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FEATURES OF A
REALISTIC BANKING SYSTEM
WITHIN A POST-KEYNESIAN
STOCK-FLOW CONSISTENT MODEL

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Features of a realistic banking system within a post-Keynesian stock-flow consistent model

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1. INTRODUCTION

This paper presents some of our work in progress. More specifically, our purpose here is to present one block of the main two chapters of the monograph that we are writing, the block that deals with the banking system. The manuscript is provisionally called *Monetary Economics: An Integrated Approach to Money, Credit, Production, Income and Wealth.* As is clear from the title, the objective of the book is quite ambitious. We wish to integrate production to various aspects of monetary analysis, including income, credit, money and wealth. To do so, we need to link the aggregates with which standard macroeconomic analysis is concerned to the financial aggregates, which are usually the purview of flow of funds analysis, including balance sheets.

Our analysis is based on a few principles: (i) All financial stocks held as assets by one sector must have a counterpart liability within some other sector; (ii) Transaction flows must take into account revenues, expenditures, as well as changes in financial stocks; (iii) All inflows and outflows (sources and uses of funds) must be accounted for within a matrix (the transactions flow matrix), and there cannot be any black holes; (iv) Changes in balance sheets (changes in the value of stocks) must be accounted for either by flows (from the transactions flow matrix), or by appreciation; (v) All sectors must fulfill their balance sheet constraint, in expected and in realized form; (vi) Inflation accounting must be right; (vii) Inventories accounting, if they exist, must be right; (viii) the quadruple entry principle must hold: any change generates a change in at least four cells of the transactions matrix. This gives rise to stock-flow consistent macroeconomics, with several sectors. This was also the goal of Tobin (1982), as he presented it in his Nobel Prize lecture, but we believe that we go at least one step beyond him.

The two main chapters contain several blocks: there is a production block, tied to the behaviour of firms; a consumer block, tied to the behaviour of households; a government block, tied to the behaviour of the government per se; there is also a central bank block, and finally a block that deals with private banks. For simplicity, other financial institutions are omitted. This is understandable. The first main model by itself contains 75 equations, while the second model is approximately twice as big.

In the first of the two main chapters, the private bank block is based on the approach, which is to be found in the *Cambridge Journal of Economics* article of Godley (1999) and in Godley (1997). This block is very much under control, and its behaviour is well understood. In the second of the main chapters, more realistic features are introduced, and this is the work, which is still in progress.

The outline of the paper is the following. In the first section, I present what we believe to be essential differences between the neoclassical approach to banking, as can be found in the work of Tobin, and what we consider to be a post-Keynesian approach to banking. This alternative theory of banking, along with the links between the banks and the central bank, is of course how the present paper relates with the important work of Basil Moore (1988). In the second section, we go over the approach to banking taken in Godley (1999), along with the mechanisms that explain the behaviour of the interest rates administered by banks. In the third section, more realistic features are introduced, and the difficulties and consequences of these are outlined.

2. POST-KEYNESIAN VERSUS NEOCLASSICAL VIEWS OF BANKING

At the heart of our model is a principle, which is of great importance if any degree of realism is to be introduced. All economic sectors need buffers that provide an adjustment factor. This is because the expectations of agents are usually not being fulfilled, so that agents need to adapt to situations that were not correctly foreseen. In the real world, there needs to be an immediate automatic adjustment, that precedes reaction functions, which provide the more gradual adjustment that takes time to fully operate. So all sectors must include some buffers, that will provide an automatic and immediate response to disequilibria, when it is too late to do anything about it within the period; in addition, there need to be reaction functions, that will provide the disequilibrium dynamics, and which will act from period to period, hopefully providing the dynamics that will get back the sector towards the levels or the rates which are being targeted.

In the case of production firms, inventories are one of these buffers, more specifically the unexpected fluctuations in inventories. In addition to this current account buffer, bank loans also provide a buffer on the capital account of firms. Banks thus play a key role in post-Keynesian stock-flow consistent models.

Households also have buffers. Households have expectations about revenues, expenditures and wealth. It is assumed that money deposits act as the buffer whenever expectations are not met. If revenues are lower than expected, for instance, this will show in the banking deposit account of households.

Governments have a buffer as well. Whenever tax revenues are insufficient to cover government expenditures, governments issue securities – bills or bonds. The quantity of securities issued or retired constitutes the government buffer. On the other hand, central banks play the role of a buffer for the entire economy. Central banks are the residual purchasing sector of Treasury bills. They also provide advances to the private banking sector, on demand, when such advances are required, as is usually the case in Continental Europe and in most other economies of the world. At a more refined level, which will not be dealt with here, the central bank also acts as a buffer within the settlement system, by providing day overdrafts when banks complete their inter-banks transactions.

Finally, as can be implied from the above, private banks also benefit from a buffer. In the anglo financial systems, the so-called asset-based financial systems, the quantity of Treasury bills held by private banks is the main buffer. In Continental Europe, advances obtained from the central bank are the main buffer.

The presence of buffers is a key feature of monetary production systems. They prevent gridlock. Buffers provide the flexibility, which is required by any well functioning capitalist system.

This buffer role also helps to explain the role of banks within a post-Keynesian approach. By contrast, one could say that there is neither need nor place for buffers in the neoclassical world; indeed their presence destroys the equilibrium condition on which neoclassical economics critically depends.

Table 1 below helps to explain the main differences between a post-Keynesian bank and a neoclassical bank. The post-Keynesian features either arise from what has been said above or will be explained in the next section. We leave to the reader to decide whether previous efforts to model post-Keynesian banks fit within the proposed table (Palley 1987-88; Dymski 1988, Moore 1988, ch. 3; Heise 1992; Wray 1989; Wray 1992; Screpanti 1997; Chick and Dow 2002).

Table 1: PK vs Neoclassical banks	
Post-Keynesian banks	Neoclassical banks
The crucial role of the banking system is to provide loans, which are systemically required if production takes time and sales cannot be predicted; its secondary role is to provide a well-functioning payments system	Banks are intermediaries and asset allocators
Banks accept all deposits	Banks make asset and liability choices
Banks provide all credit-worthy loans	Banks have supply functions of deposits and loans
Banks set deposit rates	Deposit rates clear the deposit market
Loan rates are marked-up over deposit rates	Loan rates clear the loan market

3. A FIRST-STEP BANKING SECTOR

3.1 The balance sheet constraints of the banking sector

To understand the behaviour of post-Keynesian banks, it is best to start from the following balance sheet matrix. All elements with a positive sign are an asset of the sector; all negative signs are a liability of the sector. As in all such stock matrices, there is a residual balance, which insures by definition that the sum of each column is zero. Any financial asset must have a counterpart financial liability, so that all rows, except the one devoted to tangible capital (here *IN* for inventories), must sum to zero as well. In Table 2, for simplification, loans to consumers have been omitted, and so have the financial assets of firms. Table 2 describes a pure asset-based financial system, akin to the financial systems that can be found in the major anglo countries such as the UK or the US. There is a stock of high-powered money (HPM), divided into cash balances H_h held by households and the reserves H_b held by private banks. There are checking deposits *M1* and time deposits *M2* held by households. Treasury bills *B* are held by households, private banks and the central bank. Long-term securities, bonds *BL*, are assumed to be held by households only, and their price is p_{bL}. And finally,

banks make loans L to firms. Since the profits of firms and private banks are all assumed to be redistributed to households, while the profits of the central bank are given back to the government, these three sectors have zero net wealth. The net wealth of households is V_h, while that of government is $-GD$; in other words, the debt of government is GD. The net wealth of the entire economy is equal to the value of inventories IN since fixed capital is assumed away here.

We now focus on the balance sheet constraint of the banking sector. From Table 1, it can be written as:

$$(1) \qquad B_{bd} = M1_s + M1_s - L_s - H_{bd}$$

Banks are assumed to provide loans L_s and money deposits (current accounts $M1_s$, and time deposits $M2_s$) on demand. Banks also need to acquire reserves H_{bd} from the central bank (in general, s subscripts stands for supply and d subscripts stand for demand). Since banks have no capital of their own (no net wealth), there is only one free element, the amount of bills held by banks. This is the only element of the banks' balance sheet, which is not predetermined. The amount of bills held by banks thus will normally fluctuate, depending on the evolution of the other elements of the balance sheet.

A second possibility is to have an overdraft financial system, as in Continental Europe. In this case, the banks hold no Treasury bills. On the contrary, they get advances A at cost r_a from the central bank, i.e., the central bank provides loans to the private banks. This system is illustrated with the balance sheet matrix of Table 3. In this pure overdraft system, the balance sheet constraint of the banking sector becomes:

$$(2) \qquad A_{bd} = Ls + H_{bd} - M1_s - M2_s$$

In this case, the buffer of the banking system is made up of the advances A_{bd} being demanded by the banking system from the central bank. If the system is to function well at all, the advances must be provided whenever they are needed. In addition, the banks need to accept to go into debt vis-à-vis the central bank. Such a system may arise if households are holding a large proportion of their money holdings in the form of cash, or if reserve ratios on money deposits are high.

Naturally we can have a mix of the two systems, with banks possibly holding bills while simultaneously piling up advances as part of their liabilities. This could be the case if banks faced a compulsory secondary reserve ratio, for instance a required bills to deposits ratio.

Whatever is the case, in fully consistent systems, there is always a hidden equation in the model, an equation which is not to be found explicitly in the model, but which will always turn out to be true. In our model, taking into account all blocks, this hidden equation is:

$$(3) \qquad H_{bs} = H_{bd}$$

Equation (3) simply says that the supply of reserves is equal to the demand for reserves. It implies that reserves are supplied on demand. The central bank is always fully responding to the demand for reserves of the banking system, as was underlined by Moore (1988). This requirement arises out of necessity from the conditions imposed on the rest of the model.

3.2 The banking liquidity ratio

A certain number of post-Keynesians have recently emphasized the fact that while banks may provide loans on demand to credit-worthy borrowers, or may provide deposits on demand, they may exhibit liquidity preference (e.g., Bibow 2000). What is meant by liquidity preference is not always clear, but here two meanings can be established. First, higher liquidity preference by banks may mean that banks set up tougher standards when granting loans. This I believe, can best be reflected within the investment function of firms, by modifying the autonomous component or by raising the (absolute) value of the coefficient attached interest payments or to the leverage ratio of firms. This is congruent with Wolfson's (1996, 2003) interpretation of credit rationing, whereby the creditworthy demand for credit is shifted downwards (also see Lavoie 1992, p. 178). The second meaning of liquidity is to imply that banks wish to hold a certain proportion of their assets in the shape of safe Treasury bills. This is the meaning that will be entertained here. When the liquidity preference of banks is on the rise, they wish to hold a higher proportion of safe assets.

Let us assume then that banks target a certain bills to loans ratio, or what comes almost to the same, a certain bills to money deposits ratio. Let us assume that such a ratio needs to be realized in all periods, with no adjustment lag. Then, clearly, from what has been set about equation (1), such a ratio could not be achieved in general. If banks have self-imposed bills to loans ratios that must be achieved instantaneously, there has to be some buffer variable that will absorb shocks. This buffer variable can only be advances from the central bank. Thus, in a world where the demand for bills by banks is predetermined by the other elements of the balance sheet (loans and deposits), advances must be the buffer element, and the balance sheet constraint of banks become:

(4) $\qquad A_{bd} = B_{bd} + L_s + H_{bd} - M1_s - M2_s$

This is the mechanism adopted by Zezza and Dos Santos (2004). If banks wish to hold more bills, everything else being equal, they will need to borrow more from the central bank. Godley (1999) however proposes another mechanism, which is based on a reaction function and takes time to fully operate, based on an endogenous deposit rate. In Godley's view, deposit and loan rates are not market clearing in any way; still they may be endogenous.

Godley considers that banks have a *target banking liquidity ratio* (*BLR* ratio). This ratio is given by the bills/deposits ratio. This is a kind of non-compulsory secondary reserve ratio. It is nearly the converse of Alfred Eichner's (1985) *degree of liquidity pressure*, which is a loans/deposits ratio. Godley's *BLR* ratio must be within a certain range, between *bottom* and *top*, within a short time frame, but in the short run the actual banking liquidity ratio may turn out to be outside its normal range.

How do banks react when they find out the actual banking liquidity ratio is not on target? Banks can only act upon incentives. When banks have an insufficient amount of bills relative to their liquidity preference, they increase the interest rates on deposits, and so induce households to trade their Treasury bills for bank deposits (mostly time deposits). This allows banks to recover a proper bills to deposits ratio, by increasing both the numerator and the denominator of the banking liquidity ratio by the same amount (by increasing their overall balance sheet, with both bills and deposits

rising). Since bills represent only a small percentage of deposits, the ratio will rise. Conversely, when banks consider that they hold excessive amounts of bills, they will reduce deposit rates.

In the simple model, it is assumed that interest rates on bank loans are marked-up over deposit rates. This implies that any change in the deposit rate will be reflected in loan rates. Hence an increase in deposit rates, following an insufficient bills to deposits ratio or an insufficient bills to loans ratio, will give rise to an increase in lending rates, which in theory should reduce the demand for inventories and hence the demand for loans arising from the production sector. This should also help to recover the proper banking liquidity ratio.

Deposit rates (and lending rates) will rise as long as the actual banking liquidity ratio will stay below the bottom of the target range; similarly, deposit rates (and lending rates) will diminish as long as the actual banking liquidity ratio will stay above the top of the target range. These movements will occur under the following additional two conditions. When deposit rates are rising, they face a ceiling: they cannot be any higher than bill rates, otherwise there would not be any purpose for households to hold Treasury bills since they are less liquid than bank deposits. Also, there is a floor to falling lending rates: they cannot be any lower than the rate on bills, for otherwise there wouldn't be any reason for making loans, since such an asset is always more risky than a Treasury bill. There is thus a hierarchy of interest rates: the lowest is the deposit rate, the highest is the lending rate, while the Treasury bill rate ought to be in between (Godley and Cripps 1983, p. 160; see also Chick and Dow 2002, p. 596). As a result, with the central bank setting the Treasury bill rate, we can say that the monetary authorities have a fairly strong influence over the deposit and lending rates that will be charged by the private banking system.

What occurs when the deposit rates rise to the level of the Treasury bill rate, or when the lending rates fall to the level of the bill rate? In these conditions, we may say that the target banking liquidity ratio constitutes a convention that is inadequate system-wide. The convention just cannot be met, and hence will need to be changed. Thus we can say that the model incorporates a necessary evolutionary component. As the spread between the lending rate and the bill rate shrinks, the banks need to increase their target banking liquidity ratio. Similarly, as the spread between the bill rate and the deposit rate gets near zero, the banks need to reduce their target banking liquidity ratio. Indeed, this is what has been observed by Eichner (1985). In his empirical work, Eichner notes that the actual degree of liquidity pressure *relative to trend*, rather than the absolute level of this ratio, explains the evolution of interest rates.

There is another possible exit door from the fact that the target banking liquidity ratio is inadequate system-wide. When deposit and lending rates are rising, the private banks may decide instead to borrow funds from the central bank, if such advances are easily being provided. The advances will allow the banks to purchase the bills they long for. Indeed the bills will now be provided by the central bank, in what looks like a kind of open-market operation. In a pure asset-based financial system, where central bank advances are not so well tolerated, a market-based escape hatch will be provided by the presence of commercial paper. Whenever lending rates (and deposit rates) rise relative to Treasury bills, firms will start issuing commercial paper, which households will add to their portfolio. Conversely, when lending rates fall to low levels, firms will retire commercial paper. This additional market-based financial asset will add a degree of flexibility to the financial system, and will help the banking system to achieve its target liquidity ratio, generating a more horizontalist system.

3.3 An experiment: the effects of an increase in the compulsory reserve ratio

As a way of illustrating the functioning of the mechanisms associated with the target banking liquidity ratio, let us make an experiment with the first main model of the manuscript (other experiments are provided in Godley (1999) and Lavoie (2001); all simulations were carried out using MODLER software). This will also help us understand how a formal model based on endogenous money is different from the standard verticalist story questioned by Moore (1988). Let us see what happens when the central bank imposes an increase in the compulsory reserve ratio. In the model described in elementary textbooks and even in intermediate macroeconomics or in money and banking courses, such an increase in the compulsory reserve ratio is said to lead to a brisk decrease in the supply of money. This arises from two features of textbook neoclassical analysis: the stock of high-powered money is said to be under the control of the central bank, and a stable relationship between high-powered money and money is presumed to exist. By contrast, in our model, the supply of high-powered money responds endogenously to demand, and the central bank sets the rate of return on Treasury bills.

In the experiment, the compulsory reserve ratio on all deposits is assumed to rise from 10% to 15% – a 50% change in that statutory ratio. The first figure shows that the immediate impact of the increase in the reserve ratio is an equivalent increase in the amount of reserves being held by private banks (all lines of the first figure measure differences compared with the original steady state). As argued in section 2, Treasury bills act as a buffer, and they absorb the shock on required reserves being inflicted by the central bank. The figure shows that banks obtain the additional reserves by initially selling their Treasury bills to the central bank (which will then engage in accommodating open market operations, if it wishes to keep constant the Treasury bill rate). There is no change whatsoever in the stock of money in the first period following the change in the reserve ratio.

In the following periods, the liquidity mechanism described above kicks in. Banks wind up with a banking liquidity ratio (called the bills ratio in the second figure) which falls below the floor of the target range, the range being shown by the two fully horizontal lines of the second figure. This induces rising deposit rates and lending rates. The rising deposit rates induce a portfolio change, with households gradually holding more bank deposits and less Treasury bills, which are purchased by the banks. On the hand, the rising lending rates induce firms to reduce their target inventory to sales ratio, and as a result, their needs for bank loans diminishes, which is illustrated in the first graph by a fall in the quantity of outstanding loans. There is thus a gradual change in the balance sheet of the banks. In the present case, there is a relative increase in money deposits and a relative fall in loans to the production sector. The increase in the compulsory reserve ratio has actually led to an increase in the money supply, not a reduction of it!

The balance sheet of the banking sector is modified until finally deposit and lending rates stop rising. This occurs when the actual banking liquidity ratio is back within its target range. As can be seen in the second figure, the actual banking liquidity ratio (the bill ratio) remains constant when it is to be found between the two horizontal lines representing the floor and the ceiling of the target liquidity ratio. At that stage, the deposit rate stops rising and remains constant.

In this model, the increase in the compulsory reserve ratio does not reduce the money supply; it only leads to higher deposit and lending rates, relative to the assumed constant Treasury bill rate. It should be pointed out that even this effect would have been avoided if banks did not respond to the fall in their actual bill to deposit ratio.

4. A MORE REALISTIC POST-KEYNESIAN BANKING SECTOR

4.1 General features of a more realistic banking sector

Despite its original features, the bank model, which has been presented, in the previous section is still a long way from depicting the main features of an actual banking system. In the manuscript, we have tried to go beyond the banking sector that was described in the Godley (1999) model. This more realistic banking sector incorporates the following features:

·   Banks issue equity
·   Banks have retained earnings and net worth
·   Banks may take advances from the central bank
·   Banks face a BIS-imposed capital adequacy ratio (*CAR*)
·   Banks have labour costs
·   The markup that defines lending rates over deposit rates is endogenous
·   Banks make loans to consumers
·   Firms can issue commercial paper
·   Firms can hold financial assets

While all these additional features would seem rather obvious, incorporating them into a fully-coherent model is sometimes a daunting task, and it can generate instabilities. In what follows, we identify some of the issues that we encountered as we added these realistic features.

The first issue is that of the balance sheet of the banking sector. Compared to Tables 2 and 3, things are now more complicated as a result of the role of the BIS-imposed capital adequacy ratio – the so-called Cook ratio. One needs to keep track of the evolution of the own funds of the banking system. One has to devise two balance sheets for the banking system, rather than a single one. These two balance sheets are shown in Table 4. The balance sheet on the right is in line with the overall macroeconomic balance sheet matrix, and insures that all rows of financial assets sum to zero. The balancing item, noted V_b, insures that the column of the banking sector, like all other columns, sums exactly to zero. This balancing item, which is the net worth of the banking system from a system-wide point of view, may be positive or negative. Indeed, it could be negative when the stock-market value of the shares issued by banks $eb.p_{eb}$ is high (eb is the outstanding number of shares issued by banks while p_{eb} is the price of each share). This balancing item plays no role in the behavioural equations.

Hence, we now need a second balance sheet, to be found on the left-hand side of Table 3, which corresponds to private accounting and which helps to keep track of the own funds of the private banks, noted OF_b. This other balance sheet provides the accounting constraint of the banks, a constraint which is similar in purpose to those described by equations (1), (2) and (4). With standard accounting, the value of the shares owned by households appears nowhere. Or rather, it is assumed that somehow the financial value of shares issued by banks are worth the residual item of the balance sheet, what accountants would call the net worth of banks, or what the BIS would call the capital of banks, and what we have called here the own funds of banks, OF_b. The own funds are the amount which, when added to liabilities, insures that the asset total and the liability total are equalized.

To be viable, a firm or a bank must have assets that are larger than liabilities, and as a result, own funds are a positive number that is entered on the liability side. In the view of the accountant, if the firm or the bank were to be dissolved, this is the amount that would be left to shareholders. If own funds were to become negative, owners would get nothing back, but despite this the firm or the bank would be unable to pay back all of its liabilities. The business is thus not solvent anymore. In the case of banks, as already pointed out, such a situation could arise if borrowers were to default on their loans. If 100 millions of these were to default, 100 millions would need to be subtracted on both sides of the balance sheet, away from L and from OF_b. The bank would then need to act in an effort to recover an adequate capital ratio, in other words it would need to find means to increase its own funds back to the required level relative to its loans. The own funds OF_b of banks are not the ultimate residual, since they are determined by the following equation:

(5) $OF_b = OF_{b-1} + FU_b + \Delta eb_s.pe_b - NPL$

This equation says that the change in the own funds of the banks is equal to the sum of their retained earnings FU_b and the proceeds of the new issues of shares, minus the amounts of non-performing loans NPL. As long as non-performing loans can be predicted, or if they are non-existent, banks will be able to achieve the level of own funds, which is consistent with the capital adequacy ratio.

The logic of the banking sector is still essentially the same as it was in the simpler model. The amount of bills held by banks is still a residual (unless, as in Zezza and Dos Santos (2004), banks want to achieve a minimal bill to deposits ratio, in which case, bank advances become the residual item when the minimal ratio is under threat). In the asset-based case, the balance-sheet constraint of the private banks, equation (1), is only modified by the addition of own funds, and now becomes:

(6) $B_{bd} = M1_s + M2_s + OF_b - L_s - H_{bd}$

4.2 An endogenous lending rate markup

In a world with explicit bank owners and compulsory capital adequacy ratios, banks need to make a definite amount of profits. They first need to cover the dividend payments, which their household shareholders view as desirable; secondly they need to augment their own funds in line with the BIS rules on capital adequacy ratios. These two profitability requirements, which determine the required dividends and the required retained earnings, for given bank labour costs and given the interest rates administered by the central bank (the Treasury bill rate and the rate of central bank advances), determine the spread between the rate of interest on loans and the rate of interest on deposits. The deposit rate is determined as in the other main model, on the basis of the target banking liquidity ratio. The values targeted by banks are given by the following equations.

The total profits targeted by banks (FU_b^T) is the sum of targeted dividends FD_b^T and retained earnings FU_b^T, the superscript T representing targets:

(7) $F_b^T = \text{FDbT} + FU_b^T$

Targeted dividends depend on a conventional rate of return r_{bd}, which is applied either to own funds or more realistically to the stock market value of bank shares (thus imposing a conventional price/earnings ratio):

(8) $FD_b^T = r_{db}.OF_{b-1}$ or $r_{db}.eb_{s-1}.pe_{b-1}$

Targeted retained earnings depend on whether capital adequacy requirements are being met. Banks need the following amount of own funds:

(9) $OF_b^T = CAR^T . L_{s-1}$

where CAR^T is the targeted capital adequacy ratio, whereas the realized Cook ratio is:

(10) $CAR = OF_b/L_s$

To achieve the target amount of own funds OF_b^T, setting aside non-performing loans for now, firms need to achieve the following amount of retained earnings:

(11) $FU_b^T = \alpha\{OF_b^T - (OF_{b-1} + \Delta eb_s.pe_b^e{}_{-1})\}$

We may assume that banks give themselves certain flexibility in achieving the capital adequacy ratio. Thus in general the reaction coefficient α will not be equal to unity. It also seems fair to assume that when actual own funds (OF_{b-1}) exceed the needed amount (OF_b^T), firms set α to zero, thus avoiding to target negative retained earnings.

Equations (7) to (11) thus yield the amount of targeted bank profits. This can be compared with the actual amount of profits that banks will make for given lending and deposit rates. Writing the lending rate r_l as a marked-up deposit rate r_m:

(12) $r_l = r_m + \xi$

we thus obtain the value that the markup spread ξ must take for realized profits to equate targeted bank profits. That spread will depend on the targeted bank profit, the bank wage bill WB_b, on relative amounts of the various assets and liabilities and their rates of return, and on the absolute amount of loans.

(13) $\xi = (1/L_{-1})(F_b^T + WB_b + r_{a-1}.A_{bd-1} - r_{b-1}.B_{bd-1} + r_m.(M2_{s-1} - L_{s-1}))$

Preliminary work on this model shows that it is much more difficult to find a reference steady state. Falling loans may actually lead to rising spreads between lending and deposit rates, because the higher average fixed costs will tend to shrink the profit base.

The addition of consumer loans may create instabilities as well, because these loans could only very partially be absorbed by rising household deposits. As a result, the presence of commercial

paper issued by producing firms becomes essential in stabilizing interest rates. The addition of financial assets held by corporations may also provide a solution to this issue.

5. Conclusion

The main purpose of the present paper was to show that it is possible to build a realistic and formal behavioural model of the banking system, based on severe accounting constraints, without relying on questionable neoclassical assumptions. This model yields results, which are substantially different from those assumed in standard neoclassical textbooks. The purpose of this exercise is not to build a unique, canonical, post-Keynesian model of the bank, but rather to pave the way for further and more extensive research that uses the method advocated here. This hopefully will help heterodox authors to make some headway, and to provide firm answers to some of the controversies that have raged over the last decades.

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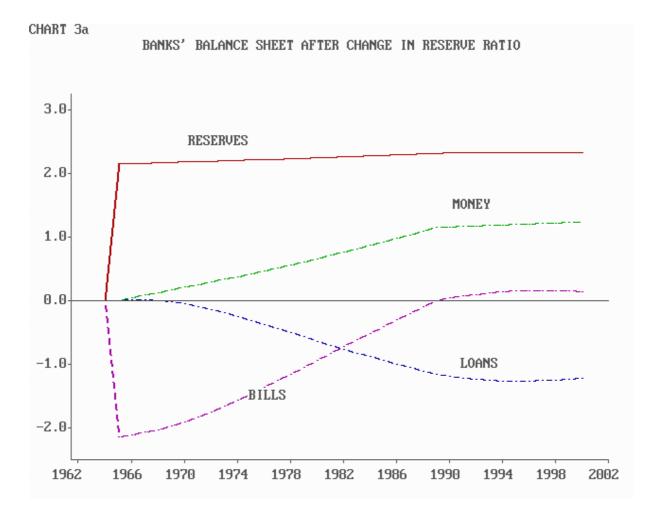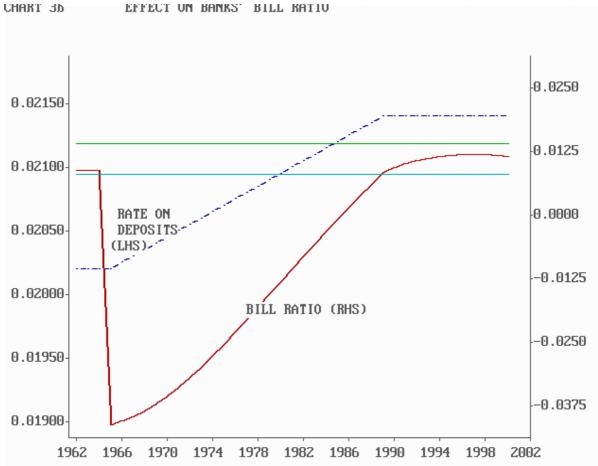
Table 2: The balance sheet of a closed economy
with a simple asset-based banking system

	Households	Firms	Govt	Central bank	Banks	Σ
Inventories		$+IN$				$+IN$
HPM	$+H_h$			$-H$	$+H_b$	0
Checking deposits	$+M1_h$				$-M1$	0
Time deposits	$+M2_h$				$-M2$	0
Bills	$+B_h$		$-B$	$+B_{cb}$	$+B_b$	0
Bonds	$+BL_h.p_{bL}$		$-BL.p_{BL}$			0
Loans		$-L$			$+L$	0
Balance	$-V_h$	0	$+GD$	0	0	$-IN$
Σ	0	0	0	0	0	0

Table 3: The balance sheet of a closed economy
with a simple overdraft banking system

	Households	Firms	Govt	Central bank	Banks	Σ
Inventories		$+IN$				IN
HPM	$+H_h$			$-H$	$+H_b$	0
Demand deposits	$+M1_h$				$-M1$	0
Time deposits	$+M2_h$				$-M2$	0
Advances				$+A$	$-A_b$	0
Bills	$+B_h$		$-B$	$+B_{cb}$		0
Bonds	$+BL_h.p_{bL}$		$-BL.p_{BL}$			0
Loans		$-L$			$+L$	0
Balance	$-V_h$	0	$+GD$	0	0	$-IN$
Σ	0	0	0	0	0	0

Table 4: The two possible balance sheets of banks			
Standard accounting		Macro-economic accounting	
Assets	Liabilities	Assets	Liabilities
B_b	$M1$	B_b	$M1$
L	$M2$	L	$M2$
H_b	A_b	H_b	A_b
	OF_b		$eb.pe_b$
Total assets = Total Liabilities		Assets - Liabilities = V_b	

BANKS' BALANCE SHEET AFTER CHANGE IN RESERVE RATIO

CHART 3b   EFFECT ON BANKS' BILL RATIO

RATE ON
DEPOSITS
(LHS)

BILL RATIO (RHS)

0.02150
0.02100
0.02050
0.02000
0.01950
0.01900

0.0250
0.0125
0.0000
-0.0125
-0.0250
-0.0375

1962 1966 1970 1974 1978 1982 1986 1990 1994 1998 2002

Working Papers