Endogenous Banking Markup, Distributional Conflict and Productive Capacity Utilisation[♦]

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Abstract: The paper develops a post-keynesian macrodynamic model of productive capacity utilisation and income distribution in which the supply of credit-money is endogenous. Nominal interest rate is set by banks as a markup over the base rate, which is exogenously determined by the monetary authority. Over time, banking markup falls with firms´ profit rate on physical capital and rises with the rate of inflation, whereas the base rate varies exogenously. The dynamic behaviour of the system is analyzed for both cases regarding capacity utilisation, namely full utilisation and excess capacity, which then makes for the possibility of multiple equilibria for the state variables real wage and nominal interest rate.

Key words: endogenous money; banking markup; productive activity

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1. Introduction

This paper develops a post-keynesian dynamic macromodel of productive capacity utilisation, distribution and conflict inflation, in which the supply of credit-money is endogenous. Nominal interest rate is determined by banks as a markup over the base rate, which is set by the monetary authority. Over time, banking markup falls with firms' profit rate on physical capital and rises with the inflation rate, whereas the base rate varies exogenously. A rise in the profit rate on physical capital raises firms' ability to serve outstanding financial obligations, lowers their perceived risk of default and, therefore, leads to a fall in the banking markup. In turn, a rise in the inflation rate raises the banking markup by leading banks to require a higher risk premium on their loans.

Following the post-keynesian monetary tradition, banks are supposed to operate with excess reserves, or at any rate attempt to increase their deposits when their loans increase, and the monetary authority, as lender of last resort, is assumed to make liquidity available to banks at the base rate. The supply of credit-money is thus endogenous at the given nominal interest rate, which is anchored to the base rate through the banking markup. The underlying idea is that banks are price makers and quantity takers in their markets for loans, and price takers and quantity makers in the markets where they raise funding.[1]

When the economy is operating with excess capacity, the equality between desired investment and saving is brought about by changes in capacity utilisation, while inflation is fully determined within a framework of conflicting claims on income by firms and workers. While firms' desired markup is positively related to the nominal rate of interest (because firms also have to make interest payments out of their markup income), workers' desired real wage is positively related to their bargaining power in the labour market, which is the stronger, the higher the level of economic activity. Capacity utilisation, in turn, is positively (negatively) related to the real wage (nominal interest rate). Once full capacity is reached, however, the inflation rate is also determined by whatever excess demand may prevail in the goods market at the given price. The dynamic behaviour of the system is analysed for

[1] See Meirelles (1995, 1998) for a fuller discussion of the post-keynesian views on endogenous money.

both cases regarding capacity utilisation, namely full utilisation and excess capacity, which then makes for the possibility of multiple equilibria for the state variables real wage and nominal interest rate.

The remainder of the paper is organised as follows. Section 2 describes the structure of the model, whereas Section 3 analyses its behaviour in the short run. Section 4 analyses the behaviour of the model in the long run, while the last one summarises the main conclusions derived along the way.

2. Structure of the model

We model an economy that is closed and has no government fiscal activities. A single good that can be used for both investment and consumption is produced with two factors of production, capital and labour, which are combined through a fixed-coefficient technology

$$X = \min[Ku_K, L/a] \tag{1}$$

where X is the output level, K is the physical capital stock, L is the employment level, u_K is the level of technologically-full capacity utilisation, while a is the labour-output ratio. These coefficients are assumed to remain unchanged throughout, since we abstract from technological change.[2]

Production is carried out by oligopolistic firms, which produce according to demand if there is not enough demand to produce at full capacity at the ongoing price, or at full capacity utilisation, $u_K K$, otherwise. Hence, firms may hold idle physical capital.[3] Firms

[2] A post-keynesian model of capital accumulation, growth and distribution in which labour-saving technological innovation plays a pivotal role is developed in Lima (2000). Technological innovation is made to depend non-linearly on market concentration, thus incorporating a possibility discussed in the (neo-)schumpeterian literature on the double-sided relation between industrial dynamics and technical change. Given such non-linearity, it is also developed a phase-diagrammatic analysis of a possible configuration leading to double equilibria and endogenous, self-sustaining fluctuations.

[3] Steindl (1952) claims that firms plan excess capacity so as to be ready for a sudden expansion of sales. First, the existence of fluctuations in demand means that the producer wants to be in a boom first, and not to leave the sales to new competitors who will press on her market when the boom is over. Second, it is not possible for the producer to expand her capacity step by step as her market grows because of the indivisibility and durability of the plant and equipment. Finally, there is the issue of entry deterrence: if prices are sufficiently high, entry of new competitors becomes feasible

also make capital accumulation plans, which are described by the following desired investment function

$$g^{d} = \alpha_0 + \alpha_1 r - \alpha_2 (i - \hat{P}) \tag{2}$$

where α_i are positive parameters, g^d is the desired investment as a ratio of the existing capital stock, r is the rate of profit defined as the flow of money profits, R, divided by the value of capital stock at output price, i is the nominal interest rate, and $\hat{P}$ is the rate of inflation. We follow Rowthorn (1981) and Dutt (1990), who in turn follow Kalecki (1971) and Robinson (1962), in assuming that desired investment depends positively on the profit rate. Regarding the negative dependence of desired investment on the real interest rate, which measures the cost of capital, we follow Dutt (1994).

The economy is inhabited by two classes, capitalists and workers. Following the tradition of Marx, Kalecki (1971), Kaldor (1956), Robinson (1962), and Pasinetti (1962), we assume that they have a different saving behaviour. Workers, who are always in excess supply, provide labour and earn only wage income, all spent in consumption. Capitalists, in turn, receive profit income, which is the entire surplus over wages. Productive and financial capitalists save constant fractions, s_p and s_f, respectively, of their share in profits, it being assumed that $s_p = s_f = s$. Hence, the division of income is given by

$$X = (W / P)L + R \tag{3}$$

where W is the nominal wage and P is the price level. Therefore, financial capitalists' profits appear as a deduction of the flow of money profits generated by the stock of physical capital. Normalizing eq. (3) by the capital stock and defining V as the real wage, the rate of profit can be expressed as

$$r = (1 - Va)u \tag{4}$$

even where capital requirements are great; hence, the holding of excess capacity allows olipolistic firms to confront new entrants by suddenly raising supply and driving prices down. In the same vein, Spence (1977) and Cowling (1982) argue that the holding of excess capacity inhibits entry by making potential entrants unsure about post-entry profits.

where $(1-Va)$ is the share of profits in income and $u = X/K$ is the actual capacity utilisation. Since we assumed that capacity output is proportional to the capital stock, we can identify capacity utilisation with the output-capital ratio.

The price level is given at a point in time, rising over time whenever firms' desired markup exceeds the actual markup and/or an excess demand in the goods market cannot be accomodated by an increase in capacity utilisation. Formally,

$$\hat{P} = \theta_1(V - V_f) + \theta_2(g^d - g) \tag{5}$$

where $\hat{P}$ is the rate of change in price, $(dP/dt)(1/P)$, g is the aggregate saving as a ratio of the capital stock, and $\theta_i > 0$ are parameters. Under excess capacity, inflation is determined within a framework of conflicting income claims, it resulting whenever the claims of workers and productive capitalists exceed the available income. Once full capacity is reached, in turn, the inflation rate is also determined by whatever excess (investment) demand gap may prevail in the goods market.

The markup over prime costs, *à la* Kalecki (1971), is given by

$$P = (1+z)Wa \tag{6}$$

where z is the markup. Given labour productivity, $(1/a)$, the markup is inversely related to real wage, and the gap between the desired and the actual markup can be measured by the gap between the actual and the desired real wage by firms. Since interest payments by firms must be made from their markup income, firms will raise their desired markup when the nominal interest rate increases. Formally,

$$V_f = \varphi_0 - \varphi_1 i \tag{7}$$

where φ_i are positive parameters. The nominal interest rate, in line with Rousseas' (1985) suggestion to apply Kaleckian theory to the determination of bank loan rates, is set by banks as a markup over the base rate:

$$i = hi^* \tag{8}$$

where $h > 1$ is the banking markup and i^* is the base rate, which is determined by the monetary authority.[4] The base rate, the banking markup and, therefore, the nominal interest rate are given at a point in time. The banking markup, however, changes over time in line with the rate of profit on physical capital and the rate of inflation:

$$\hat{h} = \beta_0 - \beta_1 r + \beta_2 \hat{P} \tag{9}$$

where $\hat{h}$ is the rate of change in banking markup, $(dh/dt)(1/h)$, while β_i are positive parameters. An increase in the profit rate on physical capital raises firms' ability to serve outstanding financial obligations, lowers their perceived risk of default and, therefore, leads to a fall in the banking markup. In turn, a rise in the inflation rate raises the banking markup by leading banks to require a higher risk premium on their loans.

Some empirical evidence for this specification are the following. Saunders & Schumacher (2000) studied the determinants of bank interest margins in six selected European countries and the United States during the period 1988-95, having found that interest margins are positively affected by credit risk. Angbazo (1997), using interest data for a sample of North-American banks during the period 1989-93, found that the ratio of non-performing loans to total loans is a significant explanatory variable for bank spreads. Hanson & Rocha (1986), using aggregate interest data for 29 countries in the years 1975-83, and Demirgüç-Kunt & Huizinga (1999), using bank-level data for 80 countries in the years 1988-95, found a positive correlation between interest margins and inflation. In turn, Brock & Rojas-Suarez (2000) studied the determinants of bank spreads in six Latin American countries during the mid-1990s, having found evidence that high levels of both non-performing loans and inflation raise spreads. This latter study also found that there is a weak tendency for higher output growth rates to lower the spread, which the authors claim

[4] "Within Post Keynesian monetary economics, the demand for money is for financial credit primarily by the business sector. It is the flow of credit money that counts, not an exogenous stock of money. In this particular approach, the focus is on bank lending, or the asset side of the balance sheet. The liability side is seen as causally reacting to changes in the asset side. Portfolio theory is therefore downplayed and a Kaleckian approach to the banking industry becomes possible" (Rousseas, 1985, p. 135).

that may reflect the fact that high growth generally raises the capitalized value of firms and reduces the cost of lending by lowering default risk.

At a point in time the base rate is given, but over time it is changed by the monetary authority at an exogenous rate:

$$\hat{i}^* = (di^* / dt)(1/i^*) = b \tag{10}$$

The money wage is also given at a point in time, changing over time in line with the gap between the real wage desired by workers, V_w, and the actual real wage:

$$\hat{W} = \mu(V_w - V) \tag{11}$$

where $\hat{W}$ is the rate of change in nominal wage, $(dW/dt)(1/W)$, and $\mu > 0$ is a parameter. Workers' desired real wage is assumed to depend on their bargaining power, which rises with capacity utilisation:

$$V_w = \varepsilon_0 + \varepsilon_1 u \tag{12}$$

where ε_i are positive parameters.

We will assume in what follows that if output is below full capacity, the equality between investment and saving will be brought about by changes in output through changes in capacity utilisation. In case output is at full capacity, in turn, actual investment will be determined by saving and desired investment may exceed actual investment. Normalized by the capital stock, the aggregate saving is given by

$$g = sr \tag{13}$$

which follows from our assumptions that workers do not save and capitalists save a fraction s of their income.

3. The behaviour of the model in the short run

The short run is defined as a time span in which the capital stock, K, the nominal interest rate, i, the price level, P, and the nominal wage, W, can all be taken as given. We have to consider both possibilities regarding capacity utilisation, namely, excess capacity and full capacity.

3.1 Case of excess capacity

The existence of excess capacity implies that output will adjust to remove any excess demand or supply, so that in short-run equilibrium, $g = g^d$. Using eqs. (2), (4), (5), (7) and (13), we can solve for the short-run equilibrium value of u, given V, i and parameters of the model:

$$u^* = \frac{\alpha_0 + \alpha_2\theta_1(V - \varphi_0) - \alpha_2 i(1 - \theta_1\varphi_1)}{(s - \alpha_1)(1 - Va)} \tag{14}$$

As regards short-run stability, we employ a keynesian short-run adjustment mechanism stating that output will change in proportion to the excess demand in the goods market. Hence, u^* will be stable provided the denominator of (14) is positive, which is ensured by the standard condition for macro stability that aggregate saving is more responsive than investment to changes in output (capacity utilisation), which we assume to be satisfied. We also assume that the numerator of u^* is positive, which will ensure a positive value for u^* itself. For a given nominal interest rate, the impact of a change in the real wage on the short-run equilibrium of capacity utilisation is given by

$$\partial u^* / \partial V = \frac{\alpha_2\theta_1 + au^*(s - \alpha_1)}{D} \tag{15}$$

where D is the denominator of u^*. Hence, a rise in the real wage leads to an increase in capacity utilisation. Like in the models developed by Rowthorn (1981) and Dutt (1984, 1990), an increase in the real wage, by redistributing income from capitalists who save to workers who do not, raises consumption demand and, therefore, increases capacity utilisation. Besides, a rise in the real wage, given the real wage implied by firms' desired markup, raises the inflation rate and, given the nominal interest rate, lowers the real interest rate, raises desired investment and, therefore, increases capacity utilisation.

For a given real wage, in turn, the impact of a change in the nominal interest rate on the short-run equilibrium of capacity utilisation is given by

$$\partial u^* / \partial i = \frac{-\alpha_2 (1-\theta_1\varphi_1)}{D} \tag{16}$$

where D is again the denominator of u^*. Hence, the impact of a change in the nominal interest rate on the short-run equilibrium of capacity utilisation is ambiguous. Eq. (7) shows that an increase in the nominal interest raises firms' desired markup and, given the actual markup, raises the rate of change in price, as shown by eq. (5). Hence, the sign of the numerator of eq. (16) depends on the impact of a change in the nominal interest rate on the real interest rate, which is given by

$$\partial(i - \hat{P}) / \partial i = (1-\theta_1\varphi_1) \tag{17}$$

We assume that this expression is positive, which implies that a rise in the nominal interest rate, by raising the real interest rate, lowers desired investment and, therefore, reduces capacity utilisation.

The short-run equilibrium value of the profit rate on physical capital, r^*, can be obtained by substituting the expression for u^* into eq. (4):

$$r^* = \frac{[\alpha_0 + \alpha_2\theta_1(V-\varphi_0) - \alpha_2 i(1-\theta_1\varphi_1)]}{(s-\alpha_1)} \tag{18}$$

For a given interest rate, the impact of a change in the real wage on r^* is given by

$$\partial r^* / \partial V = \frac{\alpha_2\theta_1}{(s-\alpha_1)} \tag{19}$$

Hence, a rise in the real wage, by generating a rise in capacity utilisation which more than compensates the accompanying fall in the profit share in income, leads to an increase in the short-run equilibrium value of the profit rate on physical capital.

For a given real wage, in turn, the impact of a change in the nominal interest rate on r^* is given by

$$\partial r^* / \partial i = \frac{-\alpha_2 (1-\theta_1\varphi_1)}{(s-\alpha_1)} \tag{20}$$

Since we assumed that a rise in the nominal interest rate, by raising the real interest rate, lowers capacity utilisation, that rise will as well lower the short-run equilibrium of the profit rate on physical capital.

3.2 Case of full capacity utilisation

Since a rise (fall) in the real wage (nominal interest rate) generates a rise in the equilibrium value of capacity utilisation, there is a subset of the (V,i)-space at which productive capacity is fully utilised, $u = u_K$. In this case, if there is an excess demand gap given by $g^d > g$, firms will not be able to invest at their desired rate, and the actual rate of profit on physical capital, using eq. (4), will be given by

$$r = (1 - Va)u_K \tag{21}$$

The actual rate of capital accumulation can then be obtained by substituting eq. (21) into eq. (13), which yields:

$$g = s(1 - Va)u_K \tag{22}$$

The short-run equilibrium value of the inflation rate, in turn, can be obtained by substituting eqs. (2), (7), (21) and (22) into eq. (5), whih yields

$$\hat{P} = \theta_1^{'}(V - \varphi_0) + \theta_2^{'}[\alpha_0 - (s - \alpha_1)(1 - Va)u_K] + \theta_1^{''} i \tag{23}$$

where $\theta_1^{'} = \theta_1 / (1 - \theta_2\alpha_2)$; $\theta_2^{'} = \theta_2 / (1 - \theta_2\alpha_2)$; $\theta_1^{''} = (\theta_1\varphi_1 - \theta_2\alpha_2) / (1 - \theta_2\alpha_2)$.

Once capacity becomes fully utilised, a rise (fall) in the real wage (nominal interest rate) will leave the short-run equilibrium value of u unchanged. However, eq. (21) shows that a rise in the real wage, by lowering the share of profits in income, will also lower the rate of profit on physical capital, while a change in the nominal interest rate, by leaving u^* unchanged, will also leave r^* unchanged.

Eq. (23) shows that a change in the real wage or in the nominal interest rate will affect the inflation rate. Since we assume that $\theta_2\alpha_2 < 1$, a rise in the real wage will put an upward pressure on the inflation rate by increasing the gap between the firms' desired and realized markups and by intensifying excess demand, given the lower propensity to save of workers. The impact of a change in the nominal interest rate, in turn, depends on the sign of $\theta_1^{''}$, which captures opposite effects. A rise in the nominal interest rate will put an upward pressure on the inflation rate by increasing the gap between the firms' desired and realized markups but will also put a downward pressure on the inflation rate by reducing excess demand. Hence, a rise in the nominal interest rate will raise (lower) the inflation rate in case $\theta_1\varphi_1 > \theta_2\alpha_2$ ($\theta_1\varphi_1 < \theta_2\alpha_2$). We assume that $\theta_1\varphi_1 < \theta_2\alpha_2$, which ultimately implies that $0 < \theta_1\varphi_1 < \theta_2\alpha_2 < 1$, given our other assumptions.

4. The behaviour of the model in the long run

In the long run we assume that the short-run equilibrium values of the endogenous variables u and r are always attained, with the economy moving over time due to changes in the capital stock, the price level, the nominal wage and the nominal interest rate. We analyse the intertemporal behaviour of the economy by examining the dynamics of the real wage and the nominal interest rate. From the definition of these variables, and using an overhat to express time-rate of change, the corresponding state transition functions are:

$$\hat{V} = \hat{W} - \hat{P} \tag{24}$$

$$\hat{i} = \hat{h} + \hat{i}^* \tag{25}$$

We proceed by analysing separately both possibilities regarding capacity utilisation.

4.1 Case of excess capacity

The existence of excess capacity allows firms to invest at their desired rate, so that $g^d = g$. Substituting (5), (7), (11) and (12) into (24), we obtain

$$\hat{V} = \mu(\varepsilon_0 + \varepsilon_1 u - V) - \theta_1(V - \varphi_0 + \varphi_1 i) \tag{26}$$

where u is given by (14). Substituting (5), (7), (9) and (10) into (25), we obtain

$$\hat{i} = \beta_0 - \beta_1 r + \beta_2\theta_1(V - \varphi_0 + \varphi_1 i) + b \tag{27}$$

where r is given by (18). Eqs. (26) and (27), after using (14) and (18), constitute an autonomous two-dimensional system of differential equations in which the rates of change of V and i depend on the levels of V and i, and on parameters of the system. The Jacobian matrix of this dynamic system is the following

$$J_{11} = \partial\hat{V} / \partial V = \mu(\varepsilon_1 u_V^* - 1) - \theta_1 \tag{28}$$

$$J_{12} = \partial\hat{V} / \partial i = \mu\varepsilon_1 u_i^* - \theta_1\varphi_1 < 0 \tag{29}$$

$$J_{21} = \partial\hat{i} / \partial V = -\beta_1 r_V^* + \beta_2\theta_1 \tag{30}$$

$$J_{22} = \partial\hat{i} / \partial i = -\beta_1 r_i^* + \beta_2\theta_1\varphi_1 > 0 \tag{31}$$

Eq. (29) shows that an increase in the nominal interest rate, by reducing capacity utilisation, lowers the real wage desired by workers, and hence the rate of change in the nominal wage. Besides, such increase in the nominal interest rate raises the inflation rate by increasing the gap between the firms' desired and realized markups. Eq. (31) shows that an increase in the nominal interest rate, by reducing the rate of profit on physical capital and by raising the inflation rate, raises the rate of change in the banking markup. In turn, eq. (28) shows that an increase in the real wage, by raising capacity utilisation, will put an upward pressure on the rate of change in the nominal wage by raising the real wage desired by workers. However, even in case this pressure is strong enough to raise the rate of change in the nominal wage, the accompanying rise in the inflation rate, given the increase in the gap between the firms' desired and realized markups, may be strong enough to end up lowering the rate of change in the real wage. Finally, eq. (30) shows that an increase in the real wage will put a downward pressure on the rate of change in the banking markup by raising the rate of profit on physical capital, but will also put an upward pressure on it by increasing the gap between the firms' desired and realized markups and hence the inflation rate.

In any case, we can analyse the (local) stability properties of this dynamic system by examining the signs of the determinant and trace of its Jacobian. In case $J_{11} > 0$ and $J_{21} > 0$, the economy has a long-run equilibrium with $\hat{V} = \hat{i} = 0$ which is unstable, since

$Det(J) > 0$ and $Tr(J) > 0$. In case $J_{11} < 0$ and $J_{21} < 0$, the long-run equilibrium is a saddle-point, given that $Det(J) < 0$. The sign of $Det(J)$ is ambiguous when $J_{11} > 0$ and $J_{21} < 0$. In this case, however, the sign of $Tr(J)$ is positive, so that the long-run equilibrium is unstable (a saddle-point) when $Det(J)$ is positive (negative). Finally, both $Det(J)$ and $Tr(J)$ have ambiguous sign when $J_{11} < 0$ and $J_{21} > 0$.

4.2 Case of full capacity utilisation

When capacity is fully utilised, $u = u_K$, if there is an excess demand gap given by $g^d > g$, firms are not be able to invest at their desired rate, and the actual rate of capital accumulation is given by eq. (22). Substituting (11), (12) and (23) into (24), we obtain

$$\hat{V} = \mu(\varepsilon_0 + \varepsilon_1 u_K - V) - \theta_1^{'}(V - \varphi_0) - \theta_2^{'}[\alpha_0 - (s - \alpha_1)(1 - Va)u_K] - \theta_1^{''} i \qquad (26')$$

In turn, substituting (9), (10), (21) and (23) into (25), we obtain

$$\hat{i} = \beta_0 - \beta_1(1 - Va)u_K + \beta_2\{\theta_1^{'}(V - \varphi_0) + \theta_2^{'}[\alpha_0 - (s - \alpha_1)(1 - Va)u_K] + \theta_1^{''} i\} + b \quad (27')$$

where, as before, the signs of the parametric combinations θ_i^j are given by the assumption that $0 < \theta_1\varphi_1 < \theta_2\alpha_2 < 1$.

The Jacobian matrix, J^+, for this dynamic system is the following

$$J_{11}^{+} = \partial\hat{V} / \partial V = -\mu - \theta_1^{'} - \theta_2^{'}(s - \alpha_1)au_K < 0 \qquad (28')$$

$$J_{12}^{+} = \partial\hat{V} / \partial i = -\theta_1^{''} > 0 \qquad (29')$$

$$J_{21}^{+} = \partial\hat{i} / \partial V = \beta_1 au_K + \beta_2[\theta_1^{'} + \theta_2^{'}(s - \alpha_1)au_K] > 0 \qquad (30')$$

$$J_{22}^{+} = \partial\hat{i} / \partial i = \theta_1^{''} < 0 \qquad (31')$$

Eq. (28’) shows that an increase in the real wage reduces the rate of change in the nominal wage by leaving workers’ desired real wage unchanged and increases the inflation rate both by increasing the gap between the firms’ desired and realized markups and by intensifying excess demand, given the lower propensity to save of workers. Eq. (29’) shows that a rise in the nominal interest rate, by reducing the inflation rate, increases the rate of change in the real wage. In turn, eq. (30') shows that an increase in the real wage raises the rate of change in the banking markup both by lowering the rate of profit on physical capital and by raising the inflation rate. Finally, eq. (31') shows that an increase in the nominal interest rate reduces the rate of change in the banking markup by lowering the inflation rate.

As regards the (local) stability properties of this dynamic system, we obtain the following. The sign of $Tr(J^+)$ is negative, which satisfies a necessary condition for the stability of the long-run equilibrium solution with $\hat{V} = \hat{i} = 0$. Therefore, such equilibrium solution is stable (a saddle-point) when $Det(J^+)$ is positive (negative).

4.3 Multiple equilibria analysis

Having analysed separately the two possibilities regarding capacity utilisation, we now combine them in a single diagram in the (V,i)-space. Given the geometry of the corresponding $\hat{V} = 0$ and $\hat{i} = 0$ isoclines, however, only some combinations of excess capacity and full capacity utilisation in a phase-diagrammatic representation will lead to the occurrence of multiple equilibria. Indeed, multiple equilibria will obtain only for the two combinations described below.

As seen above for the case of excess capacity, $Det(J)$ and $Tr(J)$ have ambiguous signs when $\partial\hat{V}/\partial V < 0$ and $\partial\hat{i}/\partial V > 0$, meaning that the long-run equilibrium solution with $\hat{V} = \hat{i} = 0$ may be stable, unstable or a saddle-point. When productive capacity is fully utilised, the sign of $Tr(J^+)$ is negative, with the equilibrium solution being stable (a saddle-point) when $Det(J^+)$ is positive (negative). Therefore, one geometric combination leading to double equilibria in the (V,i)-space, which is pictured in Figure 1, contains a saddle-point equilibrium in the case of excess capacity, E_1, and a stable one in the case of full capacity utilisation, E_2. The other combination, which is pictured in Figure 2, contains an equilibrium solution in the case of excess capacity that can be either stable or unstable, E_1, and a saddle-point one in the case of full capacity, E_2.

5. Conclusion

This paper developed a post-keynesian dynamic macromodel of productive capacity utilisation, income distribution and conflict inflation, in which the supply of credit-money is endogenous at the given nominal interest rate. The latter, in turn, is anchored to the base rate through the banking markup. Over time, banking markup falls with firms' profit rate on physical capital and rises with the inflation rate.

Firms produce according to demand if there is not enough demand to produce at full capacity at the ongoing price, or at full capacity utilisation otherwise. In the case of excess capacity, the equality between desired investment and saving is brought about by changes in capacity utilisation, while inflation is fully determined within a framework of conflicting claims on income. Once full capacity utilisation is reached, however, the inflation rate is also determined by whatever excess demand may prevail at the given price.

When the economy is operating with excess capacity, capacity utilisation and the profit rate on physical capital are positively (negatively) related to the real wage (nominal interest rate). In case capacity is fully utilised, in turn, a rise (fall) in the real wage (nominal interest rate) leaves capacity utilisation unchanged. However, a rise in the real wage, by lowering the share of profits in income, lowers the rate of profit on physical capital, while a rise in the nominal interest rate, by leaving capacity utilisation unchanged, leaves the rate of profit on physical capital as well unchanged.

Finally, the behaviour of the economy in the long-run was analysed for both cases regarding productive capacity utilisation, which allowed a phase-diagrammatic analysis of some possible configurations leading to multiple equilibria.

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FIGURA 1

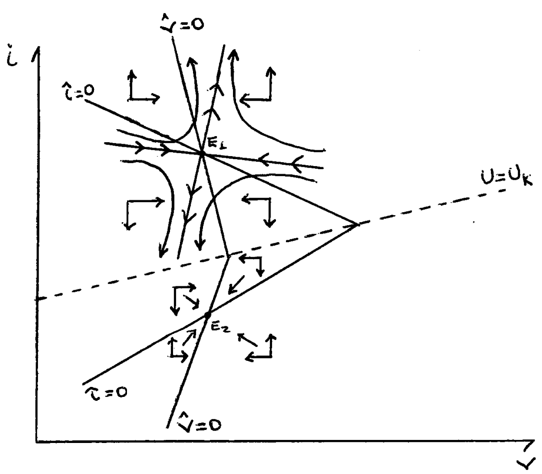
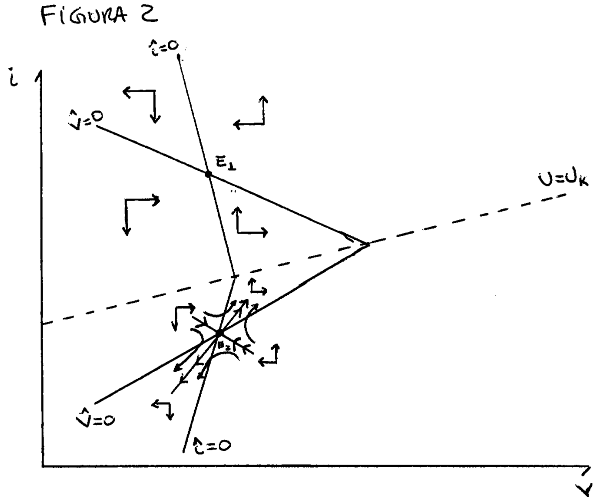


FIGURA 2



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