The Credit Crunch

Macroeconomics IV

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References

- Bernanke, B. and A. Blinder, "Credit, Money and Aggregate Demand," *American EconomicReview,* 78(2), 435-439, May 1988.
- Holmstrom, B. and J.Tirole, "Financial Intermediation, Loanable Funds, and the Real Sector," *Quarterly Journal of Economics*, 112(3), 663-691, August 1997.

Main points

- Banks play a central role in financial intermediation and can be both a source of systemic shocks and an amplification mechanism
- The credit channel is a key ingredient of the monetary policy transmission mechanism

Holmstrom and Tirole

- Firms need external finance for investment I (fixed)
- Project has return R in good state, 0 in bad state
- Moral hazard: if entrepreneur shirks, gets private benefit B, but prob. of good state is only p_L. If not, no private benefit, but prob. of good state $p_H > p_L$
- Monitor (bank): can spend cost C to reduce private benefit B to b, with $b + C < B$.
- Entrepreneur has wealth A, distribution $g(A)$.
- Rate of return to private investors r, to banks $r^B > r$.

Firms fully financed by private investors

- Return to investor in good state R_I is given by zero profits condition (if no shirking is optimal)

$$(I-A)(1+r) = p_H R_I + (1-p_H)0 \Rightarrow R_I = \frac{(I-A)(1+r)}{p_H}$$

- Return to entrepreneur in good state is $R - R_I = R - (I-A)(1+r)/p_H$
- Entrepreneur does not shirk if

$$B \leq (p_H - p_L)\left[R - \frac{(I-A)(1+r)}{p_H}\right],$$

- which yields a critical (private investor financing) value of assets $\overline{A}(r)$:

$$A \geq \overline{A}(r) = I - \frac{p^H}{1+r}\left(R - \frac{B}{p^H - p^L}\right),$$

Firms partially financed by banks

- If I_m is the amount financed by banks and R_m the return to the bank in the good state, the bank's zero profit condition is $I_m(1+r^B) = p_H R_m$.
- The bank has an incentive to monitor if $C \leq (p_H - p_L)R_m$ and R_m is chosen such that this constraint binds (skin in the game)
- Since $r^B > r$, the entrepreneur borrows the minimal amount from the bank, so

$$I_m = \frac{p_H C}{(1+r^B)(p^H - p^L)}.$$

- Return to investor in good state is again given by zero profits condition, which implies $R_I = (1+r)(I - A - I_m)/p_H$.

Firms partially financed by banks

- Return to entrepreneur in good state is therefore

$$T \equiv R - R_m - R_I = R - \frac{C}{p_H - p_L} - \frac{(1+r)(I - A - I_m)}{p_H}.$$

- The entrepreneur does not shirk if $b \leq T(p_H - P_L)$, which implies a critical value for assets:

$$\underline{A}(r^B, r) = I - I_m(r^B) - \frac{p^H}{1+r}\left(R - \frac{b + C}{p^H - p^L}\right).$$

- Hence, the firm is financed by private investors and banks if:

$$\underline{A}(r^B, r) \leq A \leq \overline{A}(r),$$

Equilibrium

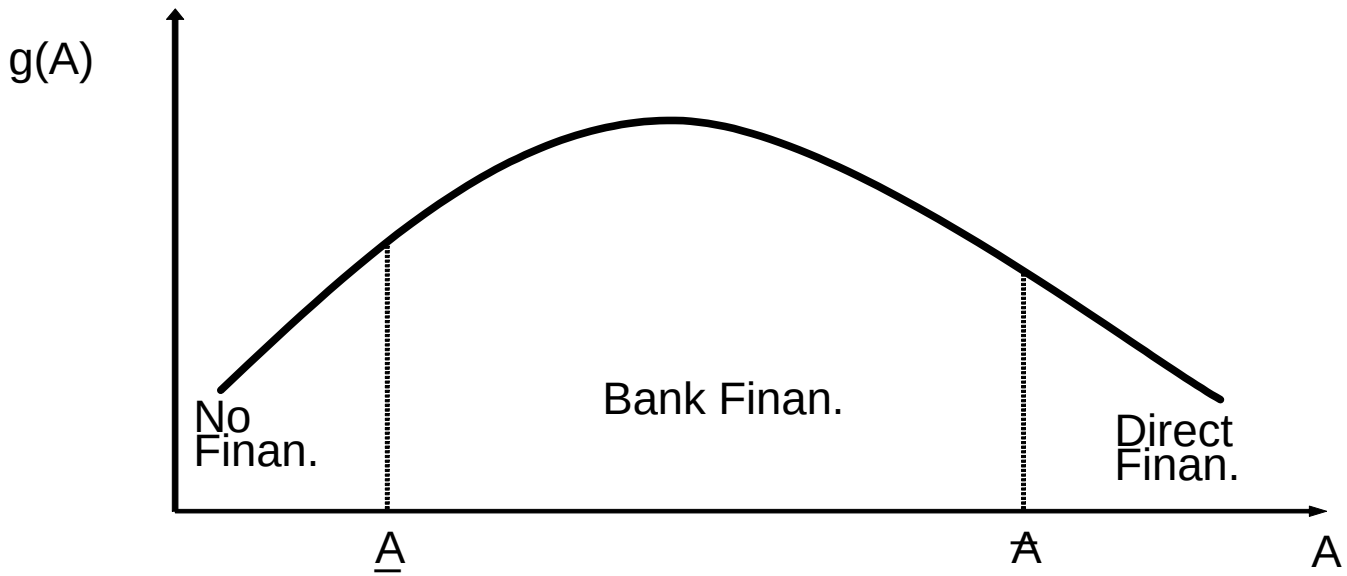
- If K_m is the supply of informed capital (owned by banks), market clearing implies

$$K_m = \left[G(\overline{A}(r)) - G(\underline{A}(r^B, r)) \right] I_m(r^B).$$

- The supply of uninformed (private) capital must satisfy

$$S(r) = \int_{\underline{A}(r, r^B)}^{\overline{A}(r)} (I - I_m(r^B) - A) g(A) dA + \int_{\overline{A}(r)}^{I} (I - A) g(A) dA.$$

Equilibrium



Credit crunch

- Credit crunch (K_m falls)
  - r^B rises, so $\underline{A}(r, r^B)$ rises
  - uninformed capital becomes less scarce, hence, r and $\overline{A}(r)$ fall. Flight to quality.
- Insights extend beyond banks. Informed capital/investors play a special role, which often gives them systemic importance. Very important for EMs.
- (Secondary result: Collateral Squeeze ($g(A)$ shifts to the left): r and r^B fall)

Bernanke-Blinder (based on)

- IS-LM plus one basic modification: Bank loans are imperfect substitutes for bonds (corporate and public)
- **Firms** (aggregate of heterogeneous firms): investment I is financed by bonds B^f (interest rate r_B) and loans L^f (interest rate r_L)

$$I(r_B, r_L) = B^f(r_B, r_L) + L^f(r_B, r_L)$$

$$B_1^f, L_2^f << 0; \qquad B_2^f, L_1^f \geq 0; \qquad I_1, I_2 < 0.$$

Banks

- **Banks:** D^b are deposits, R reserves and L^b and B^b the supply of loans and bonds, then:

$$R + L^b + B^b = D^b (= M),$$

- If α is the reserve ratio, we must have

$$D^b = \frac{R}{\alpha}.$$

- Loanable funds $LF = L^b + B^b$ are

$$LF = D^b - R = R\frac{1-\alpha}{\alpha}.$$

- From the banks' optimal portfolio decision (LF allocation), we obtain (with $\mu_1 < 0$, $\mu_2 > 0$, $\nu_1 > 0$, $\nu_2 < 0$):

$$L^b = \mu(r_B, r_L)R$$

$$B^b = \nu(r_B, r_L)R$$

LM and "IS"

- **LM** (standard):

$$\frac{R}{\alpha} = D^h(y, r_B)$$

with $D_1^h > 0$, $D_2^h < 0$.

- **"IS"** (goods market plus credit market)

$$I(r_B, r_L) + G = S(y, r^B) \tag{1}$$

$$L^f(r_B, r_L) = \mu(r_B, r_L)R \tag{2}$$

with $S_1 > 0$, $S_2 > 0$.

LM and "IS"

- Solving (2) for r_L gives

$$r_L = \phi(r_B, R) \qquad \phi_1 > 0, \phi_2 < 0.$$

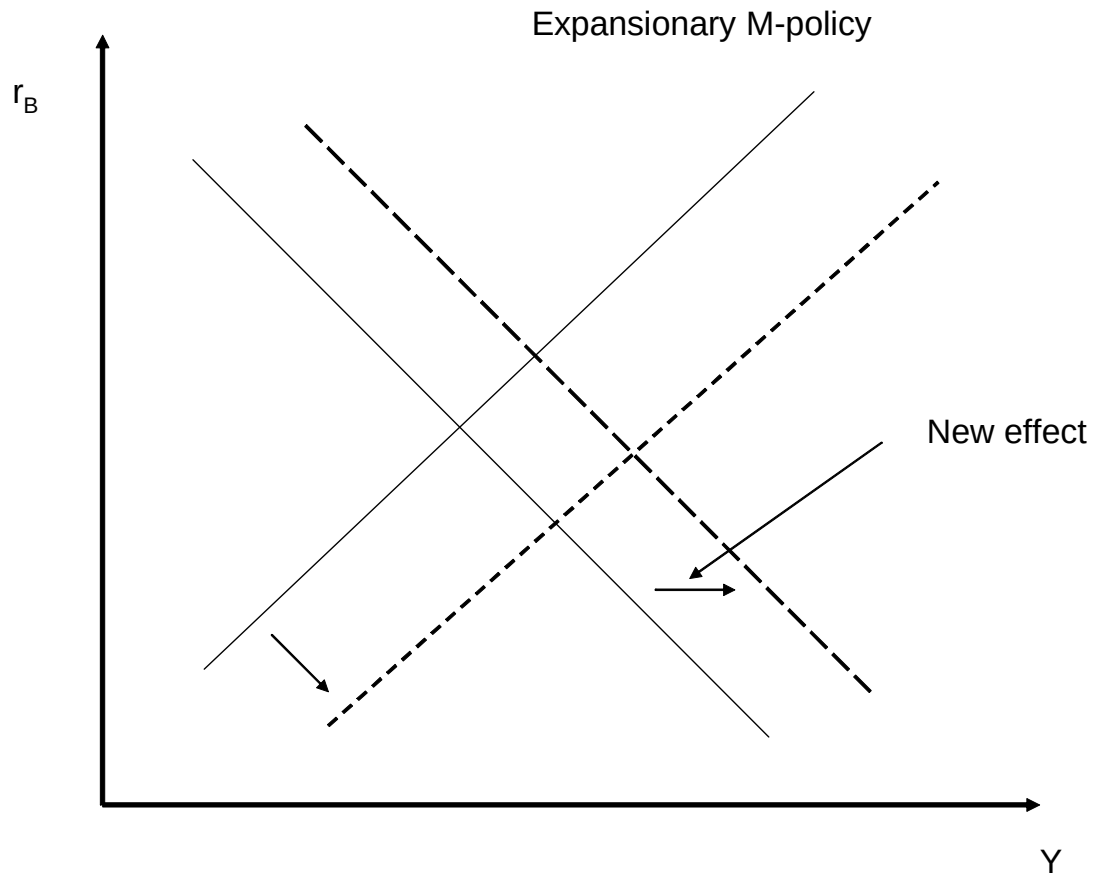
- Substituting in (1) yields the modified IS-curve

$$I(r_B, \phi(r_B, R)) + G = S(y, r^B)$$

with

$$I_R = I_2 \phi_2 > 0.$$

Credit Channel



Credit Channel

- If banks have more access to reserves, they increase loans.
- Frictionless (traditional): banks can always issue CDs (non-reservable funding), thus reserves are irrelevant.
- Evidence:
  - Small vs large banks (latter are less constrained by R)
  - Small vs large firms (former depend more on loans)
- Today (post-crisis): Banks have enormous amounts of reserves... other constraints are more binding.

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