

Endogenous Money Supply

- ▶ The following model is an extension of Georg/Pasche (2008).
- ▶ The term “bonds” B is a *broad measure* for different financial funds, including also equity shares, but not loans. For simplicity, it assumed that bonds supply is fixed. When relaxing this assumption, bonds could be regarded as a (non-perfect) substitute for loans.

The Central Bank:

- ▶ The balance sheet is $B^{cb} + L_c = rD + E$
- ▶ B^{cb} are bonds purchased by the central bank, L_c are loans to commercial banks with interest rate ρ_c , E are excess reserves.

Commercial Banks:

- ▶ The balance sheet is $L^s + B^b + E = (1 - r)D + L_c + B_b \equiv V$
- ▶ L^s is loans supply. B^p are bonds held as a part of the asset portfolio, B_b are bonds issued by the commercial bank to finance their portfolio.

- ▶ Choosing optimal portfolio *structure*:

$$L^s = \lambda_L(i, \rho) V \quad (\text{loan supply})$$

$$B^b = \lambda_B(i, \rho) V \quad (\text{bonds demand})$$

$$E = (1 - \lambda_L - \lambda_B) V \quad (\text{excess reserves})$$

- ▶ Choosing optimal portfolio *volume*:
(marginal utility of expected wealth equals refinancing costs)

$$\max_{L_c \geq 0} E[u(\tilde{V})] - \rho_c L_c \quad \Rightarrow \quad L_c(i, \rho, \rho_c)$$

where \tilde{V} is the worth of the portfolio after one period. Note, that L_c drives portfolio volume V .

- ▶ Structural and volume effects could be countervailing: E.g. increasing i makes bonds more profitable (restructuring the portfolio in favor of bonds), but it also increases the utility of the total portfolio and hence decreases marginal utility (reducing portfolio volume).
- ▶ Assumption: Structural effects are dominant.
- ▶ Results:

$$L^s(i, \rho, \rho_c)$$

$\begin{matrix} - & & - \\ + & & - \end{matrix}$

$$B^b(i, \rho, \rho_c)$$

$\begin{matrix} + & & - \\ - & & - \end{matrix}$

$$E(i, \rho, \rho_c)$$

$\begin{matrix} - & & - \\ - & & - \end{matrix}$

Non-Bank Sector:

- ▶ Balance-sheets of households, firms, and institutional investors.
- ▶ Holding physical capital, bonds, and money (deposits), financed by net financial wealth, bonds, and loans.
- ▶ Portfolio considerations regarding structure and volume as discussed above.
- ▶ Other motives, i.a. holding money for transaction purposes. Therefore money demand depends on income y .

- ▶ Resulting behavioral functions:

$$L^d(i, \rho, y)_{+ - +}$$

$$B^P(i, \rho, y)_{+ - +}$$

$$D(i, \rho, y)_{- - +}$$

Important:

- ▶ *The motives to demand loans and the motives to hold money are different!* E.g. loans are demanded to finance physical investments, money is held as a secure asset or as transaction medium.
- ▶ Adding the balance sheets of the private non-bank sector there is not necessarily an identity of credits and deposits. The presence of “bonds” as a refinancing instrument modifies the money creation process.

Equilibrium on the credit market:

$$L^s(i, \rho^*, \rho_c) = L^d(i, \rho^*, y)$$

with an equilibrium interest rate $\rho^*(\underset{+}{i}, \underset{+}{\rho_c}, \underset{+}{y})$ which depends on the endogenous variable i .

Equilibrium on bonds market:

$$\bar{B} = B_b + B_f = B^{cb} + B^b(i^*, \rho, \rho_c) + B^p(i^*, \rho, y)$$

with an equilibrium interest rate $i^*(\underset{+}{\rho}, \underset{+}{\rho_c}, \underset{+}{y})$ which depends on the endogenous variable ρ .

Total equilibrium: ρ^* and i^* constitute a (non-linear) system of equations which is assumed to have a unique solution

$$\rho^{**}(\rho_c, y), \quad i^{**}(\rho_c, y)$$

+ + + +

which is determined by the exogenous variables ρ_c and y , resulting from monetary policy and from the real sector.

- ▶ The positive relationship $i^{**}(\rho_c, y)$ is a **replacement** for the traditional **LM curve**! It is parametrized by a monetary policy variable.
- ▶ It has to be interpreted as all combinations of (i, y) where there is simultaneous (portfolio) equilibrium on all financial markets (here: credit and bond market).
- ▶ As a correlate the demand of money D also equals the loans demand and supply $L =$ wishes to create money. This depends on monetary policy ρ_c , but money supply is *not given* by the central bank.
- ▶ Money demand \Rightarrow creates loans \Rightarrow creates demand for reserves. The central bank could accommodate this increased demand or not. In case of rationing of reserve demand also a rationing effects on the credit market arises which has spillovers to the bonds market as well on the real sphere.
- ▶ In addition, it may be assumed that monetary policy ρ_c is determined e.g. by a Taylor rule.

Graphical representation of the model:

