Bank Profitability and Risk-Taking

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Financial institutions after the crisis: facing new challenges and new regulatory frameworks

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Motivation

- Banks are leveraged → incentives for risk-shifting
- Shareholder value reduces risk-shifting
  - Profitability
  - Franchise value, Net worth
  - Capital

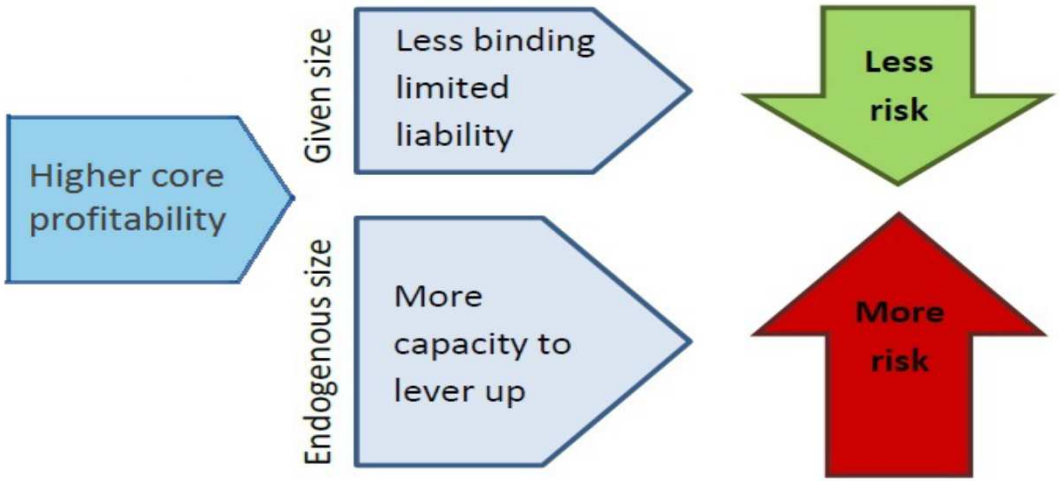
Motivation (cont'd)

- Experience from the crisis seems to contradict this
- Risk-taking in FIs with large and stable **core business**
  - Exposures to risky financial instruments
  - Massive loss of shareholder value
- Examples
  - UBS : wealth management return on allocated capital >30%
  - AIG : profitable insurer, AAA-rated
  - WaMu : dominant in consumer and small business operations

- Why FIs with substantial shareholder value took that much risk ?

Mechanism

- "Usual" risk-shifting models: choose risk of a portfolio of a given size
- In practice: risky investments ***alongside*** stable, profitable core business



- Larger scale may offset lower incentives to take risk of a given size:
  - When easier to lever up (weaker regulation, better creditor rights)
  - With senior funding for risky investments (e.g. repos)

Model: Setup

- One bank with no initial capital, borrows to invest
- Three dates (0,1,2), no discounting, risk neutrality

Model: Investments

- **Core** project (soft information / relationships-based)
  → safe, profitable, limited scale

  1 at **date 0** → ***R*** at **date 2** ***R*-1>0** *core profitability*

- **Market-based** investments (hard information)
  → scalable but less profitable

  Safe (e.g. treasury securities)

  X at **date 1** → **(1+*ε*)*X*** at **date 2** (ε>0)

  Risky (e.g. asset-backed securities)

  X at **date 1** → **(1+*α*)*X*** w.p. ***p*** (α>ε) or **0** w.p. **1-*p*** at **date 2**

- **Abscond** (leverage constraint): after **date 1**, get ***b*(1+*X*)**

Model: Investments (cont'd)

- Risky market-based has negative NPV: $p(1+\alpha) - 1 < 0$
  - but once funding is attracted, the expected return to shareholders is larger than from the safe: $p\alpha > \varepsilon$
- Core project is not credit-constrained: $R-1 \geq b$
- Market-based investments are credit-constrained: $p\alpha < b$

- The banker chooses whether to engage in risky market-based, and at which scale X

Model: Funding

- Two types of creditors
  - date 0: finance core project and charge r_0 (till date 2)
  - date 1: finance market-based investments and charge r_1
- When risky market-based investment produces **0**, bank is insolvent

  Assets' liquidation value R (the value of the core project)

  θX goes to date 1 creditors

  $R - \theta X$ goes to date 0 creditors
- Parameter θ : relative seniority
  - high θ means high seniority of date 1 creditors
    - bank "dilutes" pre-existing date 0 debt through higher seniority of date 1 debt
    - bank cannot commit not to issue senior debt or not to invest in markets
  - exogenous parameter = feasibility of senior debt
  - if endogenous, bank chooses highest possible θ

Timeline

Date 0

- A bank attracts *1* unit of funds at the interest rate r_0 to invest in the core project.

Date 1

- A bank attracts X units of funds at the interest rate r_1 to undertake a market-based investment
- A bank can convert its assets into private benefits $b(1+X)$.

Date 2

- Projects returns are realized and distributed.

Risk-shifting

Requires that debt is not priced at the margin

- Date 0 funding:
  - Exogenous $r_0 = 0$ **:** deposit insurance
  - Endogenous r_0 : interest rate on date 0 debt is set before the bank makes the investment decision at date 1
- Date 1 funding:
  - Endogenous r_1 (e.g. credit provided by informed wholesale markets) and determined by break-even condition (i.e. no friction here)

Solving the model ($r_0 = 0$)

- For $X \leq R\text{-}1$: Bank never takes risk
  (shareholders fully internalize the downside)
- For $X > R\text{-}1$: Incentives to take risk

$$p\,[\,R\text{-}1 + (\alpha\text{-}r_1)X\,] > R\text{-}1 + \varepsilon X$$

with $$r_1 = \frac{(1-p)(1-\theta)}{p}$$

Banker undertakes risky market-based investment only when

(1) its scale is large enough: $$X > X_{\min} = \frac{(1-p)\,(R-1)}{p\alpha - \varepsilon - (1-p)(1-\theta)}$$

(2) date 1 debt is sufficiently senior: $$\theta > \theta^* = 1 - \frac{p\alpha - \varepsilon}{1-p}$$

Solving the model (cont'd)

- Leverage constraint

$$p\,[\,R\text{-}1 + (\alpha\text{-}r_1)X\,] \geq b(1+X)$$

with $$r_1 = \frac{(1-p)(1-\theta)}{p}$$

- Maximum scale of risky market-based investment

$$X \leq X_{\max} = \frac{p\,(R-1) - b}{b - p\alpha + (1-p)(1-\theta)}$$

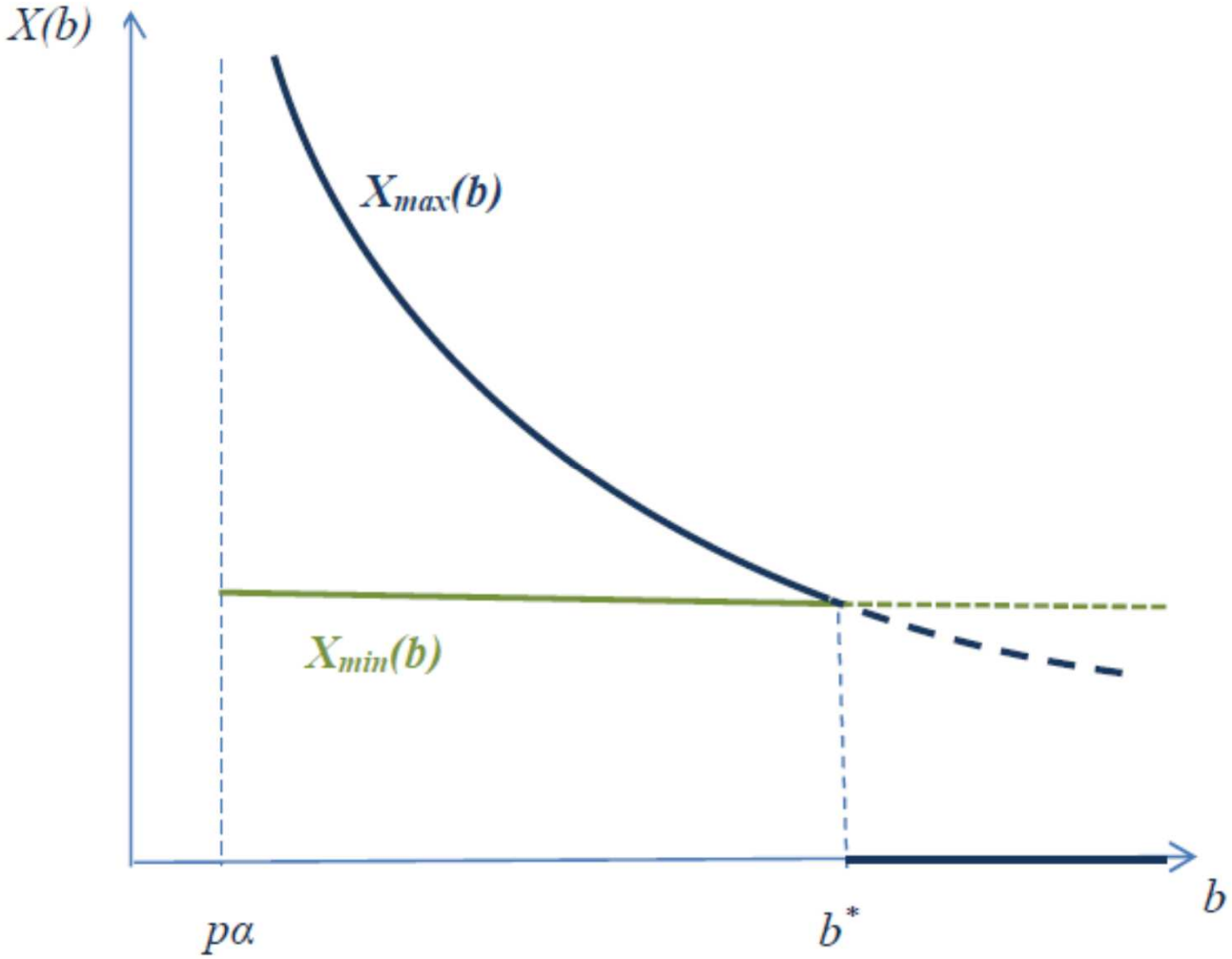
Investment choice

- Exists b^* small enough and θ^* high enough : for any $b < b^*$ and $\theta > \theta^* \rightarrow X_{max} > X_{min}$, so that the bank undertakes the risky market-based investment at scale X_{max}

$$b < b^* = \frac{(p(\alpha - \varepsilon) - (1-p)(1-\theta))(R-1)}{(1-p)(R-1) + p\alpha - \varepsilon - (1-p)(1-\theta)}$$

- **The bank takes risk when its ability to lever up is high (due to lax leverage constraint) and the market-based investment can be funded with cheap senior debt**

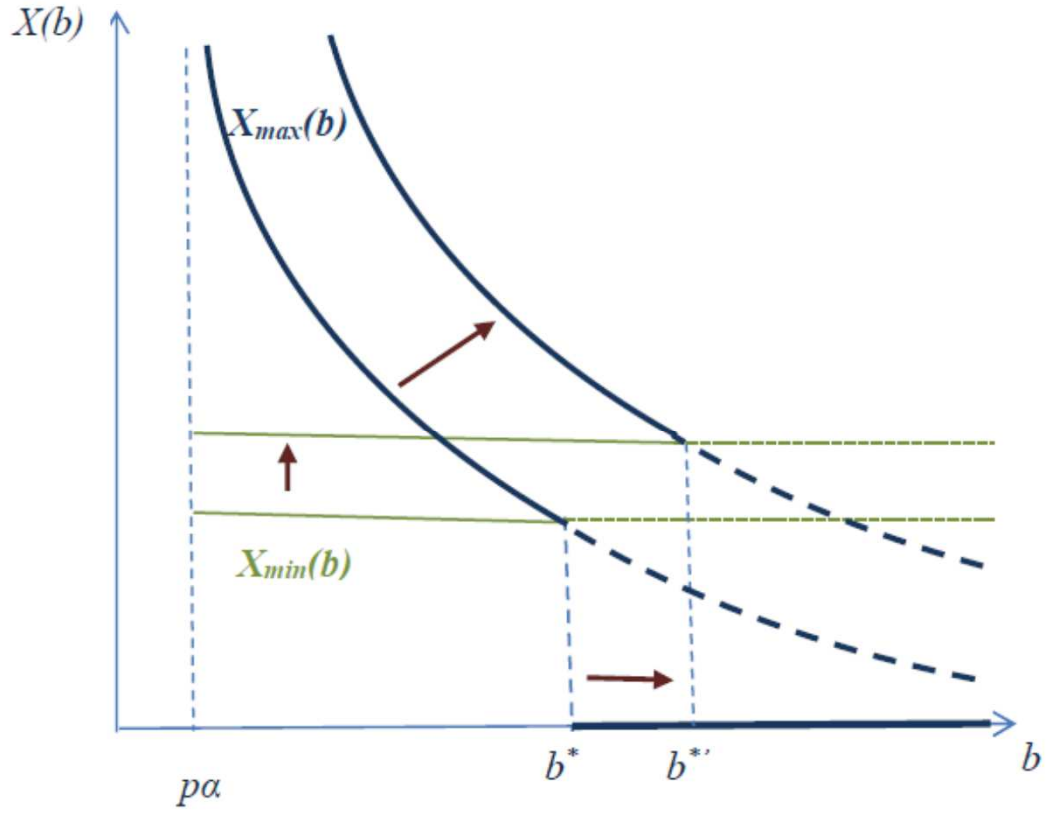
Investment choice (cont'd)



Bank profitability and risk-taking

Proposition

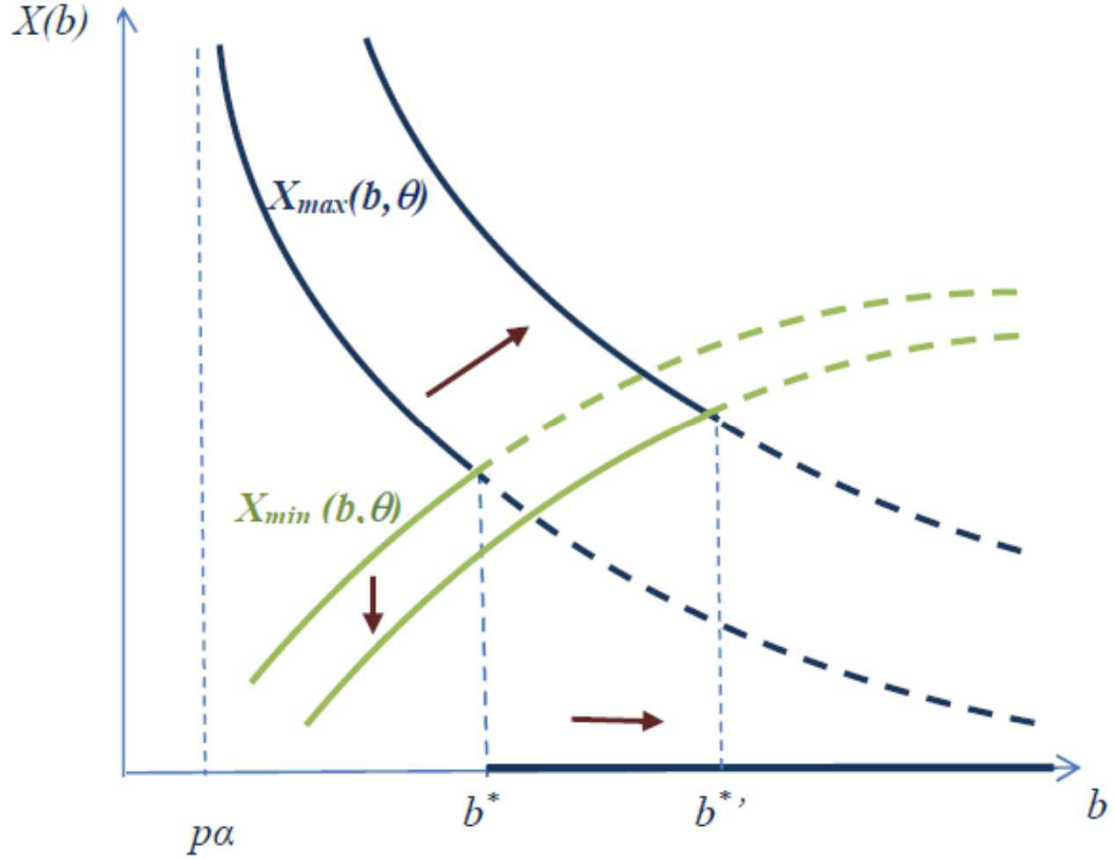
Higher core profitability → bank more likely to undertake risky investment and at a larger scale ($\frac{\partial b^*}{\partial R} > 0$, $\frac{\partial X_{max}}{\partial R} > 0$)



Debt seniority and risk-taking

Result

Risk taking increases when new debt is more senior:



Solving the model (endogenous r_0)

- Traditional risk-shifting model:

$$\uparrow \boldsymbol{r_0} \rightarrow \downarrow \text{core business profitability} \rightarrow \uparrow \text{risk-taking}$$

- Our model:

$$\uparrow \boldsymbol{r_0} \rightarrow \downarrow \text{core business profitability} \rightarrow \downarrow \text{bank's borrowing capacity} \rightarrow \downarrow \text{incentives for risk-taking}$$

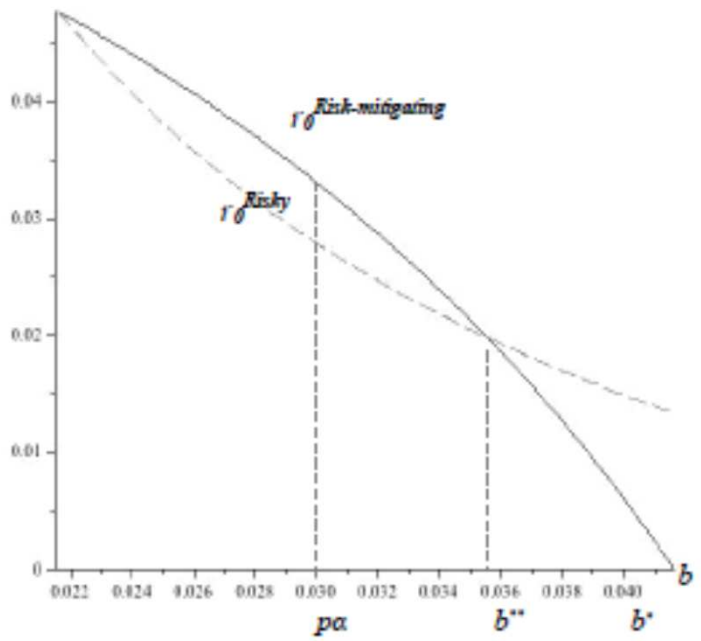
- Risk-mitigating $\boldsymbol{r_0}$ VS. Endogenous $\boldsymbol{r_0}$ (determined by date 0 depositors break-even condition)
- Date 0 creditors set the minimal interest rate such that they at least break even under correctly anticipated bank risk choices

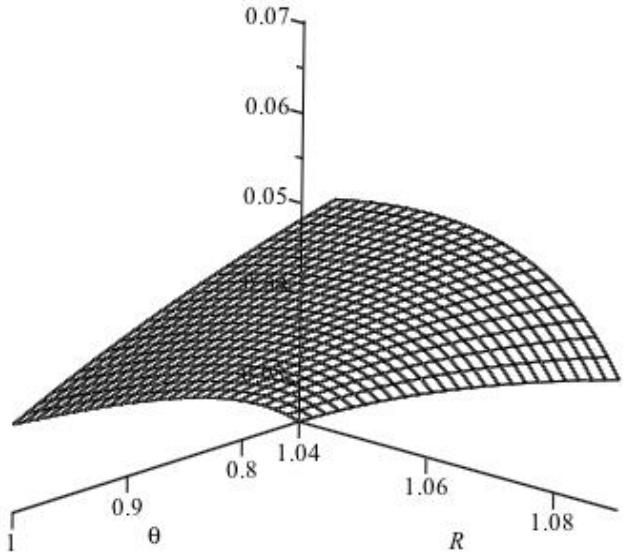
Summary

- When a bank takes risk by levering up
  - Higher core profitability can increase risk-taking because allows the bank to borrow more
  - Environments where easier to lever up more affected (advanced economies / “better” creditor protection)
  - Senior funding (repos) drives risk-taking
- Consistent with evidence from the crisis
- Policy implications

Extensions

- Robust to explicit capital
  - equivalent to the effect of bank profitability
- Non-deterministic core project → bank exerts effort
  - access to a risky market-based investment increases bank's incentives to exert effort in the core project
- Impact of monetary policy (via funding costs)
  - more accommodative monetary policy may have heterogeneous effects on overall bank risk-taking depending on the bank's mix of activities
    - increases bank margins from fixed scale investments
      → higher effort in core business
    - increases the scale of potential market-based investments
      → higher incentives for risk-shifting





- Left panel shows the evolution of the interest rate required by date 0 creditors depending on b, for the following set of parameter values: R=1.07; ε=0.02; α=0.03; p=0.97; θ=0.75.
  - For $b^{**}<b\leq b^{*}$, $r_0^{Risk\text{-}Mitigating}< r_0^{Risky}$; date 0 creditors set $r_{0=}r_0^{Risk\text{-}Mitigating}$ and the bank chooses the safe market-based investment.
  - For $b<b^{**}$, $r_0^{Risky}<r_0^{Risk\text{-}Mitigating}$; date 0 creditors set $r_{0=}r_0^{Risky}$ and the bank chooses the risky market-based investment.

- Right panel shows the evolution of threshold b^{**} depending on core profitability, R, and the feasible date 1 debt seniority, θ, for the following set of parameter values: ε=0.02; α=0.03; p=0.97. Higher R, as well as higher θ, lead to a higher b^{**}, indicating a wider range of parameter values for which a bank undertakes the risky market-based investment.