

The Credit Channel

ECON4335 The Economics of Banking

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Recall Model 1 Banking in sunshine

No default risk

- All interest rates follow the policy rate one for one
- Loans driven by demand from borrowers (firms and households)
- Loans create deposits
- When deposits increase, banks may buy bonds or bills to increase their liquid reserves. This creates new deposits.
- Lending from the central bank driven by banks' demand for reserves (unresponsive to volume of deposits)
- Lending by the central bank creates central bank money.
- Closed economy
- No currency in circulation (or stocks are constant)
- No consumer price inflation expected
- Zero saving by government and banks

- Default risk for borrowers
 - Wedge between interbank rate and lending rate
 - Varying between firms and over time
 - Denial of credit, rationing
- Default risk for banks
 - Wedge between policy rate and interbank rates
 - Wedge between deposit rate and interbank borrowing rate
 - Denial of credit to banks
- Interest rate margins or quantities of money and credit?

- Firms and household usually have one main bank
 - usually more than one relation to it
 - change of main bank rare
 - banks know their own customers best
 - having a good record with your bank is an asset
- Attracting and keeping customers
 - low borrowing rate
 - high lending rate
- Insured deposits

Sketch of a model

- How a higher policy interest rate may raise default probabilities and margins between interest rates
- Start with a given balance sheet
- How will agents want to reallocate their portfolios?
- Equilibrium response in interest rates
- Effects on investment and saving flows

- Two types of bank customers
 - Entrepreneurs who own firms
 - Wage-earners who invest in bonds and deposits
 - Entrepreneurs are borrowers, wage-earners lenders
- Assets
 - Real capital
 - Bonds /t-bills
 - Deposits, Loans

Value of existing loan portfolio goes down

Assumption: Interest rates on existing business loans are indexed to interbank rate

- Higher interest rate reduces net cash flow
 - Greater default probability
- Higher interest rate reduces the present value of future cash flows
 - Market value of existing capital goes down
 - Value of collateral goes down
 - Greater loss in case of default
 - Indexation does not compensate for higher expected loss from default
 - Mark-to-market: Value of existing loan portfolio reduced

Margin between policy and interbank rates go up

- Value of existing loan portfolio reduced
- Value of bond portfolio also declines
- Low equity ratio
 - small loss of asset value means large fraction of equity lost
 - Equity 2 per cent of assets, loss 1 per cent of assets = 50 per cent of equity,
 - Risk of default end expected loss if default increased
- Banks demand higher margins over policy rate for lending to other banks
 - Full effect quickly since interbank loans are short-term
 - Further reductions in value of existing business loans

Even solid banks are hit

- Lack of updated and firm information on solidity
- Their interbank and trading positions with troubled banks are not known
- Lemons problem, others may be better informed than you
- Banks with liquidity surplus stick to their reserves just in case

Competition for deposits

Assumption: Central bank keeps rate on T-bills equal to policy rate

- With perfect competition deposit rates gravitate to interbank rates
- Perceived differences in default risk will be reflected
- With relationship banking
 - Banks with a low base of deposits from ordinary customers will pay at least as much as their going interbank borrowing rate, maybe more for a while to attract new customers
 - Banks with a high deposit base will pay at most the interbank borrowing rate, maybe less. They may reject wholesale deposits or pay less for them.

Changes in portfolio composition?

- Increase in deposit margin compensates for risk of bank defaulting
 - Average consumer not likely to initiate large shifts between deposits and bonds (until things get really nasty)
 - Consumers who can benefit from deposit insurance may shift out of bonds and into deficits
- Similarly banks may want to hold more bonds

Consequences for demand for CB deposits

- Higher policy rate alone does not by itself increase demand for CB reserves
 - width of corridor stays constant
- Effect due to increased risk of banks defaulting may be ambiguous
 - Margin between policy rate and interbank rate goes up
 - Net borrowers get a stronger incentive to economize on CB reserves
 - Net lenders get compensated for the increased risk to the point where the market clears
 - However, some lenders may elect to leave the market
 - Rates may become more volatile depending on exactly how the net payments between banks are distributed from day to day
 - CB may choose to supply more liquidity and let the deposit rate be the policy rate
- Redistribution of liquidity through market diminishes, CB takes over

Granting of new loans

- Banks can take full account of the increase in expected loan losses
 - The increase in the policy rate and both margins increase are incorporated
 - Fewer entrepreneurs find their projects profitable
 - More projects may be denied credit
- Investment goes down
- Less lending, less growth in deposits

- Higher interest rate should yield more savings
- Since investment is down, savings must go down
- Effected by decline in economic activity, reduced income
- Value of existing capital may be depressed further

- Effect of interest rate on real economy is reinforced by effect on interest rate margins
- The relationship is probably highly non-linear The effect depends
- The effect depends on the state of the banking system
- Shocks that reduce the value of existing capital or the net worth of the banking system have similar effects on margins
- Need to consider capital adequacy requirements

- Firms (borrowers), banks, households (depositors)
- Everyone is risk-neutral
- Each firm can only borrow from one bank (not important?)
- Each household lends to only one bank (not mentioned)
- Open sector

- Firms pay labor in one period, sell output in the next
- Borrow to finance the wage bill
- Limited liability

Production function

$$y = N^\beta(1 + \varepsilon) \quad 0 < \beta < 1 \quad (1)$$

ε = aggregate productivity shock,

$$Pr(\varepsilon = 0) = \theta, \quad Pr(\varepsilon = -1) = 1 - \theta$$

- Everything is lost in bad state
- If one firm fails, all fail

Expected profits (P =price, P_N = wage rate):

$$\Pi^e = \theta P \left[N^\beta - (1 + r_L) P_N N \right] \quad (2)$$

Optimal employment, from 1.o.cond.:

$$N = \left[\frac{P\beta}{(1 + r_L)P_N} \right]^{1/(1-\beta)} \quad (3)$$

Borrowing from bank (L = wage bill):

$$L = P_N N \quad (4)$$

Borrowing depends negatively on r_L

Risk of failure independent of r_L

Initial balance sheet

$$w = A \quad (5)$$

w = net assets, D = deposits, A = Other assets

Balance sheet after lending to firm

$$w = A + (L - D), \quad D = L$$

Gross return on A is $1 + u$, with u uniformly distributed over $[\underline{u}, \bar{u}]$,
 $-1 < \underline{u} < 0$

Density $g(u) = \frac{1}{\bar{u} - \underline{u}}$

If firms fail, bank is able to repay depositors only if $u > u^*$ defined by

$$w(1 + u_*) = L(1 + r_d) \iff u^* = \frac{L}{w}(1 + r_d) - 1 \quad (6)$$

The probability that a bank fails given that borrowers fail is

$$Pr(u < u^*) = \frac{u^* - \underline{u}}{\bar{u} - \underline{u}} \quad (7)$$

The unconditional probability of bank default is then

$$\Pi = (1 - \theta) \frac{u^* - \underline{u}}{\bar{u} - \underline{u}} \quad (8)$$

$$\psi^e = w \int_{\underline{u}}^{u^*} (1+u) \frac{1}{u^* - \underline{u}} du = w \left[1 + \frac{1}{2}(u^* + \underline{u}) \right] \quad (9)$$

If we insert for u_* we get

$$\psi^e = \frac{1}{2} \left[L(1+r_d) + w(1+\underline{u}) \right]$$

Investment alternatives:

Government bond, risk free $1 + r_f$

Bank deposit $1 + r_d$ if bank can pay

Risk neutral households require equal expected returns

$$1 + r_f = (1 - \Pi)(1 + r_d) + \Pi \frac{1}{D} \psi^e = (1 - \Pi)(1 + r_d) + \Pi \frac{w}{L} \left[1 + \frac{1}{2}(u^* + \underline{u}) \right]$$

Insert $u^* = \frac{L}{w}(1 + r_d) - 1$

Solve for r_d : (to be checked)

$$r_d = r_f + \frac{\Pi}{2 - \Pi} \left[1 + r_f - \frac{w}{L}(1 + \underline{u}) \right]$$

- Margin increasing in r_f and L , decreasing in w

Competition means the expected values of what banks receive and pay at the end of period must be equal

From firms they receive $(1 + r_L)L$ with probability $1 - \theta$

To depositors they pay

$(1 + r_d)L$ with probability $1 - \Pi$

$w(1 + u)$ with probability Π

Equality in expectations means

$$(1 + r_L)L = (1 - \Pi)(1 + r_d)L + \Pi \psi^e$$

$$(1 + r_L) = (1 + r_d) + \frac{1}{2} \Pi \left[\frac{w}{L}(1 + u) - (1 + r_d) \right]$$