Comments by Rafael Repullo on

Financing Choices of Banks: The Role of Non-Binding Capital Requirements

by

Jie Gan

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Introduction

- **Empirical observation**

  Banks hold more capital than required by regulation

- **Question**

  Why banks hold excess capital?

- **Relevance**

  Discussion of Basel II focused on minimum requirements

  Perhaps more important is what will happen with total capital

Introduction

- **Existing explanations**
  - Supervisory interference: Prompt corrective action
  - Market discipline: Keep good ratings
  - Preservation of future rents
- **Gan’s explanation**
  - Limited profitable investment opportunities

The model

- **Bank's balance sheet**
  - Fixed capital $c > 0$
  - Endogenous (insured) deposits $d \geq 0$ $\rightarrow$ deposit rate = 0
  - Endogenous assets $a = c + d$ $\rightarrow$ gross return = R
- **Assumptions**

A1 Lognormal returns

$$\log R = \mu - \frac{\sigma^2}{2} + \sigma z, \quad \text{with } z \sim N(0,1) \quad \rightarrow \quad E(R) = e^{\mu}$$

A2 Shareholders are risk neutral and have zero discount rate

A3 Capital requirement: $c \geq ka \iff a \leq c / k = \overline{a}$

Bank's objective function

$$\max V(a) = E[\max\langle \underbrace{aR-(a-c)}_{\text{profits}}, 0\rangle] + \underset{\text{future rents}}{\pi \Pr[aR-(a-c) \geq 0]}$$

By the properties of the normal distribution

$$V(a) = ae^{\mu} N(x) - (a-c)N(x-\sigma) + \pi N(x-\sigma)$$

$$\rightarrow x = \frac{1}{\sigma}\log\frac{ae^{\mu}}{a-c} + \frac{\sigma}{2}$$

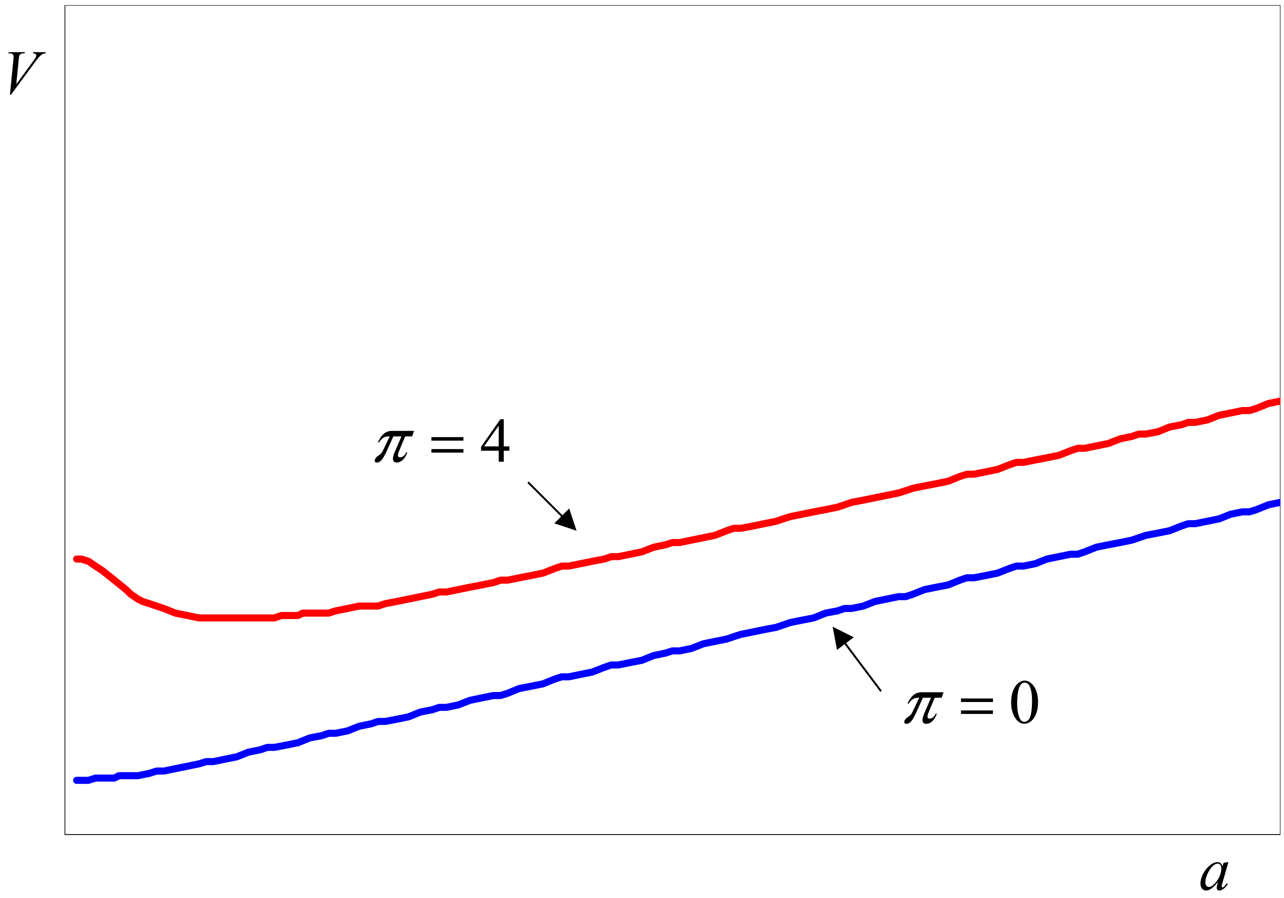
Three cases

- Investment in securities: $\mu = 0$
- Investment in loans: $\mu(a) > 0$, with $\mu'(a) < 0$
- Investment in both loans and securities

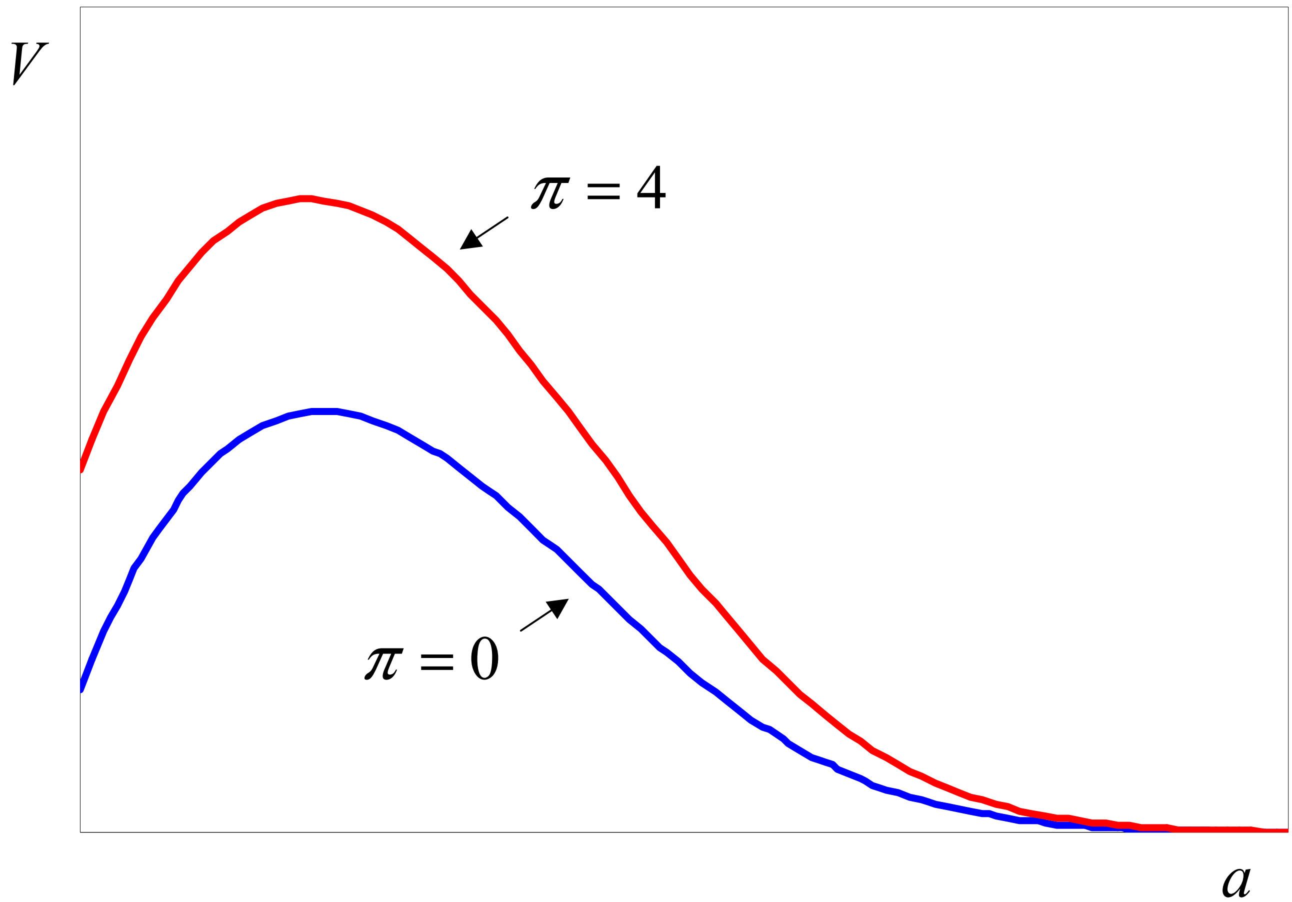
- Functional forms and parameter values

$$\mu(a) = 1 - \frac{a}{20} \quad \text{and} \quad \sigma = 0.35$$

Investment in securities



Investment in loans



Investment in loans and securities

- Return of a portfolio invested in loans (λ) and securities ($1-\lambda$)

$$R = \lambda R_l + (1-\lambda) R_s$$

- Problem: sum of two lognormal variables is not lognormal
- Solution: assume

$$\log R_l = \mu_l - \frac{\sigma^2}{2} + \sigma z \quad \text{and} \quad \log R_s = -\frac{\sigma^2}{2} + \sigma z$$

with the *same* σ and the *same* $z \sim N(0,1)$ for both returns

- Then $\log R = \mu - \frac{\sigma^2}{2} + \sigma z$ with $\mu = \log[\lambda e^{\mu_l} + (1-\lambda)]$

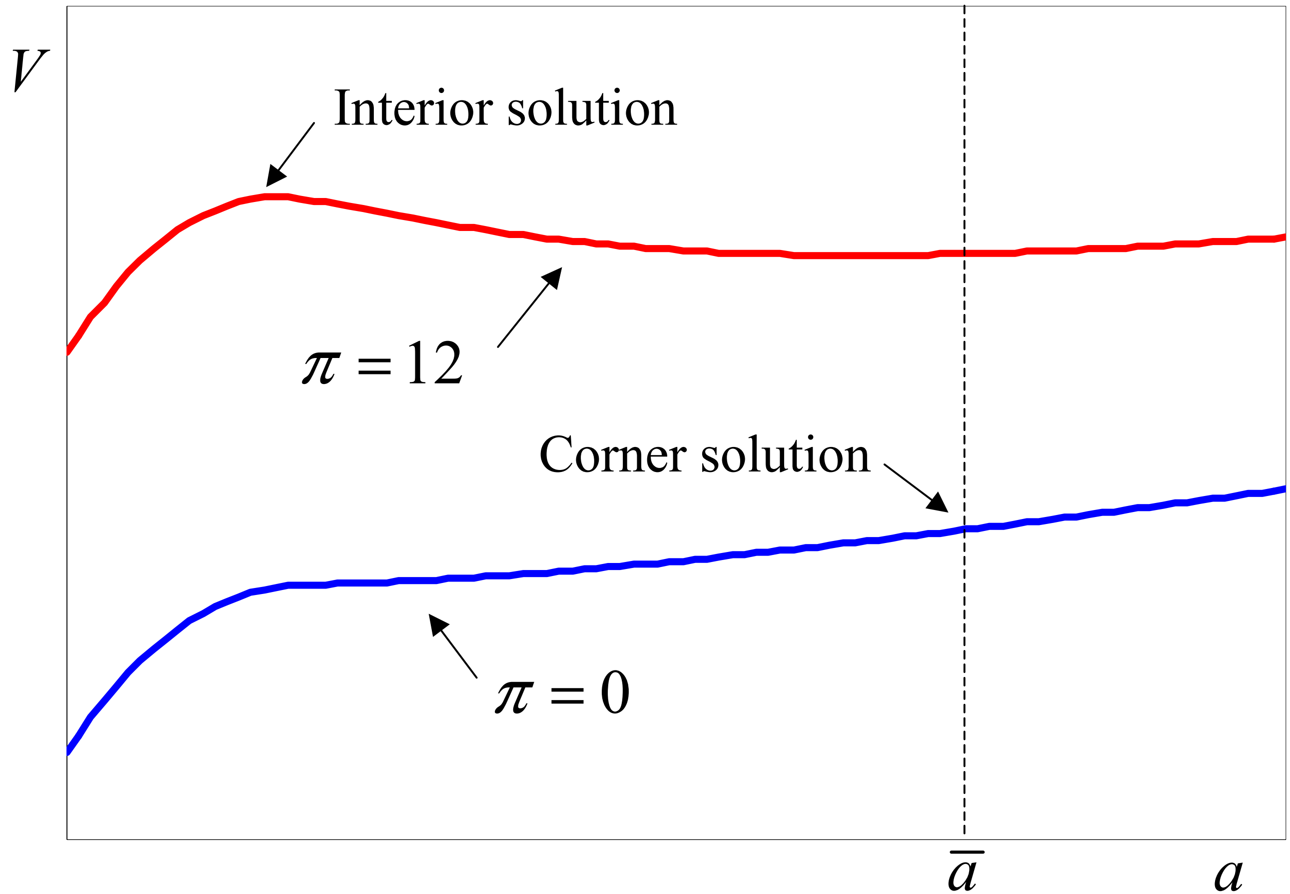
Investment in loans and securities

$$\max V(a,\lambda) = ae^{\mu} N(x) - (a-c) N(x-\sigma) + \pi N(x-\sigma)$$

$$\rightarrow x = \frac{1}{\sigma} \log \frac{ae^{\mu}}{a-c} + \frac{\sigma}{2}$$

$$\rightarrow \mu = \log[\lambda e^{\mu(\lambda a)} + (1-\lambda)]$$

Investment in loans and securities



Main comment

- If $c > ka$ shareholders may prefer to pay excess capital
- For $\pi = 0$ we have corner solution (i.e. binding requirements)

$$V(a,d) = ae^{\mu}N(x) - [a-(c-\underbrace{d}_{\text{dividends}})]N(x-\sigma) + \underbrace{d}_{\text{dividends}}$$

$$\rightarrow \frac{\partial V}{\partial d} = 1 - N(x-\sigma) > 0$$

- For $\pi > 0$ we may have interior solution

Other comments

- For low *a* shareholders would like to short-sell securities ($\lambda > 1$)

  $\rightarrow$ Intuition: same risk factor for both loans and securities

- Future rents should be endogenized

  $\rightarrow$ Bellman equation

$$V^* = \max_a [ae^{\mu}N(x) - (a-c)N(x-\sigma) + V^* N(x-\sigma)]$$

Concluding remarks

- Explanation of non-binding requirements is not convincing

  $\rightarrow$ Requires special distributional assumptions

  $\rightarrow$ Requires to rule out dividend payments

- Fall back to existing explanations
- Need to understand costs of raising (and reducing) bank equity