Money Supply & Multiplier (10/21/2010) Econ 310-004

Equations

- **MB = C + R** monetary base
- **M = C + D** M1
- **ΔD = (1/r) ΔR** deposit multiplier
- R = RR + ER reserves
- **M = mMB** money multiplier
- c = C/D currency ratio
- e = ER/D excess reserves ratio
- D = (1/(r+e+c))MB deposits vs. monetary base
- **m = (1 + c)/(r + e + c)** money multiplier
- M = ((1 + c)/(r + e + c))MB money multiplier

Variable definitions

- M ≡ money supply
- MB ≡ monetary base
- D ≡ demand deposits in banking system
- C ≡ currency in circulation
- R ≡ reserves in banking system
- RR ≡ required reserves in banking system
- ER ≡ excess reserves in banking system
- deposit multiplier ≡ 1/r
- m ≡ money multiplier
- r ≡ required reserve ratio
- c ≡ ratio of currency to deposits
- e ≡ ratio of excess reserves to deposits

Definitions

- ***required reserve ratio*** – required percentage of liabilities banks must keep as reserves
- ***discount rate*** – interest rate to borrow funds from Federal Reserve
- ***open market operations*** – purchase or sale of securities by the Federal Reserve in the open market
- ***money multiplier*** – amount by which a change in the monetary base is multiplied to calculate the final change in the money supply
- ***deposit multiplier*** – amount by which a change in reserves is multiplied to calculate the final change in deposits
- ***currency drain*** – increase in currency held outside the banks

Key insights

- MB↑ → M↑
- r↑ → M↓
- c↑ → M↓
- e↑ → M↓
- i↑ → e↓ → M↑
- E(deposit outflows)↑ → e↑ → M↓

Principles

- An increase in the required reserve ratio boosts the reserves that banks must hold, decreases their lending, and decreases the quantity of money.
- An increase in the discount rate raises the cost of borrowing reserves from the Fed and decreases banks' reserves, which decreases their lending and decreases the quantity of money.
- When the Fed conducts an open market operation by buying a government security, it increases banks' reserves. Banks loan the excess reserves, which creates money. The reverse occurs when the Fed sells a government security.
- The Fed has better control over the monetary base than over reserves.
- If a bank buys securities from the public rather than making loans, the check will be deposited at another bank and the same progression will result as for a loan.
- When the Fed conducts an open market operation, the ultimate change in the money supply is larger than the initiating open market operation.
- Banks use excess reserves from the open market operation to make loans, which multiplies the effect.
- The money multiplier is less than the deposit multiplier
- The money supply negatively related to the required reserve ratio (r), the currency ratio (c), and the excess reserve ratio (e).
- The excess reserve ratio (e) is negatively related to market interest rate (i) and positively related to expected deposit outflows.

Players in the process

- Federal Reserve
- banks
- depositors
- borrowers

Reasons for reserves at Fed

- reserve requirements
- check clearing
- emergency funds
- interest on reserves

Treasury securities

- T bills: terms of less than 1 year
- T notes: terms of 2, 3, 5, 10 years
- T bonds: terms of 30 years

Deposit creation stops if:

- loan proceeds kept in cash
- banks keep excess reserves

Deposit creation assuming 10% Reserve Requirement and $100 increase in reserves:

Bank	Increase in Deposits	Increase in Loans	Increase in Reserves
Manhattan Commercial	0.00	100.00	0.00
Fleet Bank	100.00	90.00	10.00
Bank One	90.00	81.00	9.00
Bank A	81.00	72.90	8.10
Bank B	72.90	65.61	7.29
Bank C	65.61	59.05	6.56
.	.	.	.
Total For All Banks	1000.00	1000.00	100.00