < 0.1

Sources: see table 3.

profit shares were accompanying falling interest rates indicating a flexible mark-up with respect to interest rates which became a precondition for rising labour income shares in this period. In the „post-golden-age"-period, however, there is only a significantly positive impact of interest rates on distribution in the French economy and in French manufacturing. Rising interest rates at least explain a part of the increase in the profit share in France via flexible mark-ups.

The overall explanatory power of the monetary interest rate for distribution between gross profits and wages, however, is rather low. Variations in the real interest rate rather seem to take place at the expense of retained earnings or profits of enterprise. A full explanation of the determinants of income shares and their development in the process of time should consider effective demand developments in the goods market and power relations in the labour market. On both the interest policy may have indirect effects.

Real long-term interest rates and capital stock growth

In order to grasp the impact of the monetary interest rate on private investment as the most volatile demand aggregate in the goods market and the major determinant of growth, the effects of interest rates, income distribution and demand growth on capital accumulation were tested by the following regression for the economy as a whole and for the manufacturing sector. The regression introduces a time lag between investment decisions and the actual expansion of the capital stock and hence productive capacity:

11) $$g_{t+1} = \alpha + \beta \tilde{y}_t + \tau h_t + \theta i_t + \varepsilon_t .$$

The regression was again run for the whole period under consideration and for the two sub-periods. The results are presented in tables 6 and 7.

Table 6: Regression results for the effects of demand growth, profit shares and real interest rates on investment in the economy (OLS)

$$g_{t+1} = \alpha + \beta \tilde{y}_t + \tau h_t + \theta i_t + \varepsilon_t$$

Country	**France**			**Germany**			**UK**			**USA**		
Period	1962-1993	1962-1975	1976-1993	1962-1993	1962-1975	1976-1993	1964-1991	1964-1975	1976-1991	1962-1991	1962-1975	1976-1991
β^	0.3370**	0.1425	0.1190	0.1681	-0.0824	0.1997**	0.1124	0.2468**	0.2593**	0.1466**	0.0730	0.2072**
t-Value	5.0663	1.3138	1.4559	1.3219	-0.8367	2.7923	1.3654	2.8556	3.5369	2.7812	0.9789	3.4735
p-Value	0.0000	0.2182	0.1675	0.1969	0.4223	0.0144	0.1848	0.0213	0.0041	0.0099	0.3507	0.0046
τ^	0.1247**	0.0726	0.0748*	0.1966*	0.5513**	-0.0641	0.2077**	-0.0636	-0.1249	0.0403	0.2524**	-0.2329**
t-Value	3.2945	1.3535	1.9964	1.7481	4.9957	-1.1739	3.8215	-0.7120	-1.6595	0.5630	3.1608	-2.5388
p-Value	0.0027	0.2057	0.0657	0.0914	0.0005	0.2600	0.0008	0.4967	0.1229	0.5782	0.0101	0.0256
θ^	-0.2803**	-0.0350	-0.2420**	-0.4241**	-0.3948**	-0.1129	-0.0647*	0.1877	-0.0535**	-0.1332**	-0.1305	-0.0940**
t-Value	-5.6509	-0.4580	-5.0843	-3.0874	-3.3070	-1.4225	-1.7391	1.7597	-2.2960	-3.5992	-1.2742	-2.4378
p-Value	0.0000	0.6567	0.0002	0.0045	0.0079	0.1768	0.0948	0.1165	0.0405	0.0013	0.2314	0.0313
F-Value	42.3933	0.9507	9.9561	10.1081	14.6341	3.3309	10.3596	6.5941	4.7764	7.6961	6.6734	7.1506
F-critical	0.0000	0.4528	0.0009	0.0001	0.0005	0.0505	0.0001	0.0148	0.0205	0.0008	0.0094	0.0052
Stnd.error	0.0060	0.0040	0.0045	0.0109	0.0055	0.0042	0.0065	0.0042	0.0038	0.0054	0.0043	0.0045
Adj. R^2	0.8002	-0.0115	0.6125	0.4685	0.7588	0.2915	0.5098	0.6041	0.4303	0.4092	0.5670	0.5516
Dur.-Wat.	1.7031	1.2825	1.5441	0.4181	0.8032	1.2296	1.1041	1.9350	1.2020	0.7367	1.6938	1.2360
N	32	14	18	32	14	18	28	12	16	30	14	16

**) significant with an error probability < 0.05, *) significant with an error probability < 0.1

Sources: see table 2.

Table 7: Regression results for the effects of demand growth, profit shares and real interest rates on investment in manufacturing (OLS)

$$g_{t+1} = \alpha + \beta \tilde{y}_t + \tau h_t + \theta i_t + \varepsilon_t$$

Country	**France**			**Germany**			**UK**			**USA**		
Period	1965-1993	1965-1975	1976-1993	1963-1993	1963-1975	1976-1993	1964-1987	1964-1975	1976-1987	1963-1991	1963-1975	1976-1991
β^	0.2875**	0.2151*	0.0904	0.0282	-0.1009	0.0424	0.0175	-0.0336	0.1148*	0.0583	-0.03524	0.0779**
t-Value	4.3629	2.0755	1.6983	0.5458	-1.3787	0.6302	0.3295	-0.7127	2.0592	1.6042	-0.6878	2.7066
p-Value	0.0002	0.0766	0.1116	0.5897	0.2013	0.5387	0.7452	0.4963	0.0735	0.1212	0.5089	0.0191
τ^	0.1288**	-0.1688	0.1152**	0.4006**	0.7262**	0.2228*	0.2082**	0.1263**	0.0493	0.0845	0.4619**	-0.0583
t-Value	2.1329	-0.7263	2.7192	9.1579	6.2331	2.0797	5.8808	2.3832	1.0736	1.4412	3.5656	-1.4038
p-Value	0.0429	0.4912	0.0166	0.0000	0.0002	0.0564	0.0000	0.0443	0.3143	0.1619	0.0061	0.1857
θ^	-0.1247	0.2622	-0.1714**	-0.0230	-0.4191**	0.0915	-0.1015**	0.1853	-0.1478**	-0.3189**	-0.5513	-0.3017**
t-Value	-1.4646	1.1520	-2.9731	-0.1842	-2.5916	0.5605	-2.3284	1.6225	-4.1820	-5.5299	-2.2070	-7.3929
p-Value	0.1555	0.2855	0.0101	0.8553	0.0291	0.5840	0.0305	0.1434	0.0031	0.0000	0.0547	0.0000
F-Value	23.1687	3.3262	7.0891	58.2461	19.4726	4.0522	23.0564	5.4470	8.2174	12.9838	5.2539	18.6940
F-critical	0.0000	0.0862	0.0039	0.0000	0.0003	0.0288	0.0000	0.0246	0.0079	0.0000	0.0228	0.0001
Stnd.error	0.0102	0.0080	0.0056	0.0088	0.0077	0.0064	0.0066	0.0043	0.0046	0.0084	0.0074	0.0049
Adj. R^2	0.7037	0.4110	0.5180	0.8513	0.8220	0.3501	0.7421	0.5481	0.6631	0.5622	0.5154	0.7797
Dur.-Wat.	1.8592	1.3236	1.5144	0.7021	1.4450	0.7582	1.3677	1.3884	2.3462	0.7406	1.6960	1.8599
N	29	11	18	31	13	18	24	12	12	29	13	16

**) significant with an error probability < 0.05, *) significant with an error probability < 0.1

Sources: see table

Looking first at the determinants of investment in the whole period under consideration from the early 1960s until the early 1990s we find that the real long-term interest rate had a significantly negative effect on capital stock growth in each economy. For France we also see a positive effect of GDP-growth and the profit share, in Germany and the UK there is also a positive impact of the profit share and in the USA investment is positively associated with GDP-growth. In manufacturing we find a similar pattern, but the rate of interest rate has no significant impact in France and in Germany.

For the „golden-age"-period, of which only the declining phase is covered by our data, in Germany there can be found a significantly negative influence of the real interest rate on capital formation. Low real interest rates were therefore conducive to capital accumulation. This is true for the economy as a whole and for manufacturing. On both levels the negative impact of the interest rate is accompanied by a significantly positive impact of the profit share. The other countries do not show a significant impact of the real interest rate on investment, neither in the economy as a whole nor in manufacturing. But the US economy and US manufacturing as well as UK manufacturing show a positive effect of the profit share on capital accumulation. This result reflects the fact that in the end of the „golden-age"-age period falling profit shares caused a slowdown in accumulation in these countries as well as in Germany. In French manufacturing and the UK economy there could be measured a positive impact of GDP-growth on investment in this phase, i.e. the slowdown in GDP-growth contributed to the slowdown in capital stock growth.

The „post-golden-age"-period shows a significantly negative impact of the real long-term interest rate on investment in France, the UK and the USA, both at the level of the economy and the manufacturing sector. Therefore, rising real interest rates were a main cause for the slowdown in capital accumulation in this period in these economies. In the US and the UK economy as well as in manufacturing this slowdown in capital formation was aggravated by a significantly positive relation between GDP-growth and capital formation. The reduction in the growth of de-

mand caused by the redistribution towards profits, especially in the 1980s, therefore contributed to the slowdown in accumulation. In the US economy there existed also a significantly negative impact of the profit share on investment. In France there can be found a significantly positive impact of profitability on investment in this period for the economy and the manufacturing sector as well. This, however, was not strong enough to compensate for the negative effects of rising real interest rates.

Only in the German economy and in German manufacturing there cannot be found a significantly negative impact of the real interest rate on investment in the „post-golden age"-period. This may be due to the fact that the real long-term interest rate only moderately increased from the „golden age"- to the „post-golden age"-period compared to the other countries. The slowdown in capital formation in the German economy is rather caused by the slowdown in demand accompanying the redistribution towards the profit share at the economy level. In German manufacturing, however, we observe a positive relation between profitability and investment. A constantly declining profit share in manufacturing since the early 60s can hence be seen as a major cause for stagnating capital accumulation in German manufacturing.

Our regression results support some of the tendencies derived from the development in the average values of interest rates, income distribution, demand growth, and capital formation presented in tables 2 and 3. In the UK and the USA the slowdown in capital accumulation since the mid 1970s has been caused by rising real long-term interest rates, especially in the 1980s. A slowdown in demand which seems to originate from the redistribution towards profits in this period also contributed to the stagnation in capital accumulation. A rising profit share did not have any positive impact on investment. Also in France the stagnation in capital formation was due to rising real interest rates in the 1980s. Rising real long-term interest rates also caused rising profit shares but this increase and its impact on investment was not strong enough to compensate for the negative effects on investment. Only in Germany the interest rate has had no measurable im-

pact on investment in the „post-golden age"-period. The slowdown in capital accumulation in the economy as whole is rather caused by effective demand problems originating from a redistribution towards profits. In manufacturing declining profitability may have been a cause for the reduction in the growth rate of the capital stock. The difference between the German experiences and those in the other economies suggests that it is not the level of real interest rates that acts as an impediment to investment but rather its speed of increase. This speed has been much slower in Germany than in the other economies.

4. Conclusions

Within a simple post-Keynesian aggregate demand-aggregate supply model of the Kaleckian type we have studied the effects of the monetary variable „interest rate" on the real variables income distribution, capacity utilisation and capital accumulation. Within our model the monetary interest rate has a profound influence on the real equilibrium position of the economic system. But the response of the equilibrium to a variation in the interest rate is not unique. It depends on the elasticity of the mark-up with respect to the interest rate and on the reaction coefficients in the investment and the savings function. The equilibrium position of the economic system is therefore highly sensitive to the values of the parameters and the exogenous variables in the model. Neither the post-Keynesian nor the neo-Ricardian theoretical positions concerning the real effects of variations in the interest rate can therefore claim general validity.

Confronting our model with the data of some major OECD-countries we found that the real effects of the monetary interest rate indeed vary between economies and between periods of accumulation. The impact of the real interest rate on distribution between gross profits and wages seems to be rather vague. Regimes with a flexible mark-up with respect to real interest rates could hardly be found empirically. Variations in the real interest rates rather take place at the expense of retained earnings or profits of enterprise. But the real interest rate seems to have a profoundly inverse effect on investment, low real interest rates acting as a stimu-

lus for investment and high real interest rates restricting capital formation. The theoretical possibility of a positive impact of the real interest rate upon equilibrium capital stock growth could not be confirmed by our results. Rather a significantly negative impact of high real interest rates on investment in the „post-golden-age"-period since the mid 1970s could be deduced in France, the UK, and the USA. Restrictive monetary policies originating from conflict inflation and from the replacement of the hegemonic currency system of Bretton Woods caused the slowdown in capital formation in these economies. This slowdown in capital stock growth seems to be the main reason for increasing employment problems since the mid 1970s. The redistribution towards profits and the consecutive reduction in consumption demand aggravated the stagnative trend in the UK and the USA. Falling savings propensities dampened the effects on GDP-growth but were not sufficient to counteract the overall tendency. Only in Germany rising real interest rates do not seem to have been a major problem for capital formation. Here effective demand problems in the economy and declining profitability in manufacturing seem to have been of greater importance. The German experience suggests that it is the speed of increase in the interest rate rather than the level of interest rates that chokes investment.

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Data-Appendix

France			*Manufacturing*			*Economy*		
	i^{n} [1)]	i [2)]	h [3)]	$\tilde{y}$ [4)]	g [5)]	h [6)]	$\tilde{y}$ [7)]	g [8)]
1960	4,1	*	24,8	*	*	14,9	*	*
1961	3,7	2,1	24,0	*	5,9	14,1	5,5	5,4
1962	3,6	0,7	23,3	*	6,5	15,1	6,7	5,5
1963	4,0	-1,1	24,2	*	6,1	15,5	5,3	5,5
1964	4,7	1,4	26,0	10,3	6,0	16,4	6,5	5,6
1965	4,2	3,5	26,2	5,5	5,4	17,8	4,8	5,2
1966	4,8	3,7	27,3	9,3	5,8	18,8	5,2	5,1
1967	4,8	3,5	24,6	5,2	5,6	20,1	4,7	5,1
1968	6,2	2,8	25,6	5,8	5,3	19,6	4,3	5,1
1969	9,3	1,3	28,5	12,0	6,6	20,4	7,0	5,8
1970	8,6	3,0	27,8	9,0	6,8	20,2	5,7	5,8
1971	6,0	2,1	26,6	6,4	6,3	19,8	4,8	5,9
1972	5,3	1,0	26,7	6,3	6,1	20,1	4,4	6,1
1973	9,3	0,5	26,8	7,0	6,1	20,8	5,4	6,1
1974	13,0	-0,8	29,7	3,2	4,8	18,1	2,9	5,5
1975	7,6	-2,7	19,4	-2,1	3,0	13,6	-0,7	4,8
1976	8,7	-0,6	20,8	7,1	3,5	13,3	4,3	4,6
1977	9,1	1,7	20,0	3,7	3,1	13,5	3,7	4,1
1978	7,8	0,5	19,5	3,2	2,8	13,7	2,8	3,9
1979	9,7	0,8	21,1	2,8	2,6	13,5	3,0	3,8
1980	12,0	1,7	19,5	0,1	2,7	11,1	1,3	3,4
1981	15,3	4,5	18,1	-1,1	2,0	10,6	0,6	3,7
1982	14,6	4,0	17,5	-0,1	1,5	10,4	2,2	3,0
1983	12,5	3,9	18,3	1,2	1,3	11,0	0,8	2,5
1984	11,7	5,0	15,3	1,6	1,3	12,4	1,3	2,1
1985	10,0	5,1	17,4	-0,4	1,7	13,9	1,8	2,3
1986	7,7	3,2	22,3	-0,2	1,9	17,0	2,4	2,4
1987	8,3	6,4	23,0	-0,9	2,1	17,8	2,2	2,5
1988	7,9	6,2	27,5	6,0	2,8	19,0	4,2	3,0
1989	9,4	5,8	28,4	5,2	3,1	20,4	3,9	3,4
1990	10,3	6,8	27,5	1,9	3,3	19,9	2,4	3,4
1991	9,6	5,7	25,4	-1,9	2,8	19,9	0,8	3,2
1992	10,4	6,5	24,2	-1,9	1,9	20,1	1,1	2,8
1993	8,6	4,2	*	-3,1	0,5	19,7	-1,3	2,1

Notes: [1)] Nominal short-term interest rate (3 months), [2)] Real long-term interest rate: Nominal long-term interest rate (more than 7 years) corrected by the growth rate of the GDP price index, [3)] Net operating surplus/Net value added in manufacturing, profits include imputed and actual interest payments, [4)] Annual growth rate of real gross domestic product in manufacturing, [5)] Annual growth rate of the real gross capital stock in manufacturing, [6)] Net operating surplus/Net value added, profits include imputed and actual interest payments, [7)] Annual growth rate of real gross domestic product, [8)] Annual growth rate of the real gross capital stock in agriculture, industry and services.

Sources: Europäische Kommission (1996), OECD (1982-1997), OECD (1986-1996), OECD (1980-1997), OECD (1998), authors‘ calculations.

Germany			*Manufacturing*			*Economy*		
	i^{n} [1]	i [2]	h [3]	$\tilde{y}$ [4]	g [5]	h [6]	$\tilde{y}$ [7]	g [8]
1960	5,1	*	33,8	*	*	22,7	*	*
1961	3,6	1,2	31,6	*	9,3	20,6	4,6	7,5
1962	3,4	2,0	28,4	4,4	8,2	19,6	4,7	7,1
1963	4,0	3,0	27,3	2,4	6,9	19,0	2,8	6,4
1964	4,1	3,2	29,0	8,7	7,4	20,3	6,7	6,6
1965	5,1	3,4	29,4	7,9	7,3	19,9	5,4	6,5
1966	6,6	4,7	26,2	1,5	6,6	18,8	2,8	5,9
1967	4,3	5,4	26,8	-2,1	4,7	19,1	-0,3	4,6
1968	3,8	4,2	30,6	10,7	4,4	21,1	5,5	4,5
1969	5,8	2,6	30,1	12,0	6,0	20,6	7,5	5,3
1970	9,4	0,6	26,7	5,1	7,0	18,7	5,0	5,9
1971	7,1	0,3	25,2	1,0	6,3	17,7	3,1	5,8
1972	5,7	2,6	23,9	3,3	4,8	17,4	4,3	5,3
1973	12,2	2,9	23,4	6,1	3,8	16,6	4,8	4,8
1974	9,8	3,3	21,8	-0,3	2,6	14,3	0,2	3,7
1975	4,9	2,8	19,5	-4,8	1,9	14,1	-1,3	3,2
1976	4,3	4,2	21,3	8,0	1,9	15,9	5,3	3,2
1977	4,3	2,5	20,4	2,1	1,9	15,8	2,8	3,3
1978	3,7	1,4	20,0	1,8	1,6	16,6	3,0	3,4
1979	6,9	3,6	20,3	4,6	2,0	16,7	4,2	3,6
1980	9,5	3,5	16,2	0,0	2,2	14,1	1,0	3,5
1981	12,4	6,2	14,6	-1,5	1,5	13,2	0,1	3,0
1982	8,8	4,6	16,1	-2,4	0,7	13,3	-0,9	2,5
1983	5,8	4,7	15,9	1,1	0,6	15,5	1,8	2,5
1984	6,0	5,7	16,2	3,0	0,1	16,7	2,8	2,3
1985	5,4	4,8	17,7	3,7	0,9	17,4	2,0	2,4
1986	4,6	2,7	20,1	1,5	1,4	18,5	2,3	2,5
1987	4,0	3,9	17,4	-1,8	1,7	18,1	1,5	2,6
1988	4,3	4,6	18,1	3,2	1,7	19,5	3,7	2,7
1989	7,1	4,6	17,8	3,4	2,1	20,4	3,6	2,9
1990	8,4	5,7	18,2	5,5	2,8	21,3	5,7	3,4
1991	9,2	4,7	17,2	3,7	3,0	21,0	5,1	3,7
1992	9,5	2,5	13,4	-2,7	2,2	19,8	1,8	3,2
1993	7,2	2,6	8,8	-8,0	0,4	18,8	-1,9	2,0

UK			*Manufacturing*			*Economy*		
	i^{n} [1]	i [2]	h [3]	$\tilde{y}$ [4]	g [5]	h [6]	$\tilde{y}$ [7]	g [8]
1963	3,7	3,3	25,4	3,5	3,0	19,9	4,0	3,3
1964	5,0	2,3	26,0	9,1	3,6	20,1	5,0	3,9
1965	6,8	1,5	24,9	3,0	4,0	20,0	2,8	4,2
1966	7,0	2,4	22,5	1,7	4,0	18,7	2,0	4,1
1967	6,3	3,9	22,9	0,6	3,6	18,7	2,3	4,0
1968	7,9	3,5	22,8	7,2	3,6	18,9	4,0	4,1
1969	9,2	3,7	22,1	3,8	3,9	18,8	2,1	3,8
1970	8,1	1,9	19,3	0,4	3,8	16,7	2,4	3,9
1971	6,2	-0,5	19,7	-1,1	3,3	17,4	2,1	3,5
1972	6,8	0,9	21,4	2,4	2,5	17,7	3,5	3,2
1973	11,8	3,2	22,0	9,2	2,5	18,0	6,7	3,3
1974	13,4	0,4	14,0	-1,2	2,7	12,7	-1,4	5,6
1975	10,0	-11,8	10,8	-7,0	2,4	10,1	-0,1	2,9
1976	11,6	-1,2	11,9	1,8	2,1	12,4	2,2	2,7
1977	8,0	-1,6	18,9	2,0	2,1	16,4	2,2	2,8
1978	9,4	1,1	19,6	0,6	2,2	16,3	3,6	2,7
1979	13,9	-1,5	13,9	-0,2	2,2	15,3	2,8	2,8
1980	16,6	-4,6	11,0	-8,7	1,5	12,5	-1,6	2,5
1981	14,1	3,4	5,9	-6,0	0,5	11,4	-1,3	1,8
1982	12,2	4,9	10,8	0,2	0,4	13,8	1,5	1,8
1983	10,1	5,5	13,9	2,9	0,2	15,7	3,6	1,7
1984	10,0	6,3	13,4	4,0	0,6	14,5	2,5	2,1
1985	12,2	4,7	16,4	3,0	0,8	15,8	3,5	2,4
1986	10,9	6,6	17,8	0,9	0,7	14,3	4,4	1,7
1987	9,7	4,5	17,5	*	0,7	14,8	4,8	2,3
1988	10,3	3,2	20,6	*	1,4	14,6	5,0	2,8
1989	13,9	2,5	19,6	*	1,7	13,2	2,2	3,3
1990	14,8	4,7	20,8	*	1,5	11,5	0,4	3,0
1991	11,5	3,4	16,3	*	0,8	10,5	-2,0	2,4

USA			*Manufacturing*			*Economy*		
	i^{n} 1)	i 2)	h 3)	$\tilde{y}$ 4)	g 5)	h 6)	$\tilde{y}$ 7)	g 8)
1961	2,4	3,0	18,7	*	2,3	15,0	2,5	2,3
1962	2,8	1,7	20,1	8,8	2,4	16,6	5,2	2,6
1963	3,2	2,6	21,7	8,0	2,6	17,1	4,0	2,7
1964	3,6	2,4	22,3	7,2	3,5	17,6	5,6	3,2
1965	4,0	1,6	24,5	9,0	5,2	19,7	5,6	4,1
1966	4,9	1,4	23,9	8,0	6,4	20,9	5,9	4,5
1967	4,3	2,1	21,9	0,0	5,6	20,2	2,7	4,1
1968	5,4	0,3	21,7	5,7	4,8	20,0	4,2	4,2
1969	6,7	1,0	19,4	3,1	4,8	19,1	2,7	4,4
1970	6,3	1,1	16,3	-5,7	4,1	16,7	0,2	4,0
1971	4,3	0,1	18,3	1,2	3,5	17,3	2,9	3,6
1972	4,2	0,6	19,2	9,3	3,4	17,7	5,1	3,7
1973	7,2	-0,1	18,6	11,4	4,0	18,5	5,2	4,5
1974	7,9	-1,9	15,0	-4,0	5,0	16,2	-0,4	4,3
1975	5,8	-2,8	17,5	-7,5	3,8	16,4	-0,4	3,1
1976	5,0	0,4	19,4	9,2	3,7	16,4	4,9	3,2
1977	5,3	0,4	19,9	7,3	3,8	17,2	4,3	3,6
1978	7,4	0,2	19,4	6,1	4,3	18,0	5,0	4,3
1979	10,1	-0,1	16,7	2,2	4,5	17,7	2,5	4,5
1980	11,6	1,4	13,5	-4,4	4,0	16,3	-0,6	4,0
1981	14,0	3,2	14,2	1,9	4,2	17,2	1,7	3,9
1982	10,6	6,1	11,4	-6,2	3,1	15,3	-2,0	3,1
1983	8,7	6,9	16,6	6,1	1,5	15,6	3,4	2,7
1984	9,5	8,0	18,6	7,9	2,2	18,6	6,0	3,4
1985	7,5	7,3	17,9	2,6	2,7	19,3	3,3	3,7
1986	6,0	5,6	18,7	0,9	1,6	18,2	2,9	3,1
1987	5,9	5,6	21,2	7,5	1,8	18,2	2,7	2,8
1988	6,9	5,1	23,2	5,4	1,7	19,6	3,8	2,8
1989	8,4	4,1	23,8	1,1	2,6	20,1	3,3	2,8
1990	7,8	4,4	22,6	-0,7	2,6	19,5	1,2	2,6
1991	5,5	4,6	21,2	-1,8	2,2	18,7	-1,0	2,0
1992	3,5	5,3	20,5	1,6	1,8	18,0	2,8	1,8

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