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A Positive Analysis of Bank Behaviour under Capital Requirements

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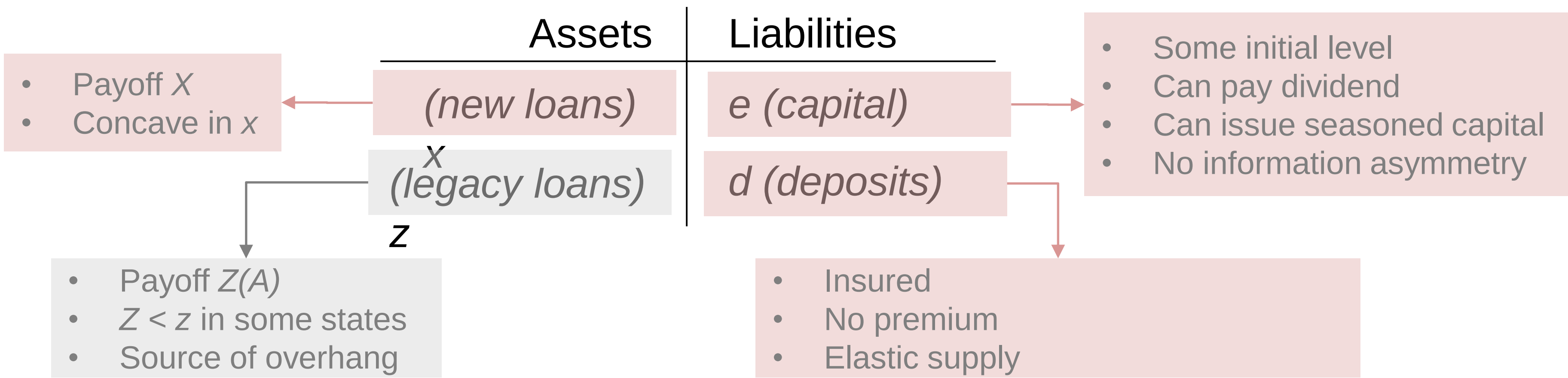
Contribution

- A bank faces an increase in capital requirement
  - Will it raise capital or cut lending?
- Theoretical framework
  - Risk-shifting and debt overhang
- Main takeaway: it depends
  - Lending response typically U-shaped
  - Economic conditions matters
- Test predictions using UK data
  - Find that main margin of adjustment is
  - Lending in bad times but capital in good times

The environment

- Three dates: 0, 1, and 2, random variable $A \in [A_L, A_H]$
- A bank and risk-neutral households



- Capital requirement: $e \geq \gamma(x + z)$
- Three choice variable, but
  - Focus on binding capital requirement: $e = \gamma(x + z)$
  - Balance sheet identity: $d = z + x - e$

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The problem of the bank

- Economic surplus: $E\left[X + Z(A) - (x+z)\right]$
- Private surplus: $E\left[X + Z(A) - (1-\gamma)(x+z)\right]^{+} - \gamma(x+z)$
- FOC: $\boxed{\int_{A_0}^{A_H} \left(X_x - (1-\gamma)\right) f(A)\,dA - \gamma = 0}$

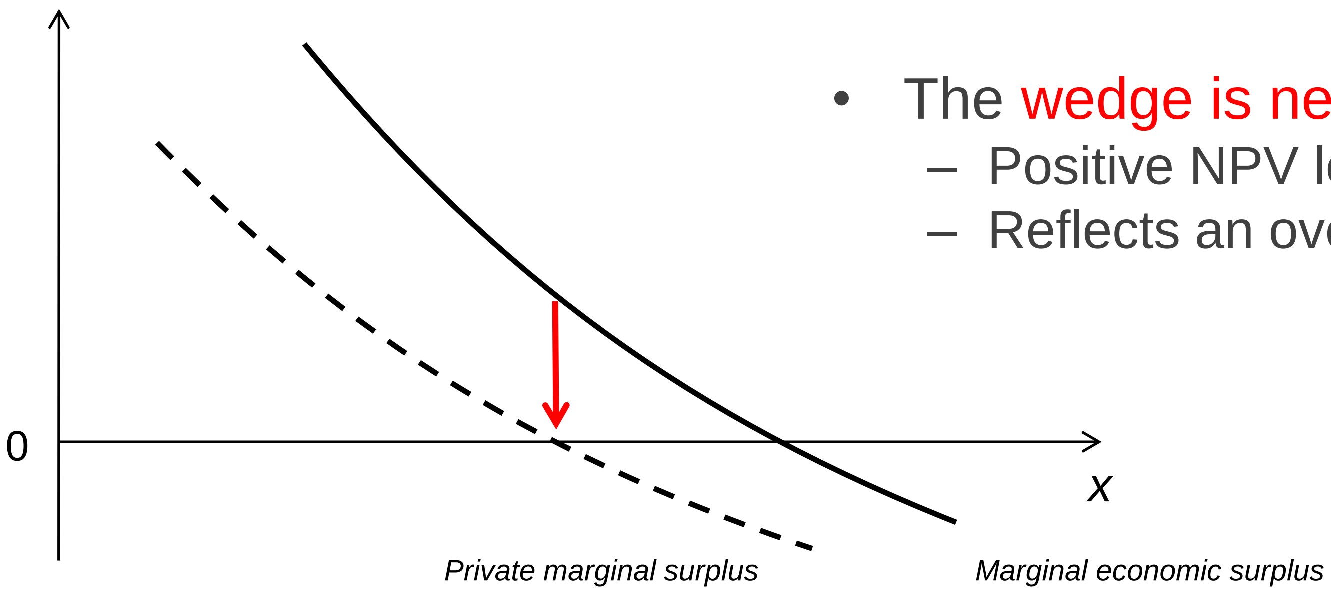
  where A_0 is the default threshold

- Define $\pi(x,\gamma) \equiv \int_{A_0(x,\gamma)}^{A_H} f(A)\,dA$

$$X_x - \left(1 - \gamma + \frac{\gamma}{\pi(x,\gamma)}\right) = 0$$

The overhang problem

$$\boxed{\int_{A_0}^{A_H} (X_x - (1-\gamma)) f(A) dA - \gamma = 0} \implies X_x - 1 + \int_{A_L}^{A_0} ((1-\gamma) - X_x) f(A) dA = 0$$



- The wedge is negative
  - Positive NPV loans are not issued
  - Reflects an overhang problem

- How does γ affect wedge?
- Comparative statics with respect to γ based on the FOC

Conditional reasoning

$$\underbrace{X_x}_{\text{mr}} - \underbrace{\left(1 - \gamma + \frac{\gamma}{\pi(x,\gamma)}\right)}_{\text{mc}} = 0$$

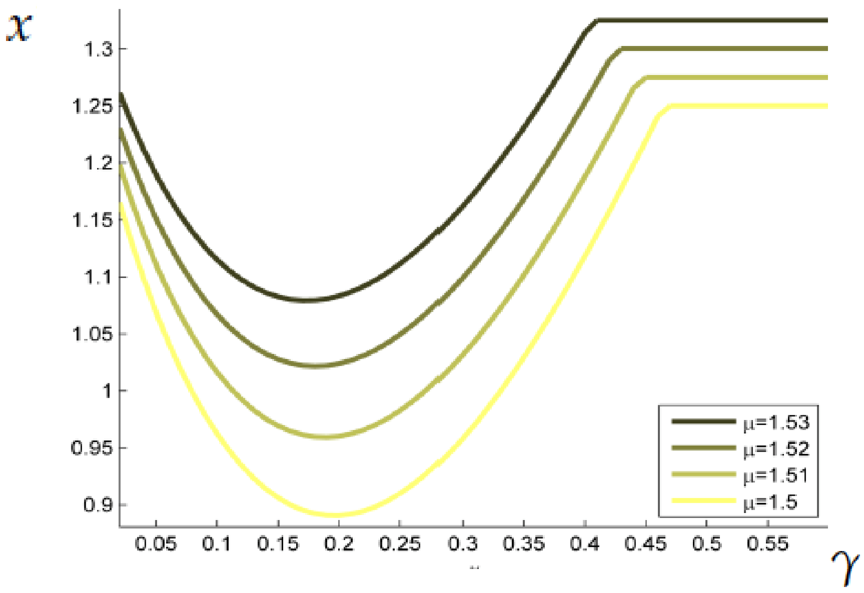
- The sign of $\frac{dx^*}{d\gamma}$ hinges on conditional marginal cost

$$\frac{d\text{mc}}{d\gamma} = \underbrace{\frac{1}{\pi} - 1}_{\substack{\text{composition effect} \\ > 0}} + \underbrace{\gamma \frac{\partial \pi}{\partial \gamma}\left(\frac{-1}{\pi^2}\right)}_{\substack{\text{price effect} \\ < 0}}$$

As $\pi \to 1$, price effect dominates!

The U-shape

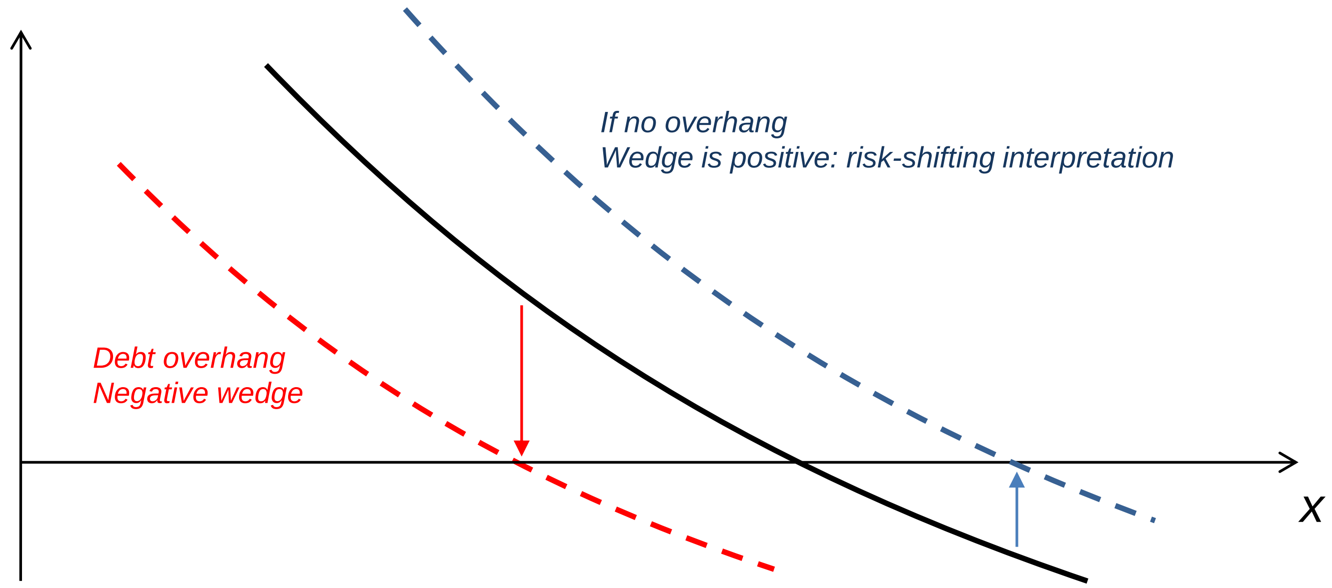
- Equilibrium lending as a function of γ



- Changes in economic conditions, for instance *E[A]*, shift the relationship

Risk-shifting

- Assume *X* also depends on *A*



- Either can dominate
- $\frac{d\text{mr}}{d\gamma} < 0 \;\rightarrow\; \text{internalisation effect}$
- Reinforces the composition effect; but price effect can still dominate

Empirics

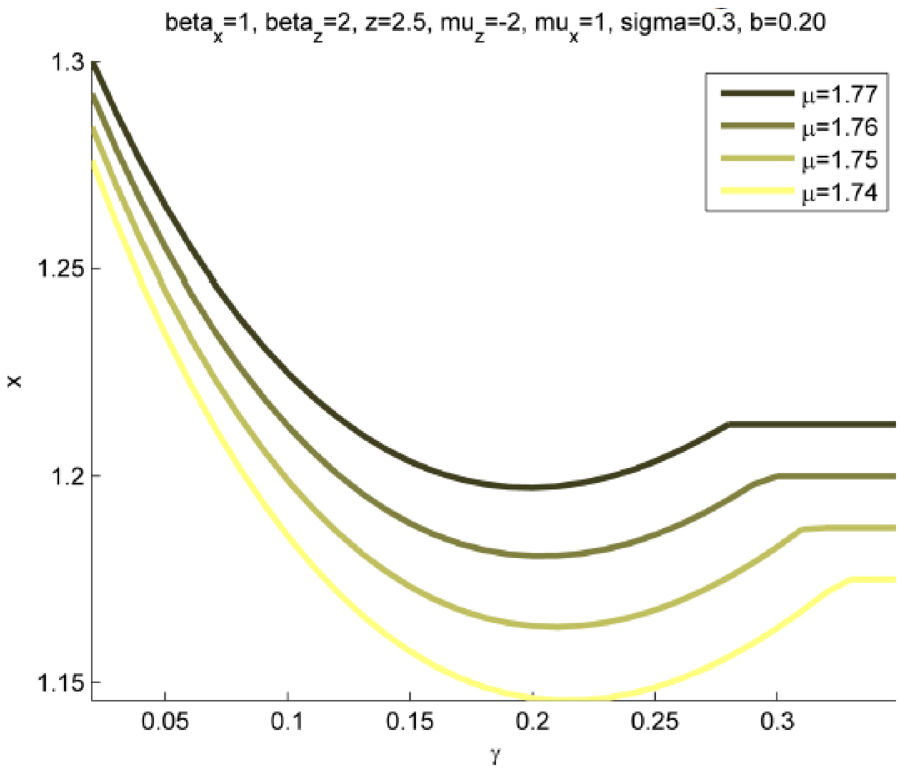
- We use regulatory UK data (Basel I)
  - Changes to individual capital requirements
  - Test the interaction with economic conditions
  - We can control for what other banks do
- Find that the main margin of adjustment is
  - Lending in bad times
  - Capital in good times
- Consistent with prediction on
  - how economic conditions "shift" the U-shape

Conclusion

- Capital requirement under Basel III
  - Overall increase
  - Time varying adjustments
- Intellectual debate
  - Costs and benefits
  - Normative and general equilibrium questions
- Tractable general equilibrium analysis
  - Requires stark assumptions on bank individual behavior
- Understanding the determinants of such behavior is essential

Thank you

Overhang and risk-shifting



Lending response

Figure 3: Lending and lending response in the general case