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Abstract

In Kaleckian models of distribution and growth the equilibrium rate of capacity utilisation may persistently diverge from the 'normal rate' of utilisation. We assess this problem following the approach by Dumenil/Levy (1999) who consider the 'normal rate' of utilisation in a monetary production economy as the rate which is associated with price stability. Since inflation in our model is driven by distribution conflict, the 'normal rate' of utilisation is associated with consistent claims of firms and labourers. Taking into account real debt effects of changes in inflation and distribution effects of monetary policy interventions we discuss the short-run stability of the 'normal rate' and address the issue of long-run endogeneity. Generally, we show that in a Kaleckian monetary distribution and growth model, which takes the major features of a credit economy seriously, the 'normal rate' of capacity utilisation is endogenous to distribution conflict and monetary policy intervention in the long run. And we also show that major Kaleckian results, in particular the paradox of costs, can be retained for the short and the long run.

JEL classification: E12, E22, E25, E52, O42

Keywords: distribution, growth, capacity utilisation, inflation, monetary policy

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1. Introduction

Within Post-Keynesian investment-driven growth theory we can broadly distinguish between the older Kaldorian/Robinsonian models and the more recent models based on the work of Kalecki and Steindl.[1] In the Kaldorian/Robinsonian model distribution is determined by capital accumulation when savings propensities out of profits and out of wages are given and the former exceeds the latter. In the long run, the utilisation of productive capacity determined by the capital stock is assumed to be at a 'normal' level, and there is an inverse relation between the real wage rate and the rate of profit, and also between the real wage rate and the rate of capital accumulation. In the Kaleckian/Steindlian model, however, distribution is determined by mark-up pricing in incompletely competitive goods markets, and utilisation of productive capacity determined by the capital stock is variable also in the long run. Therefore, there is not necessarily an inverse relation between the real wage rate and the rate of profit, nor between the real wage rate and the rate of capital accumulation in the long run. Whereas the extension of Keynes's 'paradox of thrift' to growth theory is common to both the Kaldorian/Robinsonian and the Kaleckian/Steindlian models, only the latter also give rise to a 'paradox of costs'. A positive relation between the real wage rate and the rates of capacity utilisation, capital accumulation and profit can generally be found in the wage-led Kaleckian models pioneered by Rowthorn (1981), Dutt (1984, 1987) and Amadeo (1986, 1986a), which rely on a strong accelerator effect of rising demand on investment. Even if a negative cost-effect of rising real wages on investment is allowed for and profit-led expansion may occur, as in the model proposed by Bhaduri/Marglin (1990), wage-led expansion remains a possible regime also in this type of model.[2]

Kaleckian models, however, have been criticised by some neo-Marxian and neo-Ricardian authors (i.e. Auerbach/Skott 1988; Committeri 1986), because the equilibrium rate of capacity utilisation may permanently deviate from firms' target rate of utilisation, the long run 'normal rate', without any tendency of adjustment.[3] This seems to be inconsistent with the requirement that firms' investment decisions should be based on expectations of some 'normal rate' of utilisation of new productive equipment. Therefore, firms are supposed to adjust productive

[1] See Kaldor (1956, 1957, 1961), Robinson (1962), Kalecki (1954, 1971), Steindl (1952) and the overviews in Lavoie (1992: 282-347) and Hein (2004: 149-219).
[2] See Blecker (2002) for a survey of the Kaleckian models.
[3] See Lavoie (1995a, 1996a, 2003) for a review and discussion of the relevant literature.

capacity to demand in the long run, and capacity utilisation should be equal to firms' target rate of utilisation in a 'fully adjusted long-run position'.

Dumenil/Levy (1999) have even argued that taking into account the adjustment of the goods market equilibrium rate of capacity utilisation to the long-run 'normal rate' yields a synthetic model which displays Keynesian/Kaleckian properties in the short run, but regains classical properties in the long-run fully adjusted position. Therefore, in the long run both the paradox of thrift and the paradox of costs, although valid in the short run, disappear. The adjustment mechanisms Dumenil/Levy (1999) apply and the results they derive are similar to those proposed in the New Consensus macroeconomic model:[4] Deviations of the goods market equilibrium rate of capacity utilisation from the 'normal rate' trigger rising (or falling) prices which make monetary policies intervene bringing the economy back to the 'normal rate' of utilisation in the long run, which is then associated with stable prices.

Post-Keynesians/Kaleckians have reacted differently to the neo-Marxian/neo-Ricardian critique. Whereas Chick/Caserta (1997) have argued that a 'provisional' goods market equilibrium may be more important than a fully adjusted long-run position when it comes to analysing a monetary production economy characterised by continuous change in historical time, others have proposed different adjustment mechanisms between the 'normal' and the goods market equilibrium rate of capacity utilisation. Lavoie (1996a), Dutt (1997), Park (1997) and Commendatore (2005) have argued that the firms' notion of the 'normal rate' of utilisation is slowly increased (decreased) when the actual rate is persistently higher (lower) than the 'normal rate'. In a model with full-cost-pricing Lavoie (2002) has made the target rate of return calculated on the basis of 'normal' utilisation adjust to the actual rate of return which depends on the goods market equilibrium rate of utilisation. And adding conflict inflation to this model, Lavoie (2002, 2003) has shown that firms' target rate of return becomes endogenous and equilibrium capacity utilisation is not necessarily the standard or 'normal' rate underlying target-rate-of-return pricing, i.e. capacity utilisation remains endogenous. These papers show that under certain conditions the main propositions of the Kaleckian model, the paradox of thrift and the paradox of costs, may still hold.

[4] See Lavoie/Kriesler (2005) on the similarity of the Dumenil/Levy (1999) model to the New Consensus model. For the New Consensus model see Clarida/Gali/Gertler (1999), McCallum (2001), Meyer (2001) and Walsh (2002). For post-Keynesian critique and amendment of the New Consensus models see Arestis/Sawyer (2004), Hein (2005), Lavoie (2004), Palacio-Vera (2005), Setterfield (2004).

Although these Kaleckian models discuss important adjustment processes, they are far from complete. In particular, although they contain distribution struggle and inflation arising from unresolved conflict, they omit to discuss major effects of rising or falling inflation on demand and hence on capacity utilisation. In a credit economy these effects are associated with the influence of changing inflation on firms' real debt position, as has already been discussed by Fisher (1933) and Keynes (1936: 264). And these models also lack a discussion of monetary policy effects on distribution and demand in a credit economy. The present paper attempts to fill some of these gaps.

We start from the Dumenil/Levy (1999) notion that the long-run 'normal rate' of capacity utilisation in a monetary production economy should be associated with stable inflation. But unlike Dumenil/Levy (1999) we take a closer look at the causes of changing inflation in a monetary production economy, which remain unclear in their model and which we see originating from unresolved distribution conflict. And also unlike Dumenil/Levy (1999) and the Kaleckian models referred to above we integrate the feedbacks of changing inflation on demand into our model. And we fully take account of the short-run and long-run demand and distribution effects of monetary policies applying the interest rate tool in order to fight rising or falling inflation rates. Our discussion is based on a monetary extension of the Bhaduri/Marglin (1990) model, as developed in Hein (1999, 2006), in order to allow for potential profit-led growth, as in Dumenil/Levy's (1999) long run.[5]

The paper is organised as follows. Whereas Section 2 presents the basic model, Section 3 adds conflict inflation to the model and distinguishes the Stable Inflation Rate of Utilisation (SIRCU), as the long-run 'normal rate' of utilisation, from the Goods market Equilibrium Rate of Capacity Utilisation (GERCU). In Section 4 we discuss the short-run stability properties of the SIRCU, with and without monetary policy interventions. Section 5 addresses the endogeneity issue of the 'normal rate' and focuses on the long-run adjustments of GERCU and SIRCU. In Section 6 the validity of the paradox of thrift and the paradox of costs within our model is discussed, and Section 7 concludes.

[5] For a similar model based on the monetary extension of the traditional Kaleckian 'wage-led only' approach see Hein (2005).

2. The basic model

We assume a closed economy without economic activity of the state. Under given conditions of production, there is just one type of commodity produced that can be used for consumption and investment purposes. There is a constant relation between the employed volume of labour (L) and real output (Y), i.e. there is no overhead-labour and no technical change, so that we get a constant labour-output-ratio and hence constant labour productivity (y). The capital-potential output-ratio (v), the relation between the real capital stock (K) and potential real output (Y^v), is also constant. The capital stock is assumed not to depreciate. The rate of capacity utilisation (u) is given by the relation between actual real output and potential real output. The basic model can be described by the following equations:

$$p = (1+m)\frac{w}{y}, \qquad m > 0, \tag{1}$$

$$h = \frac{\Pi}{pY} = 1 - \frac{1}{1+m}, \tag{2}$$

$$r = \frac{\Pi}{pK} = \frac{\Pi}{Y}\frac{Y}{Y^v}\frac{Y^v}{K} = hu\frac{1}{v}, \tag{3}$$

$$\Pi = \Pi^n + Z = \Pi^n + iB, \tag{4}$$

$$\lambda = \frac{B}{pK}, \tag{5}$$

$$h = h(i), \qquad \frac{\partial h}{\partial i} \geq 0, \tag{6}$$

$$\sigma = \frac{S}{pK} = \frac{\Pi - Z + S_Z}{pK} = h\frac{u}{v} - i\lambda(1-s_Z), \qquad 0 < s_Z \leq 1, \tag{7}$$

$$g = \frac{\Delta K}{K} = \frac{I}{K} = \alpha + \beta u + \tau h - \theta\lambda i, \qquad \alpha, \beta, \tau, \theta > 0, \quad g > 0 \text{ for } r - i > 0, \tag{8}$$

$$g = \sigma, \tag{9}$$

$$\frac{\partial \sigma}{\partial u} - \frac{\partial g}{\partial u} > 0, \qquad \frac{h}{v} - \beta > 0. \tag{10}$$

Writing w for the nominal wage rate, we assume that firms set prices (p) according to a mark-up (m) on constant unit labour costs up to full capacity output with the mark-up being

determined by the degree of price competition in the goods markets and by the relative powers of capital and labour in the labour market (equation 1). The profit share (h), i.e. the proportion of profits (Π) in nominal output (pY) is therefore determined by the mark-up (equation 2). The profit rate (r) relates the annual flow of profits to the nominal capital stock (equation 3).

Introducing monetary variables into the model, we follow the post-Keynesian 'horizontalist' monetary view developed by Kaldor (1970, 1982, 1985), Lavoie (1984, 1992: 149-216, 1996) and Moore (1988, 1989) and assume that the interest rate is an exogenous variable for the accumulation process whereas the quantities of credit and money are determined endogenously by economic activity.[6] In this view, the central bank controls the base rate of interest. Commercial banks set the market rate of interest by marking up the base rate and then supply the credit demand of consumers and investors they consider creditworthy at this interest rate. The central bank accommodates the necessary amount of cash. For the sake of simplicity, in what follows we suppose that the central bank's interest rate policy controls the real long-term interest rate. The pace of capital accumulation, therefore, has no direct feedback on the interest rate and we follow Pasinetti's (1974: 47) recommendation to treat the rate of interest as an exogenous variable in the theory of effective demand.

The pace of accumulation is determined by the entrepreneurs' decisions to invest. We assume that long-term finance is supplied only by retained earnings or by long-term credit of rentiers' households (directly or through banks).[7] By means of this simplification we do not have to distinguish between creditor households receiving interest income, on the one hand, and shareholder households receiving dividend income, on the other hand, and their different saving propensities.[8] Introducing interest payments into the model, profit splits into profit of enterprise (Π^n) and rentiers' income (Z) (equation 4).[9] Rentiers' income is determined by the stock of long-term credit (B) granted to firms and the exogenously given rate of interest (i). Equation (5) defines the debt-capital-ratio (λ).

[6] See for a similar procedure with respect to the introduction of monetary variables into post-Keynesian models of distribution and growth Lavoie (1992: 347-371, 1993, 1995), Dutt/Amadeo (1993), Dutt (1989, 1992), Taylor (1985, 2004: 272-278) and Hein (1999, 2006, 2006a).

[7] The distinction between short-term finance for production purposes and long-term finance for investment purposes, not dealt with in the present paper, can be found in the monetary circuit approach (Graziani 1989, 1994; Lavoie 1992: 151-169; Seccareccia 1996, 2003).

[8] Of course, our simplification implies that profits net of interest payments are all reinvested into the firm.

[9] In what follows the terms 'profit', 'profit share' and 'profit rate' are related to gross profits as the sum of profit of enterprise and interest.

Considering the distribution effects of interest rate variations (equation 6) we assume that the mark-up is interest-inelastic in the short run but that it is interest-elastic in the long run.[10] As the mark-up has to cover the firm's actual and imputed interest payments, the minimum mark-up is affected by the interest rate. For the same reason, the rate of interest determines the minimum rate of profit on real investment in the long run. In the short run, there need not be an immediate positive impact of interest rate variations on the mark-up, the profit share and the profit rate, but we rather suppose a direct effect on internal funds of the firm and hence on investment and employment, which will be discussed below. If changes in the interest rate are lasting, however, mark-up and profit share will have to change in the same direction, because in the long run firms can only sustain those production processes which yield the minimum rate of profit determined by the interest rate. This position that considers interest to be a part of firms' long-run costs of production can, in particular, be found in neo-Ricardian work (Ciccarone 1998; Panico 1985; Pivetti 1985, 1988, 1991). There it is argued that the exogenously given monetary interest rate determines the rate of profit and closes the degree of freedom of the production price model by Sraffa (1960). When there is an effect on the mark-up and the profit share in our model, it will be a lasting change in the interest rate and not in the actual interest payments which is relevant, because we assume that firms are aware of imputed interest costs on own capital, i.e. accumulated retained earnings.

We assume a classical saving hypothesis, i.e. labourers do not save. The part of profits retained is completely saved by definition. The part of profits distributed to rentiers' households, i.e. the interest payment, is used by those households according to their propensity to save (s_Z). Therefore, total saving (S) comprises retained profits (Π-Z) and saving out of interest income (S_Z). Taking equations (3), (4) and (5) into account, we get the saving rate (σ) in equation (7) which relates total saving to the nominal capital stock.[11] Note that an increase in the rate of interest, cet. par., decreases the saving rate because income is transferred from firms with a saving propensity of unity to rentiers' households with a saving propensity of less than unity. An increasing debt-capital-ratio of firms reduces the saving rate for the same reason.

[10] According to Kalecki (1954: 18), the degree of monopoly, and hence the mark-up, may but need not increase when overhead costs, including interest costs, increase.

[11] This saving function is similar to the one used by Lavoie (1992: 365, 1995: 160), the only difference is that we explicitly consider the debt-capital-ratio.

The accumulation rate (g) relating net investment (I) to the capital stock (equation 8), is a monetary extension of the function proposed by Bhaduri/Marglin (1990). In their non-monetary model based on the principle of effective demand, the decisions to invest are assumed to depend on the rate of profit. Assuming the technical conditions of production to be constant, the profit rate is decomposed into the profit share reflecting the development of unit costs and capacity utilisation indicating the development of demand. Firms have to finance - at least partially - their net investment spending by credit. Following Kalecki's (1937) 'principle of increasing risk' we assume that the firm's access to credit is positively correlated with its internal means of finance and hence negatively with the interest rate and with the debt-capital-ratio (see also Kalecki 1954: 91-95). The higher the amount of the firms' own capital, the higher the amount of debt capital that can be obtained for investment will be. From these arguments it follows, that the rate of interest and the debt-capital-ratio have a negative impact on investment because of their adverse effects on internal means of finance.[12]

The goods market equilibrium is determined by the equality of saving and investment decisions in equation (9). The goods market stability condition in equation (10) requires that the saving rate responds more elastically to changes in capacity utilisation than capital accumulation does. The goods market equilibrium values (*) for capacity utilisation, capital accumulation and the rate of profit in the short run are as follows:

$$u^* = \frac{\lambda i\left(1 - s_Z - \theta\right) + \alpha + \tau h}{\frac{h}{v} - \beta}, \tag{11}$$

$$g^* = \frac{\lambda i\left[\beta\left(1 - s_Z\right) - \theta\frac{h}{v}\right] + \frac{h}{v}\left(\alpha + \tau h\right)}{\frac{h}{v} - \beta}, \tag{12}$$

$$r^* = \frac{\frac{h}{v}\left[\lambda i\left(1 - s_Z - \theta\right) + \alpha + \tau h\right]}{\frac{h}{v} - \beta}. \tag{13}$$

[12] On Kalecki's 'principle of increasing risk' see Arestis (1996) und Sawyer (1985: 101-106, 2001a). A similar view was taken by Robinson (1962: 86) and Steindl (1952: 107-138). 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 (Fazzari et al. 1988; Hubbard 1998; Schiantarelli 1996).

3. Capacity utilisation, wage bargaining, inflation and monetary policy intervention: the GERCU and the SIRCU

With constant productivity of labour and a given labour supply, the Goods Market Equilibrium rate of Capacity Utilisation (GERCU) determines a certain rate of employment and hence unemployment, and an increase in the GERCU is associated with a proportional increase in employment and the employment rate. Generally, in Kaleckian and post-Keynesian distribution and growth models full utilisation of productive capacity determined by the capital stock will not mean full employment of labour.

Inflation in Kaleckian and post-Keynesian models is determined by distribution conflict. Figure 1 displays a simple 'conflicting claims' model of employment and inflation assuming constant production coefficients and a constant mark-up, as mentioned above.[13]

Although wage bargaining is concerned with money wage rates, it is assumed that labour unions intend to achieve a certain real wage rate – and with labour productivity given or productivity growth correctly anticipated a certain wage share. The labour unions' target real wage rate (w^r_b) depends positively on the employment rate, because unemployment has a negative impact on union bargaining power. With our assumptions from above the labourers' target real wage rate is positively related to the rate of capacity utilisation:

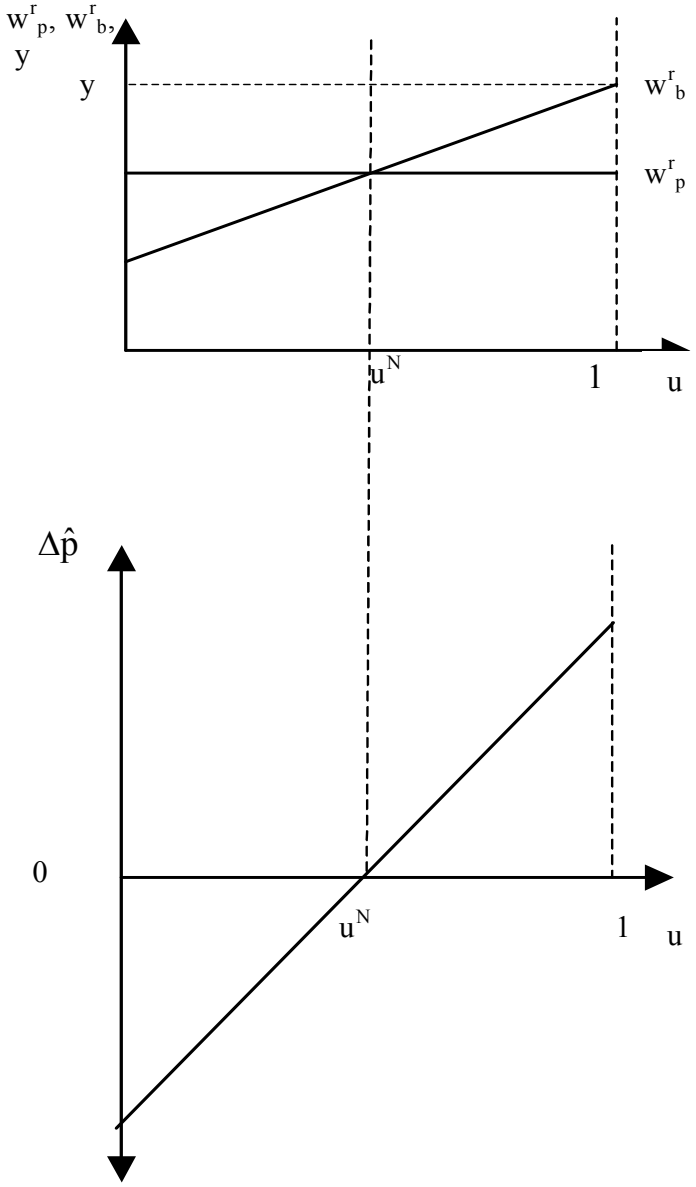
$$w^r_b = \phi + \varepsilon u \,. \tag{14}$$

In this paper we assume that unions do not consider the macroeconomic effects of their nominal wage demands. There is neither co-ordination between unions in different firms or industries nor between wage bargaining parties and monetary policy.[14] For the sake of simplicity we assume that full utilisation of capacity is associated with a union target real wage rate equal to labour productivity (y). Therefore, unemployment has to be of a sufficient amount to curtail distribution claims of labourers and to allow for positive profits (Kalecki 1971: 156-164).

[13] See Arestis/Sawyer (2004: 73-87), Cassetti (2002), Lavoie (1992: 391-421, 2002), Rowthorn (1977) and Sawyer (2001, 2002) for post-Keynesian conflicting claims models of inflation.

[14] See Hein (2002, 2005) for a discussion of the effects of effective wage bargaining coordination across the economy in which trade unions take into account the macroeconomic impacts of bargained nominal wages.

Figure 1: Capacity utilisation and distribution conflict



The feasible real wage rate (w^r_p) is given by mark-up pricing of firms. From equation (1) we get for the target real wage rate of firms:

$$w^r_p = \frac{w}{p} = \frac{y}{1+m}. \qquad (15)$$

With the simplifying assumptions of a constant coefficient technology and a constant mark-up up to full capacity output the feasible real wage rate curve in Figure 1 is just a horizontal line.

The unions' target real wage and the feasible real wage only coincide by accident. From equations (14) and (15), and making use of equation (2), we get for the rate of capacity utilisation (u^N), which allows for the equality of the target real wage rate of labour unions and firms:

$$u^N = \frac{\frac{y}{1+m} - \phi}{\varepsilon} = \frac{y(1-h) - \phi}{\varepsilon}. \qquad (16)$$

Only if the GERCU is equal to u^N, the distribution claims of labourers and firms will be compatible. Whenever the GERCU deviates from u^N we get rising or falling inflation rates (and finally deflation). Therefore equation (16) defines a Stable Inflation Rate of Capacity Utilisation (SIRCU) and hence a distribution equilibrium between the claims of labourers and those of firms. In a monetary production economy this rate of capacity utilisation can be considered to be the 'normal rate'.

4. Short-run stability of the SIRCU and monetary policy interventions

Discussing the short-run stability of the SIRCU we have to take a look at effects of rising or falling inflation on the GERCU. Let us assume in what follows, that firms set prices in the goods market after nominal wages in the labour market have been set, so that under the condition of a constant mark-up distribution between capital and labour does not change when the GERCU diverges from the SIRCU. And let us further assume that the stock of firms' debt is not indexed to changes in the inflation rate. Rising inflation rates will therefore decrease the debt-capital-ratio defined in equation (5), falling inflation rates will increase this ratio. These real debt effects associated with rising/falling inflation rates have already been highlighted by Fisher (1933) and by Keynes (1936: 264). If monetary policy does not respond to changes in the inflation rate and does not vary the nominal interest rate accordingly, real interest rates will fall in the face of accelerating inflation and will rise when inflation decelerates. Taken together, this implies that the interest-capital-ratio [$i\lambda = (iB)/(pK) = Z/(pK)$] will fall when inflation rises and will rise when inflation falls. Given that changes in the real interest rate do not affect the mark-up and hence the profit share in the short run, the effects of changes in the interest-capital-ratio on the GERCU are determined by equation (11) as follows:

$$\frac{\partial u}{\partial(i\lambda)} = \frac{1 - s_Z - \theta}{\frac{h}{v} - \beta} \tag{11a}$$

If only stable goods market equilibria are considered, equation (11a) shows that the effects of changes in the interest-capital-ratio on the GERCU depend on the parameters in the saving and investment function of the model. If the rentiers' propensity to consume ($1\text{-}s_z$) exceeds the firms' investment elasticity with respect to the interest-capital-ratio (θ), rising real debt-capital-ratios of firms and rising real interest rates will be associated with an increasing GERCU. This may be called the 'puzzling' case (Lavoie 1995), usually not expected in post-Keynesian theory. If the conditions of the 'puzzling case' prevail, the SIRCU will be stable. Rising (falling) inflation rates will trigger falling (rising) debt-capital-ratios of firms and falling (rising) real interest rates which will then cause a falling (rising) GERCU. The GERCU will therefore adjust to the SIRCU.

If the rentiers' propensity to consume is smaller than firms' investment elasticity related to the interest-capital-ratio, rising indebtedness and rising real interest payments will have a negative effect on the GERCU. This can be called the 'normal case' (Lavoie 1995), usually expected in post-Keynesian theory. If the conditions of the 'normal case' prevail, the SIRCU will be unstable. Rising (falling) inflation will cause falling (rising) real debt-capital-ratios of firms and falling (rising) real interest rates which will cause a rising (falling) GERCU, moving the economy farther away from the SIRCU.

In the 'normal case', stabilising the SIRCU requires monetary policy intervention, as suggested by Dumenil/Levy (1999) and also by modern New Consensus models. Different from New Consensus models, in our model central banks do not only have to change real interest rates by means of varying the nominal rate, but the change in the real rate has to be sufficient to overcompensate the counter-effects of the change in the debt-capital-ratio of firms on the GERCU. In general, this is not a problem in a situation of rising inflation, because there is no upper limit for the nominal interest rate set by the central bank. But in a situation of falling inflation or even deflation, central banks may not be able to reduce the nominal rate of interest by a sufficient amount to decrease real rates and to overcompensate the restrictive demand effects of rising debt-capital-ratios, because there is a zero lower bound

for the nominal interest rate. Therefore, in this situation central banks may not be able to adjust the GERCU to the SIRCU and the economy may be trapped in a deflationary recession.

In the 'puzzling case', monetary policy interventions, which follow the Dumenil/Levy (1999)/New Consensus advice and increase the real rate of interest in the face of rising inflation and decrease it in the face of falling inflation or deflation, will have a destabilising effect. This may overcompensate the stabilising effect exerted by the change in the debt-capital-ratio and may cause a further deviation of the GERCU from the SIRCU. Table 1 summarises our results with respect to short-run stability of the SIRCU or to the 'normal rate' of capacity utilisation.

Table 1: The short-run stability of the 'Stable Inflation Rate of Capacity Utilisation' (SIRCU)

	$1-s_Z-\theta$	
	- **('normal case')**	**+** **('puzzling case')**
No monetary policy intervention	*unstable*	*stable*
Monetary policy intervention	*stable*, if change in real interest rate overcompensates change in the debt-capital-ratio, otherwise *unstable*	*unstable*, if change in real interest rate overcompensates change in the debt-capital-ratio, otherwise *stable*

5. The long-run endogeneity of the SIRCU

In the 'normal case' we have monetary policies which can enforce short-run adjustment processes when the GERCU deviates from the SIRCU, provided that there is sufficient room of manoeuvre to vary real interest rates. In the long run, however, the distribution effect of persistent changes in the interest rate will make the SIRCU endogenous to short-run deviations of the GERCU. Assume for the reasons given above that persistent changes of the real interest rate are accompanied by changes of the mark-up in the same direction in the long run. In our model this has two effects:

First, changes in the mark-up affect the firms' target real wage rate: An increasing (a decreasing) mark-up shifts the firms' target real wage curve in Figure 1 downwards (upwards) and the SIRCU decreases (increases). From equation (16) we get:

$$\frac{\partial u^N}{\partial h} = -\frac{y}{\varepsilon} < 0 \,. \tag{16.a}$$

Second, changes in the mark-up and hence in distribution between wages and profits have an additional long-run effect on the goods market equilibrium and hence on the GERCU, which adds to the short-run effect of monetary policy intervention. From equation (11) we get:

$$\frac{\partial u}{\partial h} = \frac{\tau - \frac{u}{v}}{\frac{h}{v} - \beta}. \tag{11.a}$$

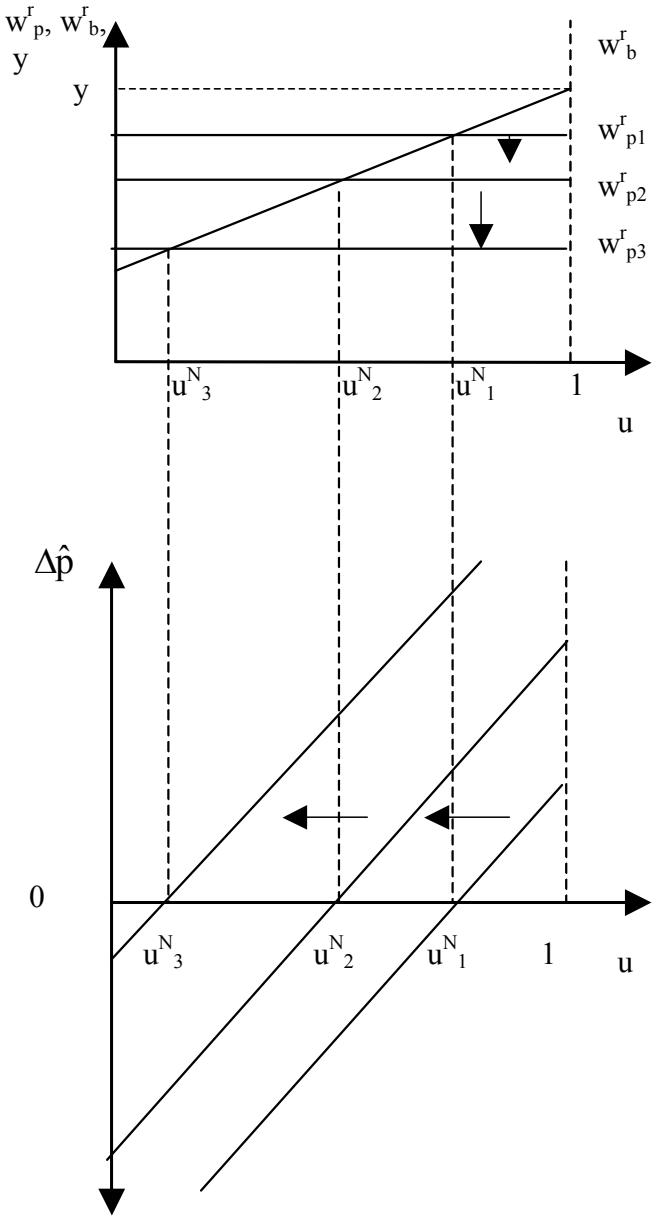
The long-run effect of a change in the profit share on the GERCU is not unique in the present model. It rather depends on the elasticity of investment with respect to the profit share and on the initial GERCU, which has been established by the short-run effects of monetary policy interventions. A high profit share elasticity of investment and a low initial GERCU will be conducive to a positive relation between the profit share and the GERCU and we will see *profit-led expansion*:

$$\frac{\partial u}{\partial h} > 0, \text{ if } : \tau - \frac{u}{v} > 0 \tag{11.b}$$

A low profit share elasticity of investment and a high initial GERCU, however, will give rise to a negative relation between the profit share and the GERCU and we will see *wage-led expansion*:

$$\frac{\partial u}{\partial h} < 0, \text{ if } : \tau - \frac{u}{v} < 0 \tag{11.c}$$

Figure 2: Long-run endogeneity of the Stable Inflation Rate of Capacity Utilisation (SIRCU) caused by monetary policy intervention



Let us now discuss the short- and long-run effects of monetary policy interventions in the 'normal case' (Table 1) of our model. Assume that by accident the GERCU exceeds the initial SIRCU at u^N_1 in Figure 2. Since rising inflation, a declining debt-capital-ratio and falling real interest rates are stimulating effective demand, the GERCU will further increase and inflation will speed up. In order to stabilise the inflation rate, central banks have to increase nominal interest rates in order to raise real interest rates by a sufficient amount to overcompensate the

demand stimulating effects of falling debt-capital-ratios. Therefore, in the short run the central bank can bring back the GERCU to the SIRCU at u^N_1. In the long run, however, a higher real interest rate will induce firms to increase the mark-up. This will shift the firms' target real wage curve down from w^r_{p1} to w^r_{p2} and reduce the SIRCU to u^N_2. The redistribution at the expense of labour will also affect the GERCU. Here we now have to distinguish between (A) wage-led and (B) profit-led regimes in order to discuss the further process:

(A) In the wage-led regime three scenarios (A.1 - A.3) are possible depending on the relative (both negative) effects of changes in the mark-up on the GERCU and on the SIRCU in equations (11.a) and (16.a):

(A.1) If by accident $\frac{\partial u}{\partial h} = \frac{\partial u^N}{\partial h}$, the reduction of the GERCU caused by an increasing mark-up will make this new rate coincide with u^N_2 so that the economy gets to rest in a stable SIRCU at u^N_2.

(A.2) If $\left|\frac{\partial u}{\partial h}\right| > \left|\frac{\partial u^N}{\partial h}\right|$, the effective demand effect of redistribution at the expense of labour will make the GERCU fall below u^N_2 and we get falling inflation rates. This should make monetary policies reduce real interest rates, making the GERCU increase to u^N_2 in the short run. In the long run, firms then reduce mark-ups, which will increase the SIRCU as well as the GERCU, with the latter now overshooting the former, and monetary policy has to intervene again. This oscillation may converge to a stable SIRCU between u^N_2 and u^N_1, but it may also generate stable or exploding oscillation around that SIRCU, depending on the degree of over- and undershooting of the GERCU with respect to the SIRCU and the concomitant change in the real interest rate required for the short-run adjustment of the GERCU to the SIRCU.

(A.3) If $\left|\frac{\partial u}{\partial h}\right| < \left|\frac{\partial u^N}{\partial h}\right|$, the negative effective demand effect of redistribution at the expense of labour is weak, so that the GERCU remains above u^N_2. Again we get accelerating inflation inducing the central bank to increase real interest rates, forcing the GERCU down to u^N_2 in the short run. In the long run, firms again increase the mark-up which shifts their target real

wage curve down to w^r_{p3} and makes the SIRCU decline to u^N_3. The effective demand effect of redistribution also makes the GERCU fall, but it remains above u^N_3, inflation accelerates anew and central banks have to intervene again.

(B) If the economy is in a profit-led regime, the long-run distribution effect of rising interest rates, which have brought down the GERCU to the SIRCU in the short run, will again increase the GERCU to a level above the old SIRCU at u^N_1. The gap between the GERCU and the new SIRCU at u^N_2 will therefore be even wider than in the situation we have started from. Inflation will speed up again inducing monetary policies to increase real interest rates again, which will be able to bring down the GERCU to the lower SIRCU at u^N_2 in the short run. The long-run distribution effect will again reduce the SIRCU to u^N_3 but will increase the GERCU, and inflation will accelerate again.

From equation (11.a) we get that the lower the GERCU, the more likely the wage-led scenario (A.3) and finally the profit-led scenario (B) will become. This is what is shown in Figure 2: The rate of capacity utilisation which stabilises the inflation rate (at whatever level) becomes horizontal because of the nature of monetary policy interventions. In these scenarios, monetary policy is only able to stabilise the inflation rate in the long run at the expense of a continuously decreasing GERCU, because monetary policy interventions trigger a process in which stabilising inflation in the short run by means of increasing real interest rates and slowing down the economy re-establishes the inflation problem in the long run when the full distribution effects of real interest rate variations are felt. Therefore, if monetary policies combat inflation by means of raising real interest rates they will become a cause of the problem of stagflation.

Note that scenarios (A.3) and (B) also work in reverse: If the central bank intends to improve the GERCU, in the short run lowering real interest rates will be associated with rising inflation rates. In the long run, however, a falling mark-up increases the SIRCU. And since the long-run demand effect of redistribution in favour of labour is either not too strong (scenario A.3) or even negative (scenario B), so that the GERCU remains below the new SIRCU, there is again room for manoeuvre for the central bank to cut real interest rates. Since this process is associated with a gradually increasing rate of capacity utilisation, monetary policies lowering real interest rates and increasing the GERCU in the short run and the

SIRCU in the long run can contribute to a transformation of a profit-led regime into a wage-led regime.

Summing up so far, in our model the 'normal rate' of capacity utilisation, the SIRCU, is endogenous to monetary policies determining the real interest rate. In the 'puzzling' case, the GERCU adjusts to the SIRCU because of the 'puzzling' real debt effects on demand and capacity utilisation. In the 'normal' case no such adjustment can be supposed and monetary policy interventions are required. In the short run, these will always be able to adjust the GERCU to SIRCU from above, but for an adjustment from below a sufficient room of manoeuvre for reducing real interest rates is required, and cannot be taken for granted. In the long run, distribution effects of changing interest rates will make the SIRCU endogenous to monetary policy, and demand effects triggered by redistribution will have a further influence on the GERCU. This will give rise to adjustment processes of the two rates which will not necessarily lead to a stable equilibrium but may rather generate a complex disequilibrium process of interacting GERCUs and SIRCUs, which is driven by monetary policy interventions in the face of deviation of these two rates and concomitant changes in inflation rates. This disequilibrium process may either lead to converging, constant or exploding oscillations of the GERCU around a SIRCU moving there and back, or to a disequilibrium process of continuously falling (or rising) GERCUs and SIRCUs.

6. The paradox of thrift and the paradox of costs

Paradox of thrift

Discussing the central features of Kaleckian models of distribution and growth we begin with the paradox of thrift. If we start from the coincidence of a goods market equilibrium with a distribution equilibrium ($u^* = u^N$), a change in the rentiers' propensity to save will only affect the GERCU negatively, but will have no effect on the SIRCU. From equation (11) we get for the change in the GERCU the well known paradox of thrift outcome:

$$\frac{\partial u}{\partial s_Z} = -\frac{\lambda i}{\frac{h}{v} - \beta}. \tag{11d}$$

A falling (rising) rentiers' propensity to save will increase (decrease) the GERCU which will then exceed (fall short of) the SIRCU and will therefore trigger rising (falling) inflation rates. In the 'puzzling' case, the change in inflation rates will re-adjust the GERCU to the SIRCU and the economy will return to the former equilibrium. Therefore, in this case a change in the propensity to save will not have any effect on this joint equilibrium.

In the 'normal' case, the deviation of the GERCU from the SIRCU will not be self-correcting, but will trigger cumulative divergence and will hence require monetary policy intervention. Here the scenarios discussed in Section 5 apply. Therefore, monetary policy intervention will question the 'paradox of thrift' in the long run without being necessarily able to re-establish a new joint equilibrium of GERCU and SIRCU: Rising (falling) inflation caused by a decreasing (increasing) rentiers' saving propensity will trigger a rising (falling) real interest rate, and hence a rising (falling) mark-up and a falling (rising) SIRCU in the long run, to which monetary policy will then again try to adjust the GERCU. Also note, that a higher (lower) rentiers' propensity to save will make the 'normal' case more (less) likely (equation 11.a).

Paradox of costs

To assess the relevance of the paradox of costs let us start again from a joint equilibrium of GERCU and SIRCU and assume that the mark-up and hence the profit share vary. This affects both the GERCU and the SIRCU as shown in equations (11.a) and (16.a). A falling (rising) mark-up will cause a rising (falling) SIRCU and in the wage-led regime a rising (falling) GERCU, whereas in the profit-led regime we get a falling (rising) GERCU. In the 'puzzling' case, however, the GERCU will adjust to the new SIRCU in both the wage-led and the profit-led regime due to the 'puzzling' real debt effects on demand and capacity utilisation. Therefore, in the 'puzzling' case the paradox of costs is generally valid, although we have in our model the Bhaduri/Marglin (1990) distinction between wage-led and profit-led expansion.

In the 'normal' case, the discussion of Section 5 applies. In the wage-led scenario (A.1) the paradox of costs is fully valid and a new joint equilibrium of GERCU and SIRCU is established. In the wage-led scenario (A.2) with a strong effect of redistribution on the GERCU, a falling (rising) mark-up will trigger increasing (decreasing) inflation and hence monetary policy intervention which in the long run will make the mark-up increase (decrease)

again. Depending on the extent of the required interest rate variations, this effect may invalidate the paradox of costs without necessarily leading to a new joint goods market and distribution equilibrium. In the wage-led scenario (A.3) and in the profit-led scenario (B) with either a weak or even a negative (positive) demand effect of a falling (rising) mark-up, falling (rising) inflation rates will induce monetary policies to cut (raise) interest rates, which in the long run will reinforce the initial redistribution. Here the paradox of costs is fully valid and is even accelerated by real interest rate variations without leading to a new joint equilibrium of GERCU and SIRCU.

7. Conclusions

Starting from the problem that in Kaleckian models of distribution and growth the equilibrium rate of capacity utilisation may persistently diverge from the 'normal rate' of utilisation without endogenous adjustments, we have followed the approach proposed by Dumenil/Levy (1999) to consider the 'normal rate' of utilisation in a monetary production economy as the rate which is associated with stable inflation. But unlike Dumenil/Levy (1999) we have taken a closer look at the causes of changing inflation, which remain unclear in their model and which we have originating from unresolved distribution conflict. And also unlike Dumenil/Levy (1999) and their Kaleckian critics we have integrated the feedbacks of changing inflation on demand via real debt effects, and we have fully taken account of the short-run and long-run demand and distribution effects of monetary policies applying the interest rate tool in order to fight rising or falling inflation rates. Our discussion has been based on a monetary extension of the Bhaduri/Marglin (1990) model, in order to allow for potential profit-led growth, as in Dumenil/Levy's (1999) long run.

We have shown that in such a model the adjustment of capacity utilisation to the 'normal rate' may but need not necessarily require monetary policy interventions. And if monetary policy interventions applying the interest rate tool are necessary, this will affect the 'normal rate' of utilisation which will therefore become endogenous to the economic process. However, with monetary policy interventions, the establishment of a joint goods market and distribution equilibrium with stable inflation cannot be taken for granted. Generally, we will get complex disequilibrium processes of interacting 'normal' and goods market equilibrium rates of

utilisation, which are driven by monetary policy interventions in the face of deviations of these two rates and concomitant changes in inflation rates.

With respect to the main results of Kaleckian models we have found that changes in the propensity to save either have no long-run effects on the joint distribution and goods market equilibrium, and hence on the 'normal rate' of utilisation, or that the paradox of thrift is invalidated by monetary policy interventions which are triggered by changes in the inflation rate following a change in demand. The paradox of costs, however, with only a minor exception, is valid also in the long run, when the adjustment of the 'normal rate' takes place, although we have allowed for the possibility of profit-led expansion already in the short run.

Generally, we have shown that in a model which takes the major features of a credit economy seriously, the 'normal rate' of capacity utilisation is endogenous to distribution conflict and monetary policy intervention in the long run. And we have also shown that some major Kaleckian results can be retained for the short and the long run. Therefore, we do not have to be 'Keynesian in the short term and classical in the long term', as suggested by Dumenil/Levy (1999).

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