Abstract

Augusto Graziani has been a major contributor to the theory of the monetary circuit, i.e., the circulation approach to money, and he has cleared up the implications of Keynes’s finance motive. In this paper, the monetary circuit and the finance motive are introduced through a method to model monetary macroeconomics that has been advocated by Wynne Godley. The method, based on a transactions matrix, essentially makes sure that every flow goes somewhere and comes from somewhere, so that there are no black holes. The method is put to use to handle the main two stages of the monetary circuit: the creation of money, when wages are paid out, and the destruction of money, when households purchase goods and financial assets. It is shown that the monetary circuit can be more clearly understood with the help of this fully coherent accounting framework.

JEL Classification: E12, E43, E51

The Monetary Circuit and Coherent Stock-Flow Accounting

I saw and heard Augusto Graziani for the first time at the Trieste Summer School, where he lectured in 1984. I was then shocked to discover that economists from outside France also held ideas that were closely related to those presented by the various schools of the monetary circuit in France, usually associated then with the names of Alain Parguez, Frédéric Poulon, and Bernard Schmitt. Others before me had made a similar observation, since Graziani, along with many of his younger colleagues and students, had participated in a conference organized in early 1984 at the University of Nice (Arena and Graziani 1985). This conference was devoted to the circulation approach to money, which the circuitistes and other heterodox economists, from Nice and inspired by the classical tradition in particular, were putting forth as an alternative monetary economics. Indirectly, this conference eventually led to another, similar conference, at the Jerome Levy Economics Institute in 1991, where the circulation approach was confronted with its sister Post-Keynesian view of money, thus giving rise to Money in Motion (Deleplace and Nell 1996), of which Graziani (1996) was a contributor.

At the time where I first met him, Augusto Graziani was engaged into a debate on the appropriate definition of the finance motive. Graziani (1984) made the point that the finance motive applied to all production, and not just investment expenditures, and that the finance motive was relevant to the value of production, and not just to a change in the value of production. This is in contrast to what Keynes himself said in his first article on the finance motive and it also contradicts the usual post-Keynesian interpretation of the finance motive, as can be found for instance in the writings of Paul Davidson. In a sense, one can say that the finance motive is the topic of the present paper. My main goal is to show how money creation arises when there is some new economic activity, following Graziani’s description of this process.

The monetary circuit put forth by Graziani will be described and formalized by making use of a method which has been advocated by Wynne Godley (1996, 1999), based on a matrix presentation of the transaction flows and financial stocks. Although Godley himself never attempted to describe the monetary circuit by making use of his matrices, he is fully aware that his matrix approach is consistent with the monetary circuit approach developed by Graziani and the French circuitistes. Indeed, Godley presented three lectures on time and credit money, in 1988, at the University of Naples, at the invitation of Augusto Graziani (Godley 1993: 79). There is a clear interaction between these two authors: Godley (1999: 404) uses the work of Graziani (1990), and Graziani (2001: 11) refers to Godley and Cripps (1983).

The outline of the paper is the following. In the first section, the monetary circuit as outlined by Graziani will be recalled, and the
principles of the framework put forth by Godley are being presented. In the second section, a simple example, without government debt but with private money, is being discussed. This will be closest to the Wicksellian pure credit economy that Graziani himself focussed on. In the third section, government debt is introduced, first without banks, then within the context of the overdraft economy. Some implications regarding some post-Keynesian controversies are drawn as we move along.

1. The monetary circuit and the stock-flow approach

1. The monetary circuit

Graziani’s theory of the monetary circuit, although officially presented in Graziani (1989, 1990), was already clearly outlined in his 1984 finance paper (Graziani 1984). There, Graziani (1984: 7) makes clear that a pure credit economy should be analysed with the help of three sectors: firms, households, and the banking system. These are the three sectors that we shall use in our first matrix.

For Graziani (1984: 9), the economic process gets started as the banking sector grants credit to firms. Graziani calls this financement to distinguish the initial credit finance of production from the end-of-period final finance, which corresponds to the placements of the savings of households. As Joan Robinson (1956: 8) used to call them, and to the retained earnings of the firms. The initial financement is also called construction finance by Paul Davidson (1982: 48-49), while the end-of-period final finance is called investment funding. For Graziani, the initial liquidity arising from the financement must cover total production costs, namely the costs of producing both consumption and capital goods. As a result, consumption and investment are equal, the production of both requiring an amount of initial finance such as to cover total money costs. This initial finance is the additional bank debt that production firms must take on. We shall see that this first stage of the monetary circuit—the money-creation stage or the flux stage—can be formalized with the help of Godley matrices.

The second stage of the monetary circuit is the money-destruction stage, or the reflux stage. This is where final finance, or investment funding is involved. In this second stage, households spend their income on consumption goods and purchase securities on the financial markets. These two money flows allow production firms to repay part of their bank debt. As Graziani (1992: 218) says, at early point in the economic process it is the portfolio decisions of the households that set the existing amount of money in the system. The causality becomes reversed. The banks do not, and could not, collect deposits without having previously granted loans.

It should be noted that production firms will be unable to repay the entire amount of their new bank debt as long as households decide to increase their money balances. Graziani (1992: 218) is crystal clear on this issue: at early point in the economic process it is the decision of savers to keep part of their savings in money form that forces firms to ask for bank credit. In other words, the demand for deposits gives rise to a demand for loans. This result contrasts with the conventional presentation according to which deposits do not act on the demand side, but rather increase the potential supply of loans on the part of the banks.

This means that, at the beginning of the monetary circuit, the production decisions of firms lead to the creation of a flow of money balances: credit makes deposits. The decision of a bank to grant a loan gives rise to the simultaneous appearance of a deposit.... Banks do not, and could not, collect deposits without having previously granted loans. However, at the end of the period, it is the portfolio decisions of the households that set the existing amount of money in the system. The causality becomes reversed. The stock demand for deposits determines the amount of outstanding loans. The more deposits households wish to hold, the more firms will be unable to repay their bank debt, being forced to ask the banks for a renewal of the additional loans that were initially consented to them.

As Graziani (1984: 10) points out, an important time interval will occur between the first and the second stage of the monetary circuit. Between the time money is created and destroyed, various operations will be performed. In fact, between the beginning of the period (year) and the end of the period (year), production, payments, and sales will occur. This implies the existence of a certain amount of idle liquidity somewhere in the circuit. To this idle liquidity will correspond the inventories, which on average, remain on hand.

1.2 The stock-flow approach

A clear implication of Graziani’s monetary circuit is that money is endogenous and cannot be exogenous. The very same claim arises from Godley’s analysis of a monetary economy. This conclusion arises from a fully coherent accounting framework, to which are superposed behavioural equations that get the models running. A key factor is that Godley’s accounting framework provides a general fully-coherent tool, which takes into consideration the various interdependences that link income flows to changes in financial assets. Godley’s monetary economics enlighten the so-called circulation approach to money that has been advocated by Graziani, his students and the French circuitistes (Graziani 1990).

Godley’s (1996, 1999) monetary approach, which complements the circuit approach, is based on a transactions flow matrix that has the following key features. All the rows must sum to zero: they represent the flows of transactions for each asset or for each kind of flows; in addition, all the columns, each representing a sector, must sum to zero as well: they represent the budget constraint of each sector. Within this framework, the budget constraints for each sector describe how the balance between flows of expenditure, factor income and transfers generate counterpart changes in stocks of assets and liabilities. These accounts are comprehensive in the sense that everything comes from somewhere and everything goes somewhere. Without this armature, accounting errors may pass unnoticed and unacceptable implications may be ignored. With this framework, there are no black holes.

Now a feature of the transactions stock matrix used by Godley, and first proposed by Backus et al. (1980), is that if there are N rows, then...
there are only N-1 independent equations. This means that the Nth equation can be left out of the analysis. This is highly reminiscent of Walras’s Law, and indeed some authors present this feature in light of Walras’s Law. Within standard models, it is usually ascertained that the bond market (or the equity market will be left out), and that the search for supply and demand equilibrium will be conducted in the money market. This choice is not without consequences. What the money market stands for is not always clear. For instance, when money is assumed to be bank deposits, what is the supply function for deposits, i.e., An what manner do banks supply demand deposits? (Goodhart 1984: 268). In what manner can we say that the supply for and the demand of bank deposits are different from each other? It seems clear that it is much more sensible to leave out the so-called money market, and to speak of a demand and supply on the bonds market, or to speak of demand and supply on the equities market, assuming equilibria on these markets are reached quasi-instantaneously by fluctuations in asset prices.

2. A simple model with private money

2.1 The transactions flow matrix

Take as a first example the transactions flow matrix of Table 1. This matrix can be found in Lavoie and Godley (2001-2002) where it describes the accounting of a growth model. There is no government sector and no central bank, as in the Wicksellian pure credit model favoured by Graziani. Here the banking sector has been restricted to its most simple form: it is assumed that the banking sector makes no profit whatsoever. This implies that the rates of interest on loans and deposits are the same, or it implies that the profits made by the banks are entirely redistributed to the households (although banks do not issue equity!). The production sector is more realistic: it has undistributed profits and it issues shares. Households receive wages, dividends and interest payments, which they can either consume or use to purchase new assets. As in all such transactions flow matrices, all rows and all columns sum to zero. The rows describe the nominal amounts which are being exchanged from one sector to another. Similarly, the columns sum to zero and represent the budget constraint that each of the sectors must respect.

Take the perhaps less obvious case of the production sector. This sector is subdivided into a current account and a capital account. Both accounts must sum to zero. All variables with a plus sign represent a source of funds; all variables associated with a negative sign represent the use of funds. In the current account, the flows of funds arising from the sales of consumption goods and of investment goods must equate the payments on wages, interests and dividends, plus the sums that the corporations can set aside for themselves.

The matrix serves to illustrate some well-known claims by some post-Keynesians and circuitistes such as Graziani regarding credit and money. The first claim is that the demand for and the supply of money are necessarily equal; the second claim is that the amount of loans supplied by banks to firms must necessarily be equal to the amount of deposits held by households (in a simple model). The matrix of Table 1 clearly shows that this cannot be otherwise. The question is, what is the mechanism that will allow such an equality?

This question has puzzled various authors (e.g., Goodhart 1984: 232-233) for some time now, for apparently the demand for money and the supply of credit are determined by two independent mechanisms. In the Lavoie and Godley (2001-2002) model for instance, the demand for credit, at the end of the period, depends on the part of investment expenditures which has not been financed by retained undistributed profit, share issues, and new borrowing from the banks.

The notations are the following: \( p_e \) is the price of equities, \( e_d \) is the unit number of equities which are demanded; \( Y_{hr} \) is the expected regular income, \( V^* \) the expected wealth, \( r_m \) is the rate of interest on money deposits set at the start of the period, and \( r_{e(-1)} \) is the rate of return on equities which includes both the dividend yield and the capital gain obtained in the previous period; \( \alpha \) are parameters, with \( \alpha_0 \) representing the share wealth that households would like to hold in the form of equities if the rates of return and the income level played no role.

The fact that these mechanisms appear to be totally independent has led some authors to claim that there could be a discrepancy between the amount of loans supplied by banks to firms and the amount of bank deposits demanded by households. This view of the money creation process is however erroneous. It omits the fact that while the credit supply process and the money holding process are apparently independent, they actually are not, due to the constraints of coherent macroeconomic accounting. In other words, the decision by households to hold on to more or less money balances has an equivalent compensatory impact on the loans that remain outstanding on the production side.

2.2 The matrix and the monetary circuit

The transactions flow matrix will help to understand how exactly the monetary circuit functions. Suppose, as we did in our model, that firms distribute wages in line with production, that dividends are distributed according to past profits, and that interest payments, as shown...
here, depends on the past stock of deposits and on a rate of interest administered by the banking system. Suppose further, as was explained in the first section, that firms borrow, at the beginning of the production period, the amount needed to pay the wages of the current period. This is, as the Graziani and the circuitistes say, the first step of the monetary circuit (Lavoie 1992: 153). Note that it does not matter whether the payments are made for consumption or investment goods.

Thus in the first step of the circuit, both the loans and the deposits newly created by the banking system belong to the production sector. This situation however, can only last for some split moments. Firms only draw on their lines of credit when they are required to make payments. Very soon, the deposits of the firms are transferred by cheques or electronic payment to the workers who provided their labour to the firms. The moment these funds are transferred, they constitute households \( = \) income. Before a single unit is spent on consumer goods, the entire amount of the bank deposits constitutes savings by households.

This is all shown in Table 2. The matrix requirement that all rows and columns must sum to zero makes clear the requirements of first step of this monetary circuit. The unsold production \( B \)the increase in inventories \( B \) must necessarily rise by an amount equal to the production costs, the wages paid \( W \). This means that investment (in inventories) in the current account of firms is equal to the value of wages. On the side of the capital account, it is clear that the value of this investment in inventories must be financed by the new loans initially fetched for.

Table 2, contrasted with Table 1, helps to understand the distinction between initial and final finance which has been so clearly underlined by Graziani (1984).

Table 2 also spells out the triangular relationship between firms, banks and households at the very moment money is being created to pay out wages, as it has been emphasized by some circuitistes (Gnos and Rasera 1985: 50, but also Parguez and Seccareccia 2000: 101). As Graziani (1992: 218) points out, \( A \) the moment a firm makes its first payment (for instance the payment of wages), money is created as the simultaneous debt of the firm towards the bank (bank deposit). Typically, a monetary payment gives rise to a triangular debt and credit relationship among agents (the bank, the payer and the payee), while it does not create any direct relationship between the two non-banking agents.

The transition from Table 2, which represents the first step of the circuit, to Table 1, which represents the second and last step of the monetary circuit, is accomplished by households getting rid of the money balances acquired through wages, and the additional money balances received on account on their dividend and interest payments. As the households get rid of their money balances, firms gradually recover theirs, allowing them to reimburse the additional loans that had been initially granted to them, at the beginning of the period. Firms decide on the amount of new equities they will issue, \( e, \) but they cannot decide on the price \( p_e \) that these new issues and the existing ones will carry. This will be decided by the confrontation, on the market for equities, between the total supply (old and new) of equities and the demand for such equities arising from the proportion of their expected wealth that households would like to keep in the form of equities.

The key factor is that, as households increase their consumption, their money balances fall and so do the outstanding amount of loans owed by the firms. Similarly, as households get rid of their money balances in order to purchase newly-issued equities by firms, the latter are again able to reduce their outstanding loans. In other words, at the start of the circuit, the new loans required by the firms are exactly equal to the new deposits obtained by households. Then, as households decide to get rid of their money balances, the outstanding loans of firms diminish pari passu. Although determined by apparently independent mechanisms, the supply of loans to firms and the holdings of deposits by households cannot but be equal.

### 2.3 Credit rationing and the principle of increasing risk

The comparison of Tables 1 and 2 and the fundamental distinction between initial finance and final funding also allows to clear up another debate within post-Keynesian theory. Various authors have claimed that the circuitistes and some theorists of endogenous money (the so-called Horizontalists \( a la \) Moore and Kaldor) have tended to ignore the issues raised by credit rationing or credit constraints imposed by banks. An excellent presentation of a post-Keynesian view of credit rationing, compatible with the present arguments, has been provided by Wolfson (1996). Wolfson points out that banks face a notional demand for credit. Banks however are only concerned with credit-worthy customers. They will grant credit to all credit-worthy borrowers. The demand for credit of these credit-worthy customers constitutes the effective demand for credit. The production that will actually be carried in Table 2 depends on the credit-worthy status of the producers. They will be able to go ahead with their production plans only insofar as they are credit-worthy, and in the case of the production of investment goods, only insofar as the customers who have ordered these goods can provide financial guarantees that they will be able to honour their orders.

Credit constraints thus appear at the stage of initial finance (as in Table 2), not at the stage of final funding (as in Table 1). The credit constraints will imply a restrained level of production. In a growth model, they will imply a restricted amount of capital accumulation by entrepreneurs, and hence credit restraint is incorporated within the investment function, with the later being sensitive to debt ratios or the weight of debt payments for instance. This justifies the assumption, made for instance in Lavoie and Godley (2001-2002), that the credit requirements of firms, as they appear at the end of the period, as shown in Table 1, are always fulfilled by banks. In other words, as pointed out by Godley (1996: 8), the change in bank loans are the residual source of finance. Bank finance is a buffer. The initial finance provided by banks to allow production, as in Table 2, is in all cases larger than the final funding requirements of firms at the end of the period, as described by Table 1. If finance has been granted to start the production process, problems of credit restraints cannot arise at the end of the accounting period.
Credit rationing can only arise at the beginning of the next period. And indeed, this is how it appears in the Lavoie and Godley (2001-2002) model. If households decide to hold a larger proportion of their wealth in the form of money deposits, the debt ratio of firms will be larger and this will slow down the rate of accumulation, either because of borrower risk or because of lender risk. Thus, as Graziani (1992: 220) correctly points out: Money as a form of wealth becomes relevant when the determination of aggregate demand is considered. Here Keynesian analysis is crucial in that any accumulation of idle balances, by increasing the debt of firms towards the banks, may cause a decline in demand. An additional mechanism could be incorporated within the model, whereby the interest rate on loans is raised whenever the debt ratio of firms rises. But this mechanism, in line with Kalecki's principle of increasing risk, would not necessarily generate the expected results at the macroeconomic level. This is because the model shows that faster growth does not necessarily induce higher debt ratios.

There are thus very close links between the theory of credit rationing espoused by Wolfson (1996) and the insights that arise from the theory of the monetary circuit. Wolfson (1996: 451) makes very clear that a theory of credit rationing based on Keynesian uncertainty relies on asymmetric expectations between lenders and borrowers, i.e., between banks and production firms. But Graziani (1990: 30) is just as clear and is of the same opinion: An the General Theory it is in fact implicit that banks and firms share the same short-term expectations regarding aggregate demand ... Such similarity of expectations between banks and firms is unknown to the theory of the circuit. The theory revives instead the role of the Schumpeterian banker, on whose evaluations the destinies of the firm depend.

3. A model with government money

3.1 A two-asset model

We now consider another simplified economy, based on a service economy, with no investment by firms. The production sector does not go into debt and consequently there are no private banks. There is however a government sector, with a central bank. When government must finance its deficit, it issues Treasury bills $B$, short-term assets the price of which is assumed to be fixed to unity, and which convey an interest payment of $r_B$. These bills are purchased by the central bank and by the public, i.e., the households. The public has the choice between holding government notes, i.e., (high powered) money $H$ issued by the central bank, or interest-earning assets $B$ the Treasury bills.

Once again the national accounting of the transaction flows is provided within the framework of a matrix, given by Table 3, where all rows sum to zero and where all columns do likewise. It can be seen in particular, that since the central bank is collecting interest payments on its stock of bonds, while paying out no interest on the notes that it issues, it will be making profits. It is assumed, in line with current practice, that the profits realized by the central bank are being retrained to the government sector.

In the model developed by Godley, the central bank sets the rate of interest $r_B$ of its choice on Treasury bills. On the basis of this rate, households decide of the proportion of their wealth which they wish to hold in the form of bonds and in the form of cash money, on the basis of Tobin-like portfolio equations similar to those of the previous section.

How is it that the central bank is able to sustain a fixed rate of interest, whatever the demand for bonds of the public, and whatever the fluctuations in the government deficit? The answer lies in the accounting constraints of a fully coherent macroeconomic model and in the assumed behaviour of the central bank. If the households now desire that a larger proportion of their wealth be held in the form of bonds, the central bank will restrict its own demand for bonds or even will sell the demanded bonds on the open market. Reciprocally, if households have high liquidity preference and wish to get rid of their bond holdings, the central bank will purchase the offered bonds. In other words, the central bank clear the market at the price of its choice, by providing an endogenous demand for bonds, which is equal to the difference between the supply of bonds resulting from the government deficit and the demand for bonds arising from the household sector. In net terms, as Godley puts it, i.e, when the central bank is integrated to the government sector, the supply of bonds by the integrated government sector is endogenous and equal to the demand of the public.

As in the previous model, when the adequate behavioural equations have been added, there is no need for any equation requiring that $H_D = H_F$. Once the bond market has been taken into consideration, the so-called money market drops out of the picture. In the computer model, introducing this equation would make the model over-determined, and the model could not solve. There just cannot be any excess supply of money. This contrasts with the standard view, where the bond rate is endogenous and the money supply exogenous. In the standard story -- as told for instance by Tobin (1982: 182) and Backus et al. (1980: 267) but also by heterodox authors Franke and Semmler (1991: 340) -- the central bank (or government) decides arbitrarily on the proportion of the deficit that will be financed by bond issues and by the creation of high powered money. In the models of these authors, this proportion is an exogenous variable. This is the crucial difference between the circuitviewationist and the neoclassical one. In the circuitviewationist or post-Keynesian view, cash is provided to the public on demand. The government, or the central bank, does not decide in advance on the proportion of the deficit that will be monetized. This proportion depends on the portfolio decisions of the households, at the rate of interest set from the onset by the monetary authorities.

3.2 The monetary circuit again

The steps of the monetary circuit can once again be used to help understand how money creation and government deficits are being related to each other. At the beginning of the circuit, the government orders the production of some goods to the private production sector. Once
these goods have been produced, they must be purchased by government. To do so, the government issues new bonds, which are purchased by the central bank. The counterpart of these bonds, in the books of the central bank, is the amount of high powered money credited to the government account. This money will circulate, first to pay the firms, which will in turn pay wages to their workers and remunerate their owners. The money balances so created will thus wind up in the deposit accounts of households.

All this is illustrated with Table 4. Once again, all rows and columns must sum to zero. Before households decide what to do with their newly acquired money balances, spending them on consumption or acquiring interest-earning assets, all accounts must balance. As a consequence, the deficit cannot but be monetized initially, in line with what neo-chartalist post-Keynesians have been recently arguing (Wray 1998, ch. 4-5; Mosler and Forstater 1999). Once households revise their demand for bonds, in line with their new expectations with regards to income and wealth, and in line with the rate of interest on bonds set by the monetary authorities, the additional demand for bonds by households must be accommodated by the central bank, if the central bank is to keep the interest rate at its target level. The central bank must sell to the households the bonds that they lurk for, and by so doing, the central bank will absorb the money balances that households do not wish to hold.

3.3 The monetary circuit in an overdraft economy

The model discussed above is illustrative of an asset-based financial system, which can be found in its purest form in Anglo-saxon countries. Most financial systems in the rest of the world, however, are instead overdraft financial systems, where commercial banks are often in debt vis-à-vis the central bank, being forced to ask for advances from the central bank. The impact of government expenditures can also be assessed in such an overdraft system. Table 5 provides such an illustration. Here, commercial banks have been reintroduced, along with the central bank. For simplification, only the relevant rows and columns have been included. For instance the current accounts of banks and the central bank have been omitted.

The overdraft economy shown here may also have some relevance to the situation of national governments within the European Monetary Union. In Europe, the private banking sector overall is indebted vis-à-vis the central banks. In addition, the prevailing rules forbid national central banks and the European Central Bank (ECB) from directly financing the expenditures of central governments. As a result, at least when they run deficits, central governments must either sell securities to private financial institutions or they must obtain loans from commercial banks (Lavoie 1992: 167). In Table 5, it has been assumed that banks grant loans to governments when they make their expenditures.

As in Table 4, Table 5 illustrates the initial impact of government expenditures from a monetary circuit point of view. As can be seen in the Government column, $G = L$, meaning that the entire expenditure is financed by a bank-issued loan. Firms get paid for providing the services to government, and the flow of revenue reverts to households $G = Y$. Before households decide to consume their income, it is assumed here that they split their money income into money deposits $M$ and cash money (government banknotes) $H$. As a result, commercial banks must obtain banknotes from the central bank, to provide the households with the banknotes that they wish to hold. To do so, banks ask for advances from the central bank, $A = H$. Commercial banks are thus in debt vis-à-vis the central bank.

Conclusion

The purpose of the present paper was to show that the systematic use of transactions-flow matrices, which insure that nothing has been left out hanging in the air and that all interdependences have been taken into account, a method advocated by Wynne Godley, provides coherence and formalism to the theory of the monetary circuit, espoused by Augusto Graziani. Taken by itself, the transactions flow matrix tells us what results occur by the end of the period. The theory of the monetary circuit allows to tell a causal story: it helps us to understand how economic activity arises, and how it is financed at the beginning of the period. There are great advantages, I believe, in combining the two methods, as it has been attempted here. Many questions which have been of concern to circuitistes and to post-Keynesians, for instance the role of bank profits and the impact of interest rates on money creation, most probably can be answered by using this framework.

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Table 1: Transaction matrix with with private debt
<table>
<thead>
<tr>
<th></th>
<th>Households</th>
<th>Firms</th>
<th>Banks</th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Current</td>
<td>Capital</td>
<td></td>
</tr>
<tr>
<td>Consumption</td>
<td>! $C$</td>
<td>+ $C$</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Investment</td>
<td></td>
<td>+ $I$</td>
<td>! $I$</td>
<td>0</td>
</tr>
<tr>
<td>Wages</td>
<td>+ $W$</td>
<td>! $W$</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Net Profits</td>
<td>+ $F_D$</td>
<td>! $(F_U + F_D)$</td>
<td>+ $F_U$</td>
<td>0</td>
</tr>
<tr>
<td>Interest on loans</td>
<td>! $r_p L(-1)$</td>
<td></td>
<td>+ $r_p L(-1)$</td>
<td>0</td>
</tr>
<tr>
<td>Interest on deposits</td>
<td>+ $r_m M(-1)$</td>
<td>! $r_m M(-1)$</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>&quot; in loans</td>
<td></td>
<td></td>
<td>+ &quot;L&quot;</td>
<td>! &quot;L&quot;</td>
</tr>
<tr>
<td>&quot; in money</td>
<td>! &quot;M&quot;</td>
<td></td>
<td></td>
<td>! &quot;M&quot;</td>
</tr>
<tr>
<td>Issue of equities</td>
<td>! &quot;e, p_e&quot;</td>
<td>+ &quot;e, p_e&quot;</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>3</td>
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<td>0</td>
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</table>

Table 2: The monetary circuit with private money
### Table 3: Transaction matrix with government debt

<table>
<thead>
<tr>
<th></th>
<th>Households</th>
<th>Firms</th>
<th>Government</th>
<th>Central bank</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Current</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Capital</td>
<td></td>
</tr>
<tr>
<td><strong>Consumption</strong></td>
<td>! $C$</td>
<td>+ $C$</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Government expenditures</td>
<td>+G</td>
<td>!G</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----</td>
<td>----</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>GDP (wages and profits of firms)</td>
<td>+Y</td>
<td>!Y</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Interest payments</td>
<td>+r.B_{h-1}</td>
<td>!r.B_{-1}</td>
<td>+r.B_{cb-1}</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Central bank profits</td>
<td></td>
<td>+r.B_{cb-1}</td>
<td>!r.B_{cb-1}</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Taxes</td>
<td>!T</td>
<td></td>
<td>+T</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Change in money</td>
<td>!&quot;H</td>
<td></td>
<td></td>
<td>+&quot;H</td>
<td>0</td>
</tr>
<tr>
<td>Change in bills</td>
<td>!&quot;B_{h}</td>
<td></td>
<td>+&quot;B</td>
<td>!&quot;B_{cb}</td>
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</tr>
<tr>
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Table 4: The monetary circuit with a government deficit

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<th>Firms</th>
<th>Government</th>
<th>Central bank</th>
<th>3</th>
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</thead>
<tbody>
<tr>
<td>Consumption</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Government expenditures</td>
<td></td>
<td>+G</td>
<td>!G</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>GDP (wages and profits of firms)</td>
<td>+Y</td>
<td>!Y</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Interest payments</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Households</td>
<td>Firms</td>
<td>Government</td>
<td>Banks</td>
<td>Central bk</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------</td>
<td>-------</td>
<td>------------</td>
<td>-------</td>
<td>------------</td>
</tr>
<tr>
<td>Govt. exp.</td>
<td></td>
<td></td>
<td>- $G$</td>
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</tr>
<tr>
<td>GDP</td>
<td>+ $Y$</td>
<td></td>
<td>- $Y$</td>
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<td></td>
</tr>
<tr>
<td>&quot; Deposits</td>
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<td></td>
<td></td>
<td></td>
<td>+ &quot;$M$&quot;</td>
</tr>
<tr>
<td>&quot; Cash</td>
<td>- &quot;$H$&quot;</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot; Loans</td>
<td></td>
<td>+ &quot;$L$&quot;</td>
<td>- &quot;$L$&quot;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&quot; Advances</td>
<td></td>
<td></td>
<td></td>
<td>+ &quot;$A$&quot;</td>
<td>- &quot;$A$&quot;</td>
</tr>
<tr>
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<td>0</td>
<td>0</td>
<td>0</td>
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</tr>
</tbody>
</table>

Table 5: The monetary circuit in an overdraft system