

Lecture 20

Money and Banking, Econ 345

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Rate of return on deposits

- What rate of return on deposits should banks offer?
- Competition will force banks to offer depositors the rate of return they earn on the assets
- Each good-unit of deposit is split between reserves and investment, earning
 - $\frac{n}{\mu}$ from reserves
 - \sqrt{X} from investing in capital
- The return on deposit equals then to

$$\begin{aligned}r^* &= \gamma \frac{n}{\mu} + (1 - \gamma) \sqrt{X} \\ &= \sqrt{X} - \gamma \left(\sqrt{X} - \frac{n}{\mu} \right)\end{aligned}$$

- Hence return on deposits is higher if
 - reserve requirement γ is higher
 - return on fiat money n/μ is higher
 - return on capital \sqrt{X} is higher

M1 is tightly linked to price level

- M1 can be increased by
 - decreasing reserve requirements γ
 - increasing monetary base M_t
- Real return on deposits is
 - higher if γ is lower
 - lower if monetary base is higher
- Effect on real demand for deposits depends on the way of increasing $M1$, leading to different effect on price
- Money supply $M1$ is more tightly linked to price level than monetary base M
 - recall: Quantity Theory of Money

Central bank lending

- If a private bank needs cash to meet reserve requirements it can:
 - sell interest-bearing assets for fiat money
 - borrow cash from other banks (interbank lending)
 - borrow from central bank
- Central bank lending can be used as another way of controlling money supply in the economy
 - Central bank just prints extra money and loans it to banks at a low rate, **the Bank rate**
 - There are limits on loans from central bank, otherwise banks would want to borrow without limit to exploit arbitrage opportunities

A Bank's Balance Sheet

Assets		Liabilities	
Reserves	γH	Deposits	H
Interest-bearing assets	$(1 - \gamma) H + \delta \gamma H$	Loans from CB	$\delta \gamma H$
		Net worth	0
Total assets	$H + \delta \gamma H$	Total liabilities	$H + \delta \gamma H$

Effects of central bank lending

- (Non-borrowed) Money market clearing condition
- Total (real) fiat money supply: $\frac{M_t}{P_t}$
- Total (real) fiat money demand: $\gamma N_t h_t - \delta (\gamma N_t h_t)$

$$\frac{M_t}{P_t} = (1 - \delta)\gamma N_t h_t$$

or

$$P_t = \frac{M_t}{(1 - \delta)\gamma N_t h_t}$$

- Central Bank lending lowers demand for nonborrowed reserves
- Has the same effect on economy as a reduction in the reserve requirement from γ to $\gamma(1 - \delta)$ (in model without central bank lending)

Effects of central bank lending

- Total interest-bearing assets:

$$(1 - \gamma)N_t h_t + \delta \gamma N_t h_t = (1 - \gamma(1 - \delta))N_t h_t$$

- Total money supply equals to total deposits (currency in circulation is zero):

$$M1_t = P_t N_t h_t$$

and required reserves:

$$\gamma M1_t = M_t + \delta \gamma M1_t$$

or

$$M1_t = \frac{M_t}{\gamma(1 - \delta)}$$

Rate of return on deposits

- What rate of return on deposits should banks offer?
- Competition will force banks to offer depositors the rate of return they earn on the assets
- Balance sheet: $(1 + \delta\gamma)H$ units of deposits are split between reserves and investments
 - $\frac{n}{\mu}$ from reserves (γH units of deposit)
 - \sqrt{X} from investing in capital ($((1 - \gamma)H + \delta\gamma H)$ units of deposit)
- Total return: $\frac{n}{\mu}(\gamma H) + \sqrt{X}((1 - \gamma)H + \delta\gamma H)$
- Total cost: $r^*H + r\delta\gamma H$, where r is the (real) Bank rate
- Total profit is zero:

$$\frac{n}{\mu}(\gamma H) + \sqrt{X}((1 - \gamma)H + \delta\gamma H) - r^*H - r\delta\gamma H = 0$$

or

$$\begin{aligned} r_{borr}^* &= \gamma \frac{n}{\mu} + (1 - \gamma + \delta\gamma) \sqrt{X} - \delta\gamma r \\ &= r^* + \delta\gamma (\sqrt{X} - r) \end{aligned}$$

Rate of return on deposits

- No effect of borrowed reserves if
 - $\delta = 0$ (no borrowed reserves)
 - $r = \sqrt{X}$ (bank rate equals to market rate)
- Otherwise deposit rate is higher than without central bank borrowing
 - if $r = \frac{n}{\mu}$ (bank rate equals return on fiat money), central bank borrowing is equivalent to decrease in required reserves from γ to $\gamma(1 - \delta)$

Example 8.3 from CF (page 166)

Assume the demand for deposits equals 100,000 goods and the nonborrowed part of the monetary base is \$20,000. Let the reserve requirement be 12 percent.

a) Find the price level, the total money stock, and the real value of investment by banks in the absence of central bank lending

b) Now assume that the central bank allows banks to meet one-third of their reserve requirement by borrowing from the central bank and that banks take full advantage of this privilege. Answer part a) given this new assumption.

Example 8.3 from CF (page 166)

a) Following notes in Lectures 18 and 19:

$$\text{Price level: } P_t = \frac{M_t}{\gamma N_t h_t} = \frac{\$20,000}{0.12 \cdot 100,000} = \frac{\$20,000}{12,000} = 1.67$$

$$\text{Total money stock: } M1_t = \frac{M_t}{\gamma} = \frac{\$20,000}{0.12} = \$166,666.67$$

Total investment by banks:

$$(1 - \gamma)N_t h_t = 0.88 \cdot 100,000 = 88,000 \text{ units of good.}$$

b) This is equivalent to lowering total reserve requirement to $2/3$, i.e., effective reserve requirement decreases from $\gamma = 0.12$ to $\gamma_1 = 0.08$.

$$\text{So price level } P_t = \frac{M_t}{\gamma_1 N_t h_t} = \frac{\$20,000}{0.08 \cdot 100,000} = \frac{\$20,000}{8,000} = 2.5,$$

$$\text{total money supply } M1_t = \frac{M_t}{\gamma_1} = \frac{\$20,000}{0.08} = \$250,000,$$

and total investment by banks

$$(1 - \gamma_1)N_t h_t = 0.92 \cdot 100,000 = 92,000 \text{ units of good.}$$