Stock-Flow-Consistent Modeling: Lecture 4 – The monetary circuit

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The monetary circuit

See Graziani (2003), Zezza (2012)

Assumptions

Firms need "cash in advance" to start production (firms have no liquidity at the <u>start</u> of the circuit)

Banks are willing to provide loans on demand

Monetary circuits

Notation in a Transaction matrix

▸ all *sources* of funds in a sectoral account take a *plus* sign, while the *uses* of these funds take a *minus* sign

Table 2.8A First step of the monetary circuit with private money

	Households	Production firms		Banks	Σ
		Current	Capital	Capital	
Consumption					
Investment					
Wages					
Δ loans			$+ \Delta L_f$	$-\Delta L$	0
Δ deposits			$-\Delta M_f$	$+\Delta M$	0
Σ			0	0	0

Monetary circuits

Table 2.8B The second step of the monetary circuit with private money

	Households	Production firms		Banks	Σ
		Current	Capital	Capital	
Consumption					
Investment		$+I$	$-I$		0
Wages	$+WB$	$-WB$			0
Δ loans			$+\Delta L_f$	$-\Delta L$	0
Δ deposits	$-\Delta M_h$			$+\Delta M$	0
Σ	0	0	0	0	0

Wages are paid (bank deposits are transferred from firms to households)

A first puzzle

In the simplest possible model, if firms sell all production to workers, they are able to recover the entire initial loan, and reimburse the banks.

The "interest payment puzzle": how can firms pay back the interest on the initial loan?

A solution?

My own view, which is not endorsed by all circuitists, is that the purpose of bankers is to make a profit out of the loan.

If we need to close the circuit within one period, such profits (interest payments) must be spent – or saved – before the end of the circuit.

If they are spent, firms earn the additional cash needed to pay back the interest, as well as the principal.

Inventories and debt

If workers don't spend all of their income (and firms have therefore produced more than what has been demanded), firms will not be able to reimburse the initial loan.

Firms debt with banks at the end of the circuit will be equal to the value of unsold goods, i.e. to the change in their stock of inventories.

A note

It is important to keep in mind that, when working with published data on assets and debt, such data are published at the end of conventional periods (months, quarters, years...).

Such data therefore do not report what happens *during* the period.

Should the circuit correspond to the accounting period, the reported stock of firms' debt should match the final position, rather than the initial loan.

A second puzzle: monetary profits

Can firms, in the aggregate, realize monetary profits at the end of the circuit?

It depends on what we mean by "profits".

If we refer to after-tax gross operating surplus, the answer is positive: when expectations are correct and coherent, undistributed "profits" will be sufficient to finance investment expenditure.

If we mean instead a monetary profit after investment expenditures have been paid, the answer is negative.

Money endogeneity

Money endogeneity

Note that the quantity of money in circulation is determined endogenously in the monetary circuit.

The standard mainstream textbook approach is (was?) instead based on the assumption that the Central Bank could control the stock of money in circulation, directly (high-powered money) or indirectly (money multiplier)

The (flawed) money multiplier model

Assumptions:

1) household wish to hold a constant share of liquidity in cash (hp money) and the rest in bank deposits

2) banks have a required reserve ratio

3) banks lend all the liquidity in excess of required reserves

The (flawed) money multiplier model #2

How it works:

1) CB creates HP money (buys Treasuries)

2) the seller (non-bank) keeps a fraction in cash, and increases its bank deposits for the rest

3) the bank increases reserves, and increases lending

4) recipients keep a fraction in cash, and increase bank deposits, etc.

Why is the money multiplier model wrong?

1) assumption that banks lend any excess liquidity is unrealistic

2) when banks make a loan, they create deposits (somewhere in the system) for the same amount

3) banks always make profitable loans (endogenous money), and finance loans preferably with deposits. Or else the inter-bank market, or CB refinancing

See McLeay et al. (2014).

Portfolio management

The Tobinesque approach

The share of each asset in the portfolio of agents is driven by relative rates of return, and liquidity preference.

Consider a simple economy with the following financial assets:

1) M: money (cash and non-interest bearing bank deposits)

2) B: government bonds (rb)

3) E: firms' equities (re)

The Tobinesque approach #2

The demand for each asset, with respect to the total stock of wealth V, and disposable income Y, can be written as

$$
\begin{bmatrix} M \\ B \\ E \end{bmatrix} = \begin{bmatrix} \lambda_{10} \\ \lambda_{20} \\ \lambda_{30} \end{bmatrix} \cdot V + \begin{bmatrix} \lambda_{11} & \lambda_{12} & \lambda_{13} \\ \lambda_{21} & \lambda_{22} & \lambda_{23} \\ \lambda_{31} & \lambda_{32} & \lambda_{33} \end{bmatrix} \cdot \begin{bmatrix} 0 \\ r_b \\ r_e \end{bmatrix} \cdot V + \begin{bmatrix} \lambda_{14} \\ \lambda_{24} \\ \lambda_{34} \end{bmatrix} \cdot Y
$$

Constraints on parameters

Symmetry implies

$$\lambda_{12}=\lambda_{21}\,;\lambda_{13}=\lambda_{31}\,;\lambda_{23}=\lambda_{32}$$

Adding up constraints

$$\lambda_{10}+\lambda_{20}+\lambda_{30}=1$$
$$\lambda_{11}+\lambda_{12}+\lambda_{13}=0$$
$$\lambda_{21}+\lambda_{22}+\lambda_{23}=0$$
$$\lambda_{31}+\lambda_{32}+\lambda_{33}=0$$
$$\lambda_{41}+\lambda_{24}+\lambda_{34}=0$$

A note on expectations

We specified the equations for portfolio management on the basis of the effective end-of-period wealth, and income.

However, they will not be known when household specify their demand for assets, so they should be replaced by their <u>expected values</u>.

When expectations are not met, at least one of the assets in the portfolio will differ from its desired value. One of them (usually money) is modeled as a *buffer stock*.

Standard assumptions

Household specify their demand for assets with the Tobinesque approach, with the demand for money as the residual.

Firms will specify their demand for loans to finance desired investment (for what is not covered by retained profits, and emissions of equities or bonds).

Banks supply loans and deposits on demand.

Standard assumptions #2

If banks demand government bonds, their demand for bonds must be specified (but it is not necessarily a substitute for loans to firms)

Banks balance assets to liabilities by increasing/reducing their debt with the CB.

The Central Bank is usually assumed to refinance the banking system. It may be the residual buyer of government securities. If not, a mechanism for clearing the market of government securities must be introduced.

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Quantitative Easing

With QE, the stock of HP outstanding becomes exogenous, as the consequence of CB purchases of Treasuries.

However, HP piles up as unwanted bank reserves.

By setting the interest rate on bank reserves to a negative value, the CB is able to induce a negative return on other financial assets (government bonds).