

Leverage Restrictions in a Business Cycle Model

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Outline

- Force in static model.
- Why leverage constraints matter?
- Dynamic Considerations.
- Comment.

- Two Players.
 - Households and Bankers.
 - Endowment: C.
 - Endowment: N.
 - Risk-Neutral Preferences.

- Technology
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 - Risky, $\bar{R}^G > \bar{R}^B > 1$.
 - Chooses return probability
 - Effort cost: $C(p)$.

- Markets
 - \bar{R} -contingent debt.
 - Effort, not contractible.
 - Static Contracts (anonymity)

Household's Problem

- Interperiod Loan:

$$\max_d (c - \varphi(d)) + Rd$$

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- Solution implies:

$$R(d) = \varphi'(d)$$

Banker's Problem

- Without LLC:

$$\max_{p \in [0,1], D} (D + N) (p\bar{R}^G + (1 - p)\bar{R}^B) - D (pR_D^G + (1 - p)R_D^B) - \frac{1}{2}p^2$$

subject to:

$$pR_D^G + (1 - p)R_D^B \geq R$$

Banker's Problem

- Arranging terms:

$$\max_{p \in [0,1], D} (D + N) (p\bar{S} + \bar{R}^B) - DR - \frac{1}{2}p^2$$

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FOC:

$$\begin{aligned} p &: (D + N) \bar{S} = p \\ D &: p\bar{S} - \bar{R}^B \geq 0 \end{aligned}$$

Solution

- Without LLC, market solution and planner solution coincide
- Implemented with $R_D^G = R_D^B = R$.

Banker Problem with LLC

- With LLC

$$\max_{p \in [0,1], D} (D + N) (p\bar{S} + \bar{R}^B) - DR - \frac{1}{2}p^2$$

subject to

$$LLC : (D + N) \bar{R}^B - DR_D^B \geq 0, (D + N) \bar{R}^G - DR_D^G \geq 0$$

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 - Not really, objective is independent of (R_D^G, R_D^B)

Banker Problem with LLC

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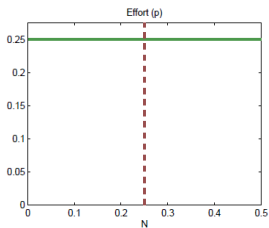
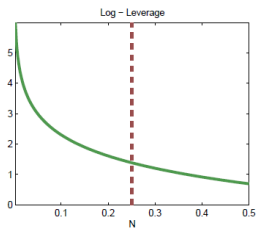
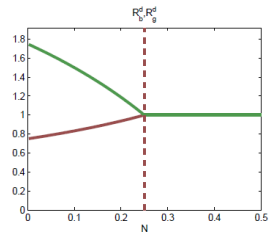
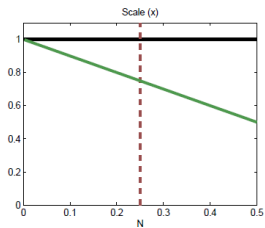
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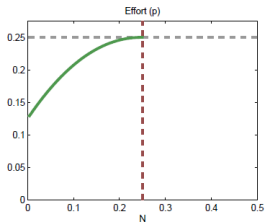
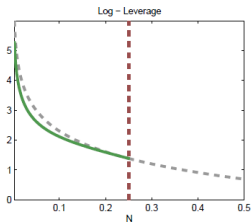
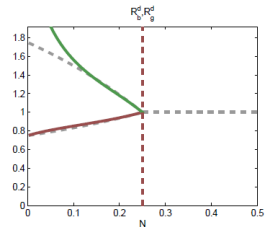
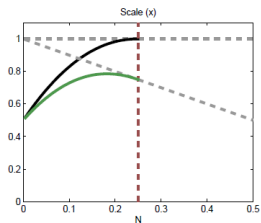
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- Effort Distortion?
 - Not really, objective is independent of (R_D^G, R_D^B)
- However LLC may bind.
 - Threshold N: $N^* = D (R(D) / \bar{R}^B - 1)$.

LLC - R constant



DRS to Intermediation - R elastic



Hidden Effort

- Effort is not contractible (verifiable, observable)
- Commitment issue
- Ex-post value is:

$$\max_{p \in [0,1]} (D + N) (pS + \bar{R}^B) - D (ps + R_D^B) - \frac{1}{2}p^2$$

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- Need to take constraint into consideration.

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- Now objective is

$$\max_{p \in [0,1], D} (D + N) (pS + \bar{R}^B) - DR - \frac{1}{2}p^2$$

subject to:

$$IC : (D + N) S - sRD = p$$

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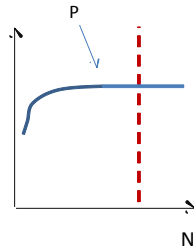
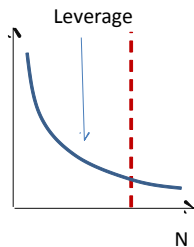
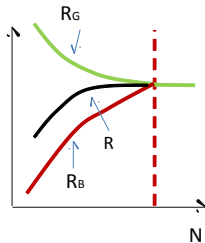
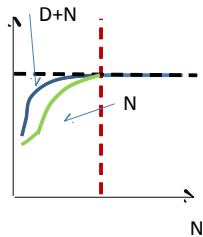
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Key Features

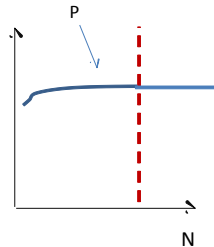
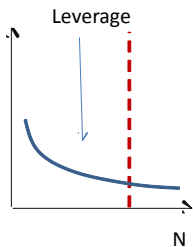
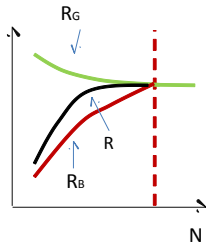
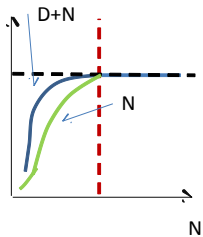
- Non-contractible effort
 - Distorts effort from first best.

- R elastic.
 - Pecuniary externality.
 - Individual banks don't internalize effects on dynamic incentives.

Key Features



Leverage Constraints



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- Summary
 - In bad times, less volume but higher effort and profits.
 - In good times, less volume but higher N in bad state.

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- Now $p(D)$ increasing in D .

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 - E.G. Christiano Ikeda
- Everything else equal.

Comparing Alternative _____

- Stylized facts (Correlation with N):

	CI	Behavioral
$E[\Delta Y_t]$	+	+
$V[\Delta Y_t]$	-	-
R	+	+
P_t	+	+

Alternative Model

- Effects of leverage constraint:

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- Difference?
 - Hidden Variable. E.

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 - Natural experiment.
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- Prudential about macro-prudential policy.
 - Lucas critique squared.

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- Challenge: identify friction