The rate of interest as a macroeconomic distribution parameter: Horizontalism and Post-Keynesian models of distribution of growth

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The rate of interest as a macroeconomic distribution parameter: Horizontalism and Post-Keynesian models of distribution of growth[*]

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Abstract

We review the main arguments put forward against the horizontalist view of endogenous credit and money and an exogenous rate of interest under the control of monetary policies. We argue that the structuralist arguments put forward in favour of an endogenously increasing interest rate when investment and economic activity are rising, due to increasing indebtedness of the firm sector or decreasing liquidity in the commercial bank sector, raise major doubts from a macroeconomic perspective. This is shown by means of examining the effect of increasing capital accumulation on the debt-capital ratio of the firm sector in a simple Kaleckian distribution and growth model. In particular we show that rising (falling) capital accumulation may be associated with a falling (rising) debt-capital ratio for the economy as a whole and hence with the 'paradox of debt'. Therefore, the treatment of the rate of interest as an exogenous macroeconomic distribution parameter in Post-Keynesian distribution and growth models seems to be well founded.

JEL code: E12, E25, E43, E52

Key words: interest rate, horizontalism, distribution, debt, capital accumulation

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1. Introduction

The introduction of monetary variables into Post-Keynesian models of distribution and growth has been an ongoing process since the late 1980s/early 1990s.[1] Until then the impacts of monetary variables were rarely considered to be relevant for the equilibrium solutions in the models built in the tradition of Kaldor (1955/56, 1957, 1961) and Robinson (1956, 1962), on the one hand, and Kalecki (1954) as well as Steindl (1952), on the other.[2] For more than two decades now Post-Keynesians have increasingly taken Keynes's (1933) research programme of a 'monetary theory of production' more and more seriously and have introduced monetary variables into the Kaldorian and Kaleckian variants of the Post-Keynesian growth and distribution models.[3]

Monetary extensions of Post-Keynesian models of distribution and growth usually follow the Post-Keynesian 'horizontalist' view, as developed by Kaldor (1970, 1982, 1985), Lavoie (1984, 1992a, pp. 149-216, 1996, 1999, 2006) 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 and payment conventions.

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[1] An exception, perhaps, was Pasinetti's (1974, pp. 139-141) natural rate of growth model in which the normal rate of profit is positively associated with the rate of interest as long as the latter is smaller than the former.

[2] See Lavoie (1992a, pp. 282-347) and Hein (2004, pp. 149-219) for surveys of Kaldorian/Robinsonian and Kaleckian models of distribution and growth. For Kaleckian models see also the overview by Blecker (2002). For more recent developments in Post-Keynesian distribution and growth models see the contributions in Setterfield (2010).

[3] See the overview in Lavoie (1995) and Hein (2008) and the contributions by, among others, Dutt (1989, 1992, 1995), Dutt/Amadeo (1993), Epstein (1992, 1994), Hein (1999, 2006a, 2006b, 2007), Hein/Ochsen (2003), Hein/Schoder (2010), Lavoie (1992a, pp. 347-371, 1993, 1995), Lavoie/Godley (2001-2), Lavoie/Rodriguez/Seccareccia (2004), Lima/Meirelles (2006), Smithin (1997, 2003a, pp. 131-151, 2003b), and Taylor (1985, 2004, pp. 272-278).

However, the validity of the 'horizontalist' view has been questioned by those Post-Keynesian authors following the 'structuralists' view, for instance Arestis/Howells (1996, 1999), Dow (2006), Howells (1995a, 1995b, 2006), Palley (1994, 1996), and Wray (1990, 1992a, 1992b, 1995). According to this view, also the rate of interest should be considered to be an endogenous variable which is dependent on the development of economic activity, in particular on the demand for credit associated with higher investment or capital accumulation. From this view it would follow that an endogenous rate of interest should be included in Post-Keynesian distribution and growth models, too.

In the present paper, we will compare the 'horizontalist' to the 'structuralist' monetary view in the second section, and we will review an attempt at reconciliation of these two views. We will argue that the arguments in favour of an endogenously increasing rate of interest, put forward in the 'structuralist' view and in the attempt at reconciliation, have not been convincing from a macroeconomic perspective. In the third section we will make use of a simple Kaleckian distribution model with an endogenous debt-capital ratio of the firm sector in the medium run, as developed in Hein (2006), and we will show that an increasing inducement to accumulate at the firm level will not necessarily be associated with rising debt-capital ratios at the macroeconomic level. Taking into account the macroeconomic feedbacks there is thus no reason to believe that the loan rates of interest will go up due to increasing indebtedness of this sector when the inducement to invest of the firm sector rises. The final section will summarise and conclude.

2. Horizontalism versus structuralism[4]

In Post-Keynesian distribution and growth models relying on the independence of investment from saving also in the long period, firms' investment finance and finance costs have to be

[4] This section draws on chapter 6.5 of my book on „Money, Distribution Conflict and Capital Accumulation" (Hein 2008).

treated explicitly. In a credit money economy, external finance for firms' investment can be supplied either by those households holding financial wealth or by the banking sector. But it is only the banking sector, consisting of a central bank and commercial banks, which is capable of supplying any creditworthy credit demand at a given rate of interest without limits, in principle. In Post-Keynesian monetary theory, the volume of credit (as a flow) and the quantity of money (as a stock) are therefore endogenous to the income generation and accumulation process.[5] The volume of credit supply is determined by credit demand which commercial banks consider creditworthy, that is by the credit demand of those debtors who are able to supply securities accepted by the central bank as collateral when providing commercial banks with central bank money in the money market. Loan demand which commercial banks deem creditworthy is granted, deposits are created with commercial banks, and the central bank accommodates the demand for the required amount of central bank money. The central bank also has to take the role of a 'lender of last resort' and is responsible for sustaining the liquidity of the monetary system. The central bank determines the price for central bank money, the base rate of interest, and commercial banks mark-up this base rate when supplying credit to investors.

There are, however, two major issues in Post-Keynesian monetary economics, discussed under the labels 'horizontalists' (or 'accommodationists') versus 'structuralists', which have yet remained unsolved.[6] The first issue is related to the central bank's supply curve of reserves in base interest rate-central bank money space and hence to the degree of central bank accommodation of reserves. The second is related to the commercial banks' supply curve in market interest rate-credit space and to the relevance and uniqueness of

[5] On endogenous money in Post-Keynesian theory see Cottrell (1994), Fontana (2003, 2004a, 2009), Hewitson (1995), Howells (1995b), Lavoie (1984, 1992a, pp. 149-216, 1994), Moore (1989), Rochon (1999, 2001), and Smithin (2003a, pp. 98-104, pp. 121-127).

[6] On the discussion between 'horizontalists' and 'structuralists' see the surveys by Fontana (2003, 2004a, 2009), Palley (1994, 1996), and Pollin (1991).

changes in commercial banks' liquidity preferences and risk assessments when credit demand expands.

2.2 The horizontalist view

In the horizontalist view, pioneered by Kaldor (1970, 1982, 1985), Lavoie (1984) and Moore (1988, 1989),[7] it is argued that the central bank's monetary policy determines the base rate of interest and that the central bank as 'lender of last resort' is responsible for the liquidity and stability of the monetary system as a whole. Therefore, the central bank fully accommodates the generation of credit and hence deposits with commercial banks by supplying the required amount of central bank money, provided that commercial banks only grant credit to creditworthy borrowers. This implies that there is always some sort of 'rationing', in the sense that the willingness to pay the rate of interest demanded by the central bank is a necessary but not a sufficient condition for commercial banks to get hold of reserves.[8] Within this limit, however, the central banks' money supply curve becomes horizontal.

Commercial banks determine the interest rate in the credit market by marking up the central bank's base rate, and then supply credit at this rate to those borrowers whom they consider to be creditworthy. Banks are therefore price makers and quantity takers, within the limits given by creditworthiness. Again, the willingness of firms and households to pay the rate of interest set by banks in the credit market is a necessary, but not a sufficient condition to obtain credit, and there will always be some sort of 'credit rationing' for those who are unable to provide required collateral (Wolfson 1996). The commercial banks' mark-up on the

[7] Major elements of the horizontalist view have already been developed by Le Bourva in the French debate of the 1950s as Lavoie (1992b) has argued. On an English translation of this contribution see Le Bourva (1992).

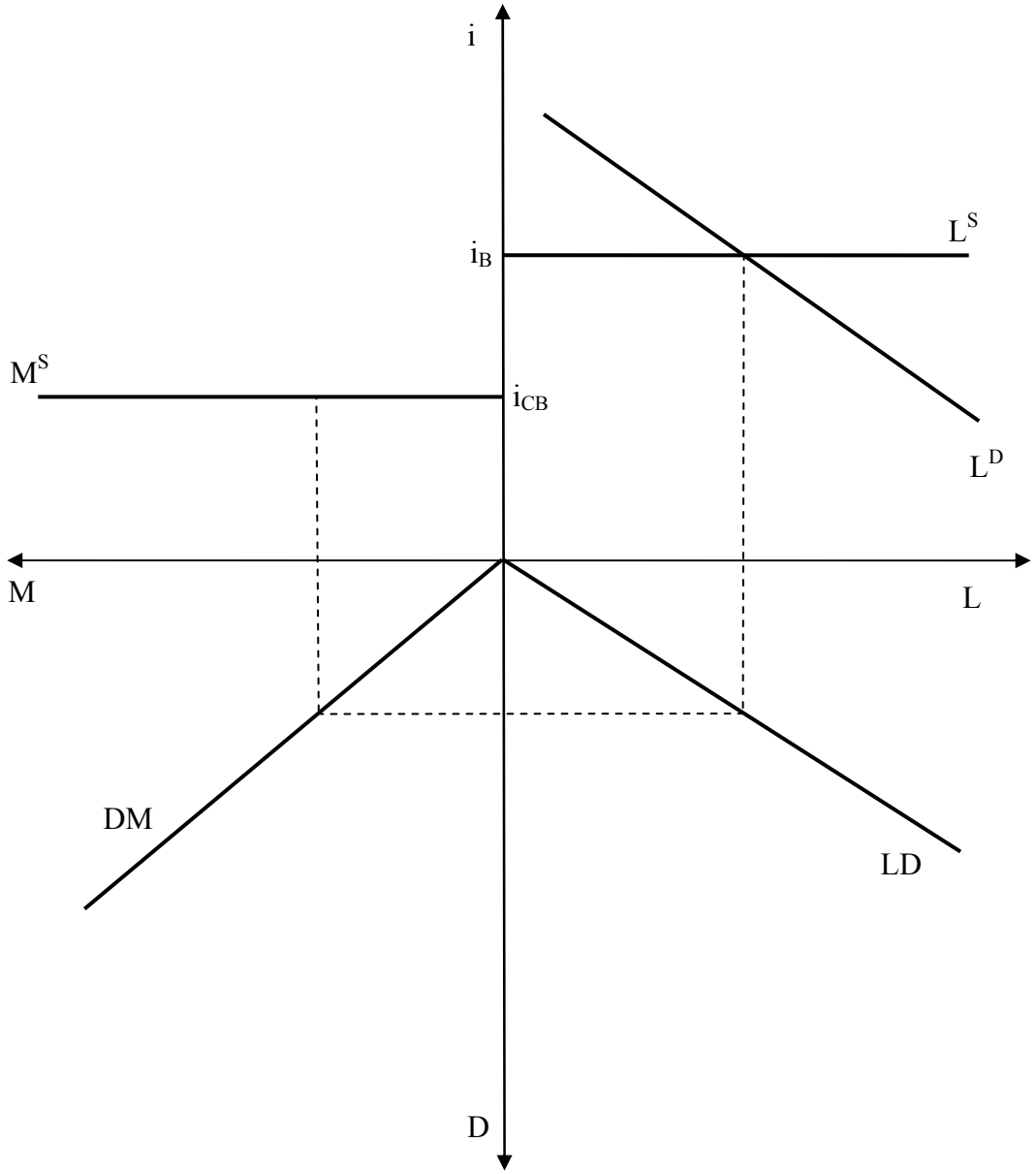
[8] See Wolfson (1996) for an elaboration of a Post-Keynesian theory of credit rationing based on asymmetric expectations of borrowers and lenders in a world with fundamental uncertainty. Credit rationing may occur due to differences in expectations between borrowers and lenders.

base rate is determined by their risk and liquidity considerations, and also by the degree of competition in the commercial banking sector. In this approach, liquidity preference determines the structure of interest rates, and not the level of interest rates. The commercial banks' liquidity preference is a determinant of the mark-up and hence the spread between the base rate and the market rate of interest.

> 'Briefly put, a generalised liquidity preference theory tells us to what extent the various agents in the economy are ready to become illiquid and to abandon liquid assets (...). The central bank determines the base rate, and all other rates are adjusted to that rate, through liquidity preference or other considerations. Liquidity preference does not determine *the* rate of interest, (...). Rather liquidity preference determines the *differential* between the base rate and all the other rates.' (Lavoie 1996, p. 293, italics in the original)

The horizontalist view can be presented graphically, adopting Palley's (1994, p. 74) approach in Figure 1. The upper left quadrant shows the central bank's horizontal base money supply curve (M^S) at a given base rate of interest (i_{CB}) set by the central bank. In the upper right quadrant we find the interest rate inverse loan demand curve (L^D) and the horizontal loan supply curve (L^S) of commercial banks at a given rate of interest (i_B) calculated by marking up the central bank's base rate [$i_B = (1+m_B)i_{CB}$]. The mark-up (m_B) is determined by commercial banks' risk and liquidity premia, and by the degree of competition in the banking sector. The lower right quadrant with the loan-deposit curve (LD) shows that 'loans (L) make deposits (D)', and the lower left quadrant with the deposit-reserves curve (DM) displays that 'deposits (D) make reserves (M)'. For the sake of simplicity it is assumed that each 'making' takes place in fixed proportions. The loan-deposit- and the deposit-reserves curves will be affected by the deposit-loan-ratio, by the required reserve ratios for deposits, and by excess reserves (Palley 1994).

Figure 1: The horizontalist approach of endogenous money and credit



An increase in loan demand, hence an outward shift in the loan demand curve, will increase loan and money supply at given interest rates, provided the loan demand is deemed creditworthy by commercial banks. Higher standards for creditworthiness associated with a more cautious credit supply will be associated with a downward shift in the loan demand curve in Figure 1.

If liquidity preference and risk considerations of private banks and, hence, their mark-ups remain constant, the central bank's interest rate setting in the base money market also determines the market rate of interest in the credit market (Smithin 2003a, pp. 121-127). Under these conditions, changes in the base rate and in the credit market rate of interest are due to changes in the monetary policy stance. Changes in the central bank's base rate will therefore also shift the credit supply curve and affect credit demand and hence real economic activity financed by credit.

However, if commercial banks' liquidity and risk considerations or the degree of competition, and hence their mark-ups, change in the face of a changing base rate of interest, monetary policy may not be able to determine the credit market rate of interest directly. Here an asymmetry may arise: An increasing base rate of interest will always trigger an increasing credit market rate, because commercial banks have to recover costs of refinancing and have to gain (minimum) profits. But a decreasing base rate may not be followed immediately by a falling credit market rate, if commercial banks' liquidity and risk premia increase due to rising uncertainty, or if banks' profit aspirations increase. Note finally, that the horizontalist view does not imply that monetary policy is free to set the rate of interest at whatever level, irrespective of economic conditions. On the contrary, modern central banks have used the interest rate tool in order to stabilize inflation – and/or the exchange rate, depending on the exchange rate regime.[9]

[9] For an analysis of the limited effectiveness of inflation targeting monetary policies within Kaleckian monetary distribution and growth models see Hein (2006b, 2008) and Hein/Stockhammer (2010).

2.2 The structuralist view

Post-Keynesian structuralists share the view that money is endogenous and that the central bank uses the base rate of interest as an economic policy instrument. But they object to the money and credit supply curves being perfectly elastic and argue that also the rate of interest becomes an endogenous variable.[10] First, it is argued, central banks may not always accommodate rising bank loans with the required amount of central bank money at a given rate of interest. Therefore, commercial banks may be forced to attract reserves from the public or to introduce financial innovations. The rate of interest will hence have to rise in order to make economic agents part with central bank money, and the money and credit supply curves become upwards sloping. Households' liquidity preference becomes important again in determining the levels of the money and the loan rates of interest. This is shown in Figure 2 adopted from Palley (1994, p. 75).

Even if the central bank fully accommodates the commercial banks' demand for money, structuralists put forward arguments in favour of a rising credit supply curve in interest rate credit space. Expanding credit decreases commercial banks' liquidity position and increases firms' degree of indebtedness, it is argued. Increasing credit supply is hence associated with increasing liquidity and risk premia of commercial banks. Liquidity preference and increasing risk induce commercial banks to increase the mark-up on the base rate when credit supply is expanded. Contrary to the horizontalist view, liquidity preference has again a role to play in the determination of the level and the time paths of the market rates of interest. This is shown in Figure 3.

[10] See for instance Herr (1988, 1993), Howells (1995a, 1995b), Minsky (1975), Palley (1994, 1996), and Wray (1990, 1992a, 1992b, 1995).

Figure 2: The structuralist approach with incomplete accommodation of the central bank

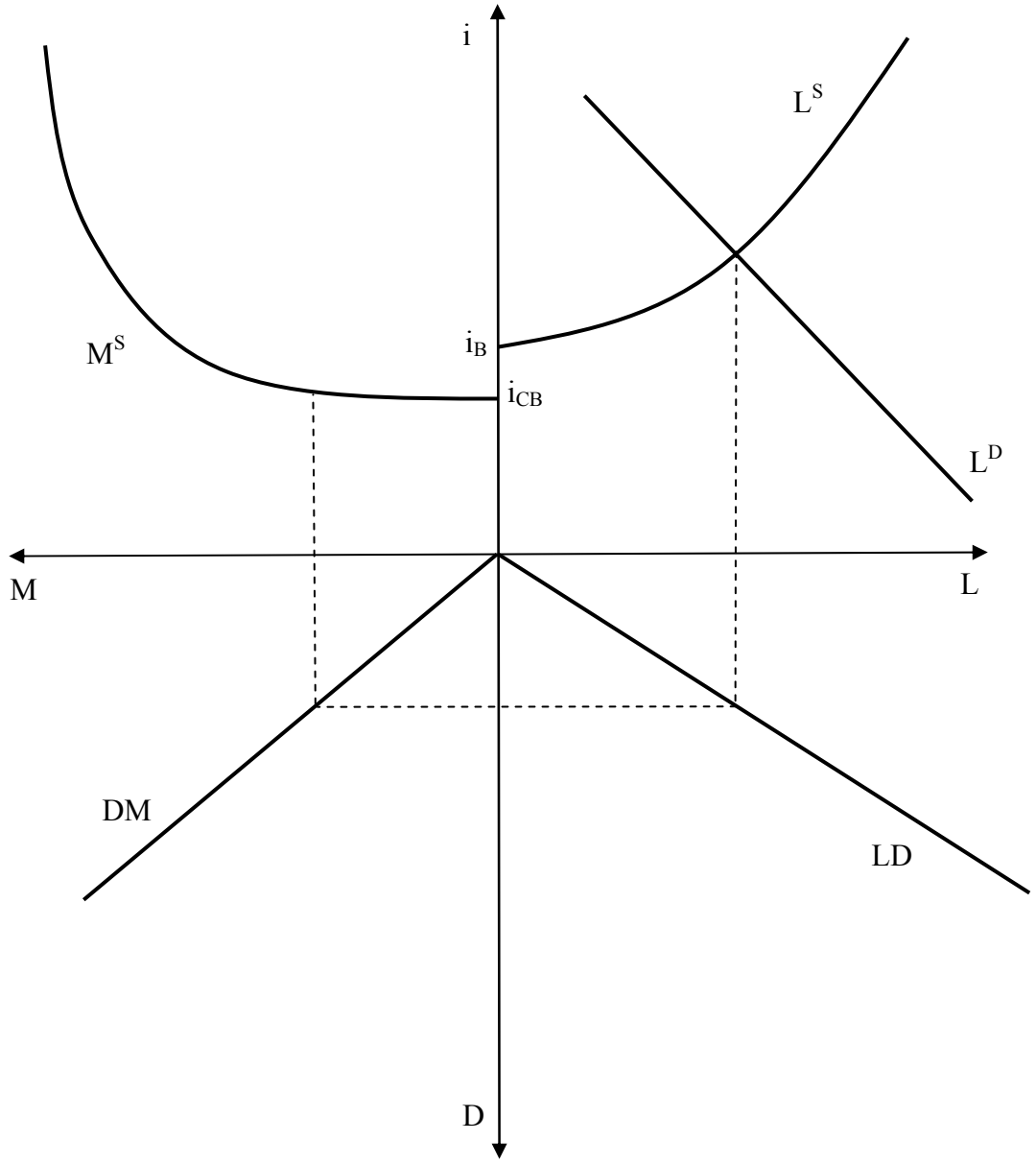
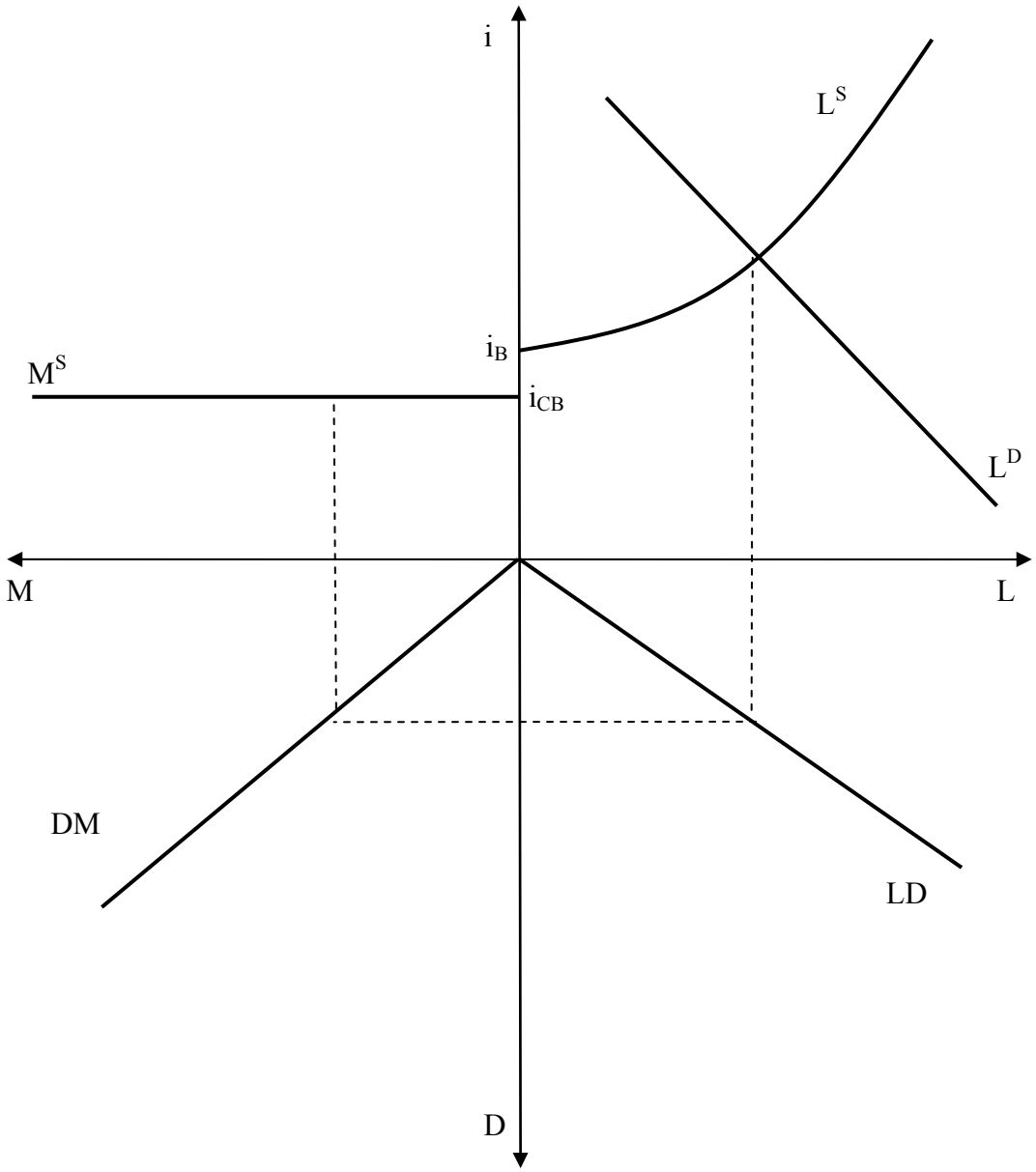


Figure 3: The structuralist approach with complete accommodation of the central bank

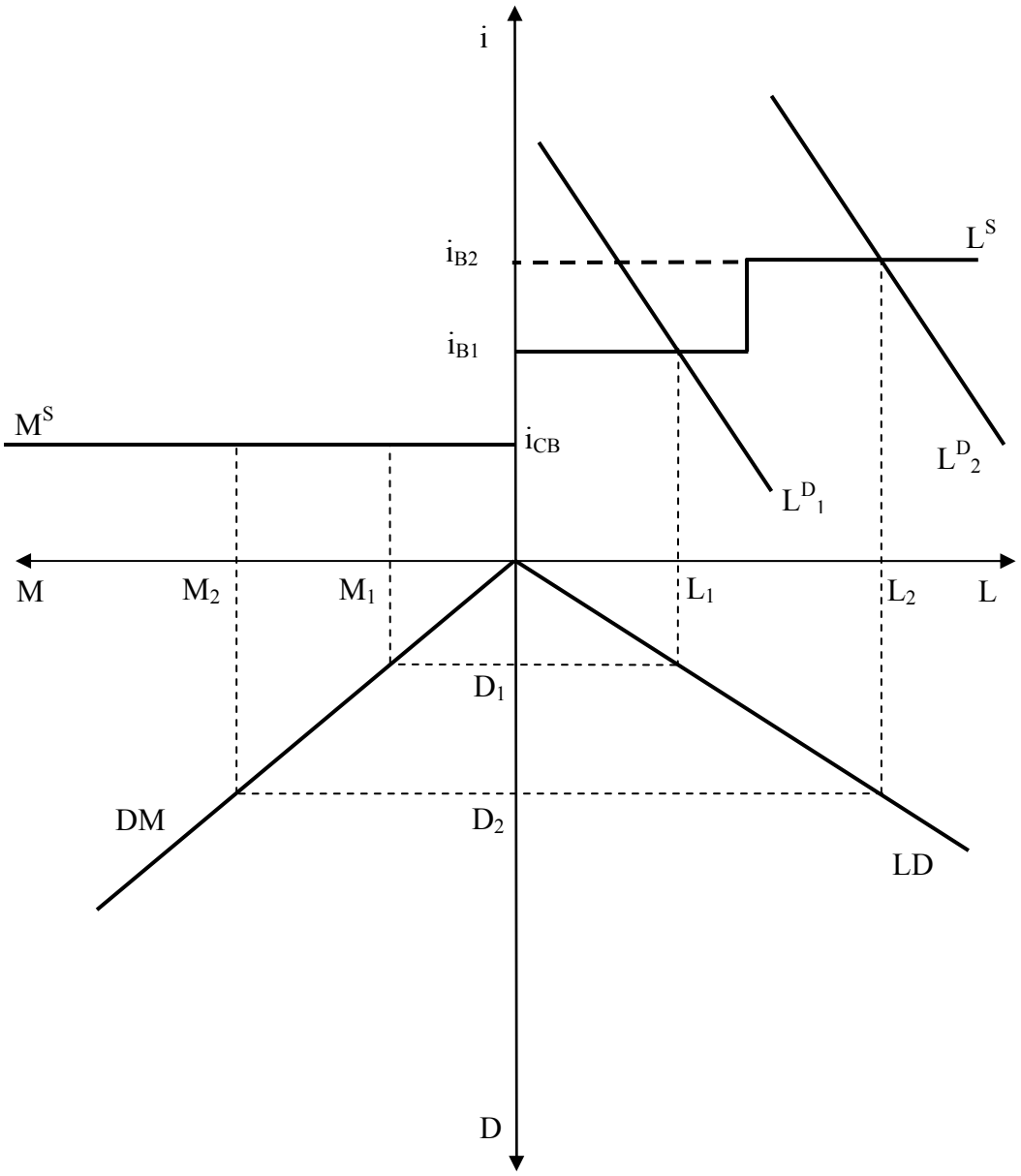


2.3 Fontana's reconciliation

Fontana (2003, 2004a, 2004b, 2009) has recently tried to reconcile the horizontalist and the structuralist approaches to endogenous money. Following a distinction made by Hicks (1982), Fontana argues that horizontalists have put forward a 'single period analysis' with given expectations, and hence given liquidity preferences and risk assessments of commercial banks and the central bank. Structuralists are said to pursue a 'continuation analysis' of money in which expectations, and hence liquidity preference and risk assessments, may change period by period. The effects of changing expectations on money and loan rates of interest are therefore integrated into the analysis. Therefore, the difference between the horizontalist and the structuralist approach boils down to different assumptions about the state of expectations, Fontana argues. Since the structuralist approach covers more than a single period, it is considered to encompass the horizontalist view and to be able to generate a richer and more complex explanation of credit and money supply. This is shown in Figure 4 adopted from Fontana (2004a, p. 374).

Assuming first that the central bank fully accommodates the commercial banks' demand for central bank money, an increase in creditworthy loan demand from L^D_1 in period 1 to L^D_2 in period 2 is considered. In period 1 firms' loan demand is met by a horizontal credit supply curve at a given interest rate i_{B1} calculated as a mark-up on the base rate i_{CB}. Note that credit supply at this rate is not infinite. An increase in credit demand and hence a shift in the loan demand curve from L^D_1 to L^D_2 is assumed to be associated with a decrease in the commercial banks' liquidity position and an increase in the degree of indebtedness of firms, according to the structuralist view. Liquidity and risk considerations induce commercial banks to increase the mark-up on the central bank's base rate, so that the loan rate moves to i_{B2}. A rise in credit demand is therefore associated with an increase in the loan rate of interest.

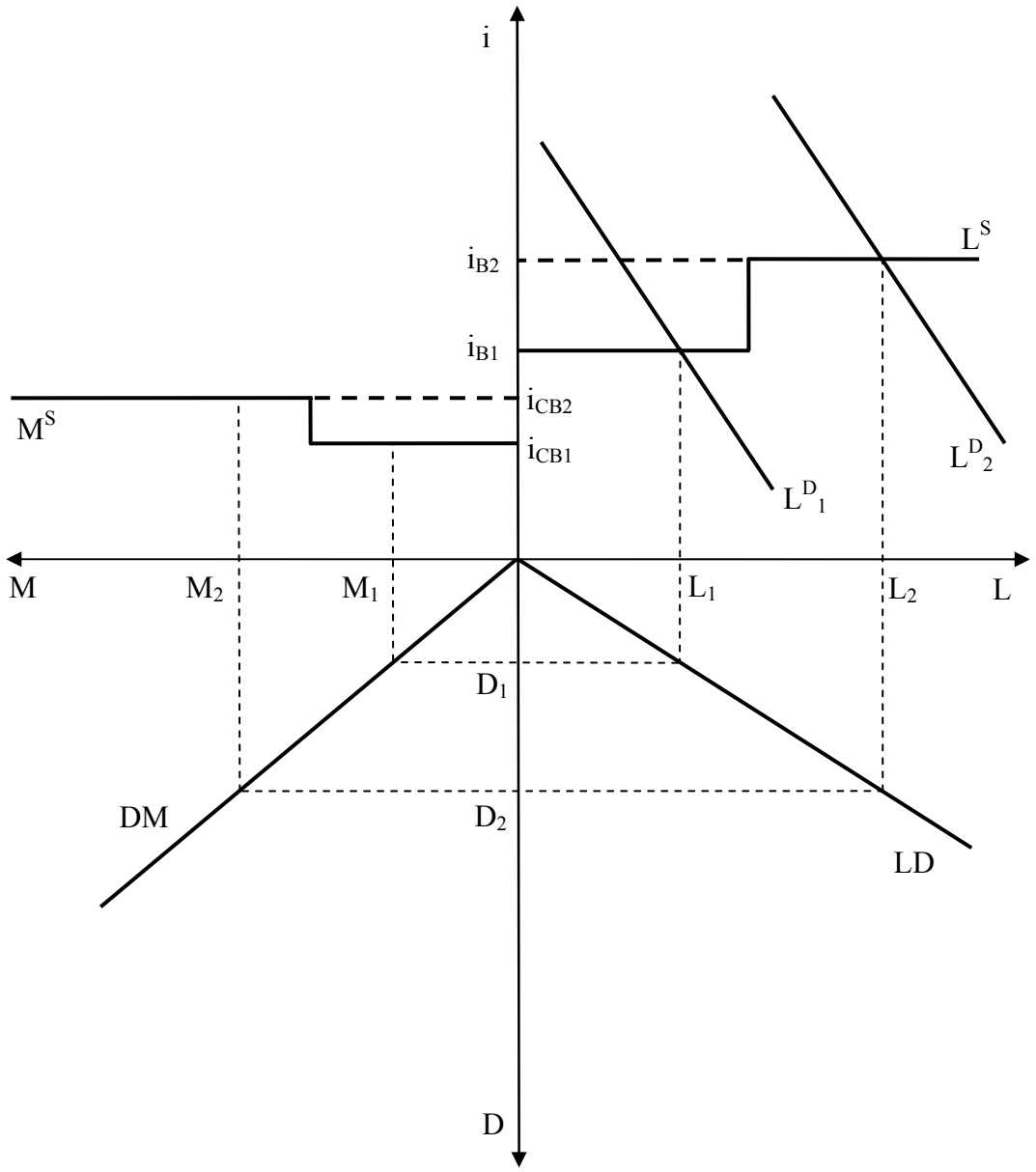
Figure 4: A time framework explanation of endogenous money with complete accommodation of the central bank



A similar exercise can be undertaken with respect to the base interest rate set by the central bank in the face of a rise in the demand for central bank money in Figure 5. If the central bank decides not to accommodate a rising demand for reserves triggered by an increasing demand for loans, the supply functions of central bank money and of loans both shift upwards. An increasing demand for loans and reserves will only be supplied at increasing interest rates. The central bank's base rate for reserves rises from i_{CB1} to i_{CB2}, and the loan rate increases from i_{B1} to i_{B2}. The increase in the loan rate may even exceed the increase in the base rate due to 'increasing risk'.

Indeed, Fontana's contributions have helped to clarify the issue. However, whereas the effects of central bank's non-accommodation on interest rates is not disputed in the controversy between horizontalists and structuralists, it is by no means clear that commercial banks will necessarily raise loan rates in the face of increasing credit demand when it is supposed that the central bank accommodates. Lavoie (1996) argues that an increasing interest rate in the face of increasing economic activity and credit demand can only be attributed to central bank's non-accommodation. And if central banks decide not to accommodate an increasing demand for reserves, this is tantamount to increasing the base rate of interest with the concomitant effects demonstrated in Figure 5. It is therefore the central bank's interest rate policy which causes changes in the rate for reserves and in the loan rate.

Figure 5: A time framework explanation of endogenous money with incomplete accommodation of the central bank



Of course, it has to be conceded that the commercial banks' loan rate may also vary when the central bank maintains the base rate at a constant level. Changes in the degree of competition in the banking sector, shifts in expectations and hence in liquidity preference or in risk assessments of commercial banks may be a cause for this. What is disputed from a macroeconomic perspective, however, is the necessity of an increase of the loan rate in the face of rising demand for credit, due to decreasing liquidity of commercial banks and increasing indebtedness of credit seeking firms (Lavoie 1996). We will examine the latter in a simple Kaleckian macroeconomic distribution and growth model in the following section.

3. Interest rate and debt in a basic Kaleckian monetary distribution and growth model

In this section we examine the effects of a change in firms' inducement to accumulate on the debt-capital ratio of the firm sector within a Kaleckian monetary distribution and growth model, as proposed in Hein (2006).[11] For this purpose we take the rate of interest as an exogenous variable, following the 'horizontalist' view, in order to see whether there is a consistent rise in our indicator for firms' indebtedness, the debt-capital ratio, whenever the inducement to accumulate increases. If this were so, the horizontalist approach could indeed be considered to be only a single period approach, as argued by Fontana, and would have to be augmented by the arguments put forward by the structuralists. Rising indebtedness of the firm sector would therefore give rise to an increase in the loan rate of interest set by commercial banks due to increasing risk and liquidity premia.

3.1 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

[11] See also Hein (2008, chapters 12 and 13).

and real output (Y), i.e. there is no overhead-labour and no technical change, so that we get a constant labour-output-ratio (l). 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:

$$p = [1 + m(i)]wl, \qquad m > 0, \frac{\partial m}{\partial i} \geq 0, \tag{1}$$

$$h = \frac{\Pi}{pY} = 1 - \frac{1}{1 + m(i)}, \qquad \frac{\partial h}{\partial i} \geq 0, \tag{2}$$

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

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

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

$$\sigma = \frac{S}{pK} = \frac{\Pi - Z + S_Z}{pK} = h\frac{u}{v} - i\lambda(1 - s_Z), \qquad 0 < s_Z < 1, \tag{6}$$

$$g = \frac{\Delta K}{K} = \frac{I}{K} = \alpha + \beta u + \tau\left(h\frac{u}{v} - i\lambda\right), \qquad \alpha, \beta, \tau, > 0, \qquad \tau < 1, \tag{7}$$

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).[12] The profit share (h), i.e. the

[12] In the present model we do not address the effects of distribution struggle on inflation and the related price, debt and investment dynamics but rather assume the level of prices to be constant and suppose that distribution conflict only affects the mark-up. See Hein (2006b, 2008, chapter 16) and Hein/Stockhammer (2010) for an extension of the present model to cover distribution conflict, inflation and real debt dynamics.

proportion of profits (Π) in nominal output (pY) is determined by the mark-up (equation 2). The mark-up and hence the profit share may become elastic with respect to the interest rate, because the mark-up has to cover interest costs of the firms. The profit rate (r) relates the annual flow of profits to the nominal capital stock (equation 3).

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).[13] Introducing interest payments into the model, profit splits into profit of enterprise (Π^n) and rentiers' income (Z) (equation 4). Rentiers' income is determined by the stock of long-term credit (B) granted to firms and the exogenously given rate of interest (i), with the latter being mainly determined by central bank policies, as argued above. Equation (5) defines the debt-capital ratio (λ) as an indicator for firms' indebtedness.

We assume a classical saving hypothesis, i.e. workers do not save. The part of profits retained is completely saved by definition. The part of profits distributed to rentiers' households (directly or through banks), i.e. the interest payments, is used by rentiers' households according to their propensity to save (s_Z).[14] 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 (6) which relates total saving to the nominal capital stock.

Equation (7) for the accumulation rate (g) relating net investment (I) to the capital stock follows the arguments in Kalecki (1954). It is assumed that investment decisions are

[13] The distinction between short-term finance for production purposes and long-term finance for investment purposes, not dealt with in the present chapter, can be found in the monetary circuit approach (Graziani 1989, 1994, Hein 2008, Lavoie 1992a, pp. 151-169, Seccareccia, 1996, 2003).

[14] In order to simplify the model we assume that there are no costs and no profits in banking and that commercial banks distribute the interest payments they receive from firms completely to the rentiers' households.

positively affected by animal spirits (α), by expected sales and by retained earnings. Expected sales are determined by the rate of capacity utilisation. Retained earnings, in relation to the capital stock, are given by the difference between the rate of profit and the rate of interest times the debt-capital ratio. Therefore, the rate of interest and the debt-capital ratio both have a negative impact on investment because they adversely affect internal funds. This also limits the access to external funds on imperfect capital markets, according to Kalecki's (1937) 'principle of increasing risk'.

For analytical purposes we will distinguish between a short-run goods market equilibrium, for which we take the firms' debt-capital ratio as given, and a medium-run equilibrium, for which the debt-capital ratio is determined endogenously.

3.2 The short-run goods market equilibrium

The goods market equilibrium is determined by the equality of saving and investment decisions in equation (8). The goods market stability condition in equation (9) requires that the saving rate responds more elastically to changes in capacity utilisation than capital accumulation does. In what follows we will assume that this condition is fulfilled.

$$g = \sigma, \tag{8}$$

$$\frac{\partial \sigma}{\partial u} - \frac{\partial g}{\partial u} > 0 \quad \Rightarrow \quad (1-\tau)\frac{h}{v} - \beta > 0. \tag{9}$$

Taking the debt-capital ratio as given in the short run, the goods market equilibrium values (*) for capacity utilisation, capital accumulation and the rate of profit are as follows:

$$u^* = \frac{i\lambda(1-s_Z-\tau)+\alpha}{\frac{h}{v}(1-\tau)-\beta}, \tag{10}$$

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

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

3.3 The medium-run equilibrium

In order to determine the medium-run equilibrium value for the debt-capital ratio and the rate of capital accumulation, we start with equation (5), and for simplicity we assume away inflation, i.e. the mark-up may change but not the price level. This implies – somewhat unrealistically – that nominal wages fall when mark-ups rise. For the growth rates of the variables it therefore follows from equation (5):

$$\hat{\lambda} = \hat{B} - \hat{K} = \hat{B} - g. \tag{13}$$

Given our assumptions above, the additional credit granted in each period ($L = \Delta B$) is equal to rentiers' saving in this period:

$$\Delta B = S_Z = s_Z i B. \tag{14}$$

For the growth rate of debt it follows:

$$\hat{B} = \frac{\Delta B}{B} = s_Z i. \tag{15}$$

In equilibrium the endogenously determined debt-capital ratio has to be constant, i.e. $\hat{\lambda} = 0$. Integrating this condition into equation (13) and making use of equations (11) and (15) we get for the medium-run equilibrium value (**) of the debt-capital ratio:

$$\lambda^{**} = \frac{s_z i\left[\frac{h}{v}\left(1 - \tau\right) - \beta\right] - \alpha\frac{h}{v}}{i\left[\beta\left(1 - s_Z\right) - \tau\frac{h}{v}s_Z\right]}. \tag{16}$$

This medium-run equilibrium will be stable, if $\frac{\partial\hat{\lambda}}{\partial\lambda} < 0$. Making use of equation (13) and applying equations (11) and (15) yields:

$$\frac{\partial \hat{\lambda}}{\partial \lambda} = \frac{-i\left[\beta(1-s_Z) - \tau\frac{h}{v}s_Z\right]}{\frac{h}{v}(1-\tau)-\beta}. \tag{17}$$

From this it follows for the stability condition:[15]

$$\frac{\partial \hat{\lambda}}{\partial \lambda} < 0, \text{ if } : \beta(1-s_Z) - \tau\frac{h}{v}s_Z > 0. \tag{17'}$$

The medium-run equilibrium will hence tend to be stable, if the rentiers' saving propensity is low and investment decisions are very elastic with respect to capacity utilisation but very inelastic with respect to internal funds. Stability of the debt-capital ratio requires that a rise in this ratio is accompanied by a rise in the rate of capital accumulation, because long run stability from equation (17') is tantamount to $\frac{\partial g^*}{\partial \lambda} = \frac{i\left[\beta(1-s_Z) - \tau\frac{h}{v}s_Z\right]}{\frac{h}{v}(1-\tau)-\beta} > 0$ derived from equation (11), assuming the interest rate to be positive and given.[16] However, if the rentiers' saving propensity is rather high and investment decisions are very inelastic with respect to demand but very elastic with respect to internal funds, the medium-run equilibrium debt-capital ratio will tend to become unstable.[17]

For the medium-run equilibrium rate of capital accumulation which is associated with a constant debt-capital ratio ($\hat{\lambda} = 0$), we obtain from equations (13) and (15):

$$g^{**} = s_Z i. \tag{18}$$

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[15] Note, that the stability of the goods market equilibrium implies $(h/v)(1-\tau)-\beta > 0$.

[16] And if $\frac{\partial g^*}{\partial \lambda} > 0$, this implies that $\frac{\partial g^*}{\partial i} > 0$, which is also derived from equation (11), and hence the 'puzzling' case in the face of a change in the rate of interest. For an extensive analysis of the effects of changes in the rate of interest on the goods market equilibrium and on the debt-capital ratio in this model see Hein (2006).

[17] The conditions for medium-run instability are associated with 'normal' negative effects of interest rate hikes on capacity utilisation, capital accumulation and the profit rate, as can be derived from equations (10) – (12).

This medium-run equilibrium rate of capital accumulation can be termed the 'warranted rate' (g**), because it is the rate of accumulation which is required for the constancy of the debt-capital ratio. However, it is by no means guaranteed that the goods market equilibrium rate of capital accumulation (equation 11) will adjust to that rate:

a) In the medium-run stable case, in which $\beta(1-s_Z)-\tau\frac{h}{v}s_Z>0$, a deviation of g* from g** will be self-correcting: If g* > g**, λ will fall according to equation (13) and this will feed back negatively on g* in equation (11), adjusting g* to g**. If g* < g**, λ will rise according to equation (13) and this will feed back positively on g* in equation (11), adjusting g* to g**.

b) In the medium-run unstable case, in which $\beta(1-s_Z)-\tau\frac{h}{v}s_Z<0$, a deviation of g* from g** will cumulatively accelerate: If g* > g**, λ will fall according to equation (13) and this will feed back positively on g* in equation (11), making g* deviate even further from g**. If g* < g**, λ will rise according to equation (13) and this will feed back negatively on g* in equation (11), making g* deviate even further from g**.

Our 'warranted rate' of accumulation is thus reminiscent of Harrod's (1939) 'warranted rate of growth'. However, in our case it is neither related to the goods market equilibrium, nor to desired capacity utilisation, but to a constant debt-capital ratio of the firm sector.

3.4 The effects of an increase in animal spirits

Having so far outlined the model properties, we are now in a position to discuss the effects of a rise in firms' inducement to accumulate which will be accompanied by an increase in the demand for investment finance and hence for credit. Let us assume that animal spirits (α) in the accumulation function (7) increase. This has positive effects on firms' investment decisions and, with a given debt-capital ratio and stable goods market equilibria in the short

run, the increase in animal spirits will positively affect the short-run goods market equilibrium rate of capital accumulation in equation (11):[18]

$$\frac{\partial g^*}{\partial \alpha} = \frac{\frac{h}{v}}{\frac{h}{v}(1-\tau)-\beta} > 0 . \tag{19}$$

Considering the medium-run effects on the debt-capital ratio we obtain from equation (16):

$$\frac{\partial \lambda^{**}}{\partial \alpha} = \frac{-\frac{h}{v}}{i\left[\beta(1-s_Z)-\tau\frac{h}{v}s_Z\right]} . \tag{20}$$

For the discussion of the effects of increasing animal spirits on the debt-capital ratio we have to distinguish between the medium-run stable and the unstable case. For the medium-run stable debt-capital ratio we have $\beta(1-s_Z)-\tau\frac{h}{v}s_Z > 0$ and hence:

$$\frac{\partial \lambda^{**}}{\partial \alpha} = \frac{-\frac{h}{v}}{i\left[\beta(1-s_Z)-\tau\frac{h}{v}s_Z\right]} < 0 . \tag{20'}$$

For the medium-run unstable case we have $\beta(1-s_Z)-\tau\frac{h}{v}s_Z < 0$ and hence:

$$\frac{\partial \lambda^{**}}{\partial \alpha} = \frac{-\frac{h}{v}}{i\left[\beta(1-s_Z)-\tau\frac{h}{v}s_Z\right]} > 0 . \tag{20''}$$

Finally, we obtain for the overall effect of an increase in animal spirits on the medium-run equilibrium capital accumulation, the warranted rate of accumulation, from equation (18):

$$\frac{\partial g^{**}}{\partial \alpha} = 0 . \tag{21}$$

[18] Also the effects of an increase in animal spirits on the goods market equilibrium rates of capacity utilisation and profit in equations (10) and (12) are positive, if the debt-capital ratio is taken as given and only stable goods market equilibria are considered.

The warranted rate of growth therefore remains unaffected by a change in animal spirits.

As equation (20') shows, in the medium-run stable regime an increase in animal spirits and in the short-run goods market equilibrium rate of capital accumulation will be associated with a decrease in the medium-run equilibrium debt-capital ratio. Firms' indebtedness will not be increasing but decreasing in this case. We will see, at least temporarily in the process towards the new medium-run equilibrium, a macroeconomic 'paradox of debt', i.e. rising rates of capital accumulation and falling debt-capital ratios.[19] Therefore, there is no reason to assume that the loan rate of interest will increase in this case. However, the decrease in the debt-capital ratio will finally feed back negatively on the goods market equilibrium rate of growth which will adjust to the unchanged warranted rate of growth.

For the medium-run unstable case equation (20'') shows that an increase in animal spirits and in the short-run goods market equilibrium rate of capital accumulation will be associated with a rising medium-run equilibrium debt-capital ratio. Therefore, this seems to be a case for a rising loan rate of interest due to increased firms' indebtedness. However, the instability of the medium-run debt-capital ratio in this case, discussed in the previous section, has to be taken into account. Let us assume that the economy is initially in medium-run equilibrium by a fluke. An increase in the equilibrium debt-capital ratio in the face of increasing animal spirits means that the actual debt-capital ratio will fall short of the new equilibrium. This will cause further deviations of the actual from the equilibrium debt-capital ratio and thus falling debt-capital ratios. Simultaneously, the increase in animal spirits will make the goods market equilibrium rate of capital accumulation exceed the warranted rate of accumulation. The rate of accumulation will therefore cumulatively deviate from the warranted rate. The disequilibrium process will thus be characterised by the macroeconomic 'paradox of debt': rising rates of capital accumulation will be accompanied by falling debt-

[19] On the 'paradox of debt' in Kaleckian distribution and growth models see Steindl (1952, pp. 113-122), Dutt (1995), Lavoie (1995) and Hein (2006a, 2007, 2008).

capital ratios. Again, rising capital accumulation will not be associated with rising firms' indebtedness and hence there is no reason for rising loan rates of interest if we take a macroeconomic perspective on the matter.

4. Conclusions

We have reviewed the main arguments put forward against the horizontalist view of endogenous credit and money and an exogenous rate of interest under the control of monetary policies. We have argued that the structuralist arguments put forward in favour of an endogenously increasing interest rate when investment and economic activity are rising, due to increasing indebtedness of the firm sector or decreasing liquidity in the commercial bank sector, raise major doubts from a macroeconomic perspective. Therefore, we have examined the effect of an increasing inducement to accumulate on the debt-capital ratio of the firm sector in a simple Kaleckian distribution and growth model. We have shown that the model does not generate a stable positive relationship between capital accumulation and firms' indebtedness which could give rise to endogenously increasing loan rates of interest due to rising risk and liquidity premia of banks and monetary wealth holders. On the contrary, rising (falling) capital accumulation may be associated with a falling (rising) debt-capital ratio for the economy as a whole and hence with the macroeconomic 'paradox of debt'.

From the perspective of Kalecki's (1937) 'principle of increasing risk', for the individual firm increasing demand for credit may be associated with increasing indebtedness and hence increasing lender's and borrower's risk which may cause an increase in the loan rate of interest from a microeconomic perspective. However, from a macroeconomic perspective increasing spending of firms financed by means of credit means increasing investment and hence also increasing realized profits. Therefore, an increasing debt-capital ratio for the firm sector as a whole is by no means necessary. On the contrary, if the 'paradox

of debt' prevails Kalecki's 'principle of increasing risk' will become irrelevant at the macroeconomic level, as was already noticed by Kalecki (1937) himself.

A similar argument as for firms' indebtedness applies to the liquidity position of commercial banks when credit supply is increased (Lavoie 1996). An increase in long-term loans relative to short-term deposits does not necessarily cause rising loan rates due to the perceived problem of decreasing liquidity on part of the commercial banks. Rising loans mean rising deposits, the spending of which will remain within the banking sector. Individual banks may face liquidity constraints, but the banking sector as a whole will not, as long as the demand for central bank money remains constant. However, increasing credit may be associated with increasing demand for central bank money, too. In this case commercial banks will face liquidity problems, if the central bank is not willing to accommodate increasing demand for reserves at a given rate of interest, and the loan rate of interest will have to rise. This increase in interest rates, however, is caused by central bank policies and not by the commercial bank sector. It is tantamount to an increase in the central bank's base rate, that is an upwards shift in the central bank's horizontal supply curve of reserves.

Summing up, the treatment of the rate of interest as an exogenous macroeconomic distribution parameter in Post-Keynesian distribution and growth models seems to be well founded. The central bank determines the base rate of interest and, with the degree of competition in the banking sector, expectations, liquidity preference and hence commercial banks' mark-up constant, the central bank also determines the loan rate of interest. Of course, expectations and liquidity preferences may change in the process of time, and thus may the spread between the base rate and the loan rate. And if sudden increases in liquidity preferences occur, they may limit the capacities of the central bank to lower loan rates of interest in the short run. And there may also be short-run inversions in the yield curves, as is usually witnessed in economic recessions. However, there is no reason to believe in a necessary increase of liquidity and risk premia when economic activity and the volume of

credit expand, and hence there is no reason to necessarily believe in rising credit supply curves in the macroeconomic interest rate loan space.

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