

Banks and bank capital in macro models

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Bank net worth – why not another accelerator?

The bank net worth problem different than the financial accelerator because of

- Limited liability (common in all problems involving equity)
- Explicit or implicit deposit insurance by the government
- Small depositor problem

In the standard debt contract, the lender has incentives to limit the borrower's leverage.

In banking, the private incentives go the other way around: Left unregulated, the banks would tend to excessive risk taking and excessive leverage.

The structure of the banks' liabilities and their asset management are therefore heavily affected by regulation, not by a (contractual) relationship with their depositors.

Van den Heuvel (2008) provides justification for capital adequacy policies and a measure of the welfare cost of such policies.

How to best think of capital regulation?

Capital adequacy ratios are not inequality constraints:

- If a bank falls short of the requirements, it does cease to exist: The regulation only limits its activities (the restrictions are the more severe the more undercapitalised the bank is).
- On the other hand, taking into account uncertainty, banks also wish to avoid approaching the regulatory minimum. Van den Heuvel (2002):

“Even when the capital requirement is not currently binding, the model shows that a low-capital bank may optimally forgo profitable lending opportunities now in order to lower the risk of future capital inadequacy.”

- In reality, most of the banks operate systematically above the regulatory minimum.
- When cast in a first-order approximate model, the regulation would resemble a cost function, decreasing in the bank capital-to-asset ratio. This approach first used by Furfine (2001).

GRAPH HERE

Access to new equity

Everything said above implicitly assumes frictions in equity markets – the banks cannot raise fresh capital freely / costlessly / immediately.

Note that the cost function is a reduced-form approach: The cost function parameters will critically depend on the equity market frictions.

Regulation + equity market frictions = Modigliani-Miller breaks, and the capital-debt structure of the banks matter.

Design of our bank capital extension

Bank assets	Bank liabilities
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Risky loans L_t	Deposits, foreign borrowing F_t
	Bank capital (equity) E_t

Here: no currency mismatches, no maturity mismatches...

Expected earnings at $t + 1$ ($\ell_t := L_t/E_t$)

$$E_t \left[R_{L,t}(1 - g_{t+1}) - R_{F,t}F_t - f(\ell_t - \bar{\ell}) E_t \right]$$

Expected return on equity—-independent of scale of banking

$$E_t \left[R_{E,t+1} \right] = E_t \left[\left(R_{L,t}(1 - g_{t+1}) - R_{F,t} \right) \ell_t + R_{F,t} - f(\ell_t - \bar{\ell}) \right]$$

The banks choose ℓ_t to maximise the expected return.

Optimal lending policy

FOC for optimal ℓ_t :

$$R_{L,t} = \frac{R_{F,t} + f'(\ell_t - \bar{\ell})}{\mathbb{E}_t[1 - g_{t+1}]}$$

Expected return on equity under optimal lending policy:

$$\mathbb{E}_t[R_{E,t+1}] = R_{F,t} + f'(\ell_t - \bar{\ell}) \ell_t - f(\ell_t - \bar{\ell})$$

Because f is concave, the expected return is increasing in ℓ_t .

Actual return on equity will be a function of $\frac{1 - g_{t+1}}{\mathbb{E}_t[1 - g_{t+1}]}$.

Equity market frictions

- Equity only builds up from retained earnings (up to a fixed “dividend” policy to make sure equity behaves well in S/S):

$$E_t = \phi R_{E,t} E_{t-1}$$

where $(1 - \phi) R_{E,t} E_{t-1}$ is transferred to the household budget.

- Generalisation of the above constraint: Households can choose how much equity they would supply subject to adjustment costs. New terms in the budget constraint

$$\cdots R_{E,t} E_{t-1} - E_t - \frac{\xi_E}{2} \left[\log(E_t) - \log(\phi R_{E,t} E_{t-1}) \right]^2 \cdots$$

Setting $\xi_E = \infty$ reproduces the above fixed rule.

The adjustment costs guarantee that the households are willing to add some more equity (to the banks' current period earnings) only if the expected return on equity is sufficiently high.

But we know from the lending FOC that (the expected) return on equity tends to be high when the banks are under-capitalised.