

Evaluating the role of limited liability and banking regulation in financial crises?

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Plan

- The Institution of limited liability
- Banks and limited liability in economic history
- Recent concerns about limited liability and the financial crisis
- A credit cycle model to investigate the role of limited liability
- Results

2

The institution of limited liability

Limited liability

- While the limited liability corporation has been called "...the greatest single discovery of modern times" and the "the most remarkable institutional innovation of the past two centuries"* it has ever been controversial
- Principal-agent problems are inherent to corporations and critics of limited liability (on the left and the right) have argued that limited liability fails to solve principal-agent problems adequately
- Such criticism has re-emerged with vigour in the literature on the international financial crisis**

* Wolf, M. (2002). A manager's real responsibility: corporations are increasingly encouraged to play a social role. *The Financial Times*. London, 30 January 2002: 1.

** Sims, H. W. (2008, 6 February 2009). "What can be learned from the banking crisis." VOXEU. from <http://www.voxeu.org/index.php?q=node/2701>.

4

Banks and limited liability in economic history

Limited liability emerged with economies of scale

- Limited liability emerged with expanding trade to and from Medieval Italian cities, for maritime trade (the *commenda*) and over land*
- In the early modern Netherlands limited liability emerged for investment in the VOC**
- Crucially, limited liability emerged as a by-product of creating a liquid secondary market in VOC shares, which mobilised savings and lowered interest rates

* Carney, W. J. (1998). *Limited Liability*. Encyclopedia of Law and Economics. B. Bouckaert and G. De Geest. New York, Edward Elgar Publishing.

** Gelderblom, O. and J. Jonker (2004). "Completing a Financial Revolution: The Finance of the Dutch East India Trade and the Rise of the Amsterdam Capital Market, 1595-1612." *The Journal of Economic History* 64(3): 641-672.

6

Continental developments

- Napoleon's legal reforms provided limited liability in 1807
- And he carried these reforms to countries subsequently conquered, including the German provinces, Prussia, Italy, Switzerland etc.**

* Carney, W. J. (1998). Limited Liability. Encyclopedia of Law and Economics. B. Bouckaert and G. De Geest. New York, Edward Elgar Publishing.

7

The UK lagged behind

- While England showed the way in the industrial revolution, it resisted a move to free incorporation for companies and especially limited liability until the mid-nineteenth century
- The legal context for this resistance is instructive, i.e. the Bubble Act of 1720 (South Sea Bubble – no new incorporation)
- Even Adam Smith was concerned about the principal-agent problems likely to emerge from limited liability*
 - Though he was willing to make an exception for Banks

* Anderson, G. M. and R. D. Tollison (1982). "Adam Smith's Analysis of Joint-Stock Companies." The Journal of Political Economy 90(6): 1237-1256.

8

Major steps along the way

- The repeal of the Bubble Act (1825)
- Joint Stock Companies Act (1844)
- Limited Liability Act (1855)
- Companies Act (1856)
- **City of Glasgow Bank collapsed in 1878**
- Victorian Banks therefore operated for a long time with unlimited liability, as did Banks in colonies such as The Cape Colony

9

The angry critics

- The arguments of the critics have a familiar ring:
- Defending the Bubble Act in 1807 Lord Ellenborough referred to limited liability as "...a mischievous delusion calculated to ensnare the unwary public**"
- In Parliament in 1810 Joseph Marryat railed against the possibility that "*if a company should at any time become insolvent, the individual members would still remain in affluence and be driven in their coaches by the person's ruined... all the evils of 1720 will be repeated***"

* Quoted in Hunt, B. C. (1935). "The Joint-Stock Company in England, 1800-1825." The Journal of Political Economy 43(1): 1-33.

10

Unlimited liability for South African Banks

- The Cape Colony tracked the institutional developments in the UK from the early nineteenth century*
- This meant unlimited liability for banks until 1846, when the Colonial Banks Regulations (1846) substituted double liability for unlimited liability**
- Hence banks remained small and local until limited liability allowed the emergence of two large banks in the 1860s
- In the USA double liability lasted until the Great Depression**

* Webb, A. C. M. (1997). "Unlimited and Double Liability Banking in the Cape Colony." South African Journal of Economics 65(3): 173-184.

** Marquis, R. W. and F. P. Smith (1937). "Double Liability for Bank Stock." American Economic Review 27(3): 490-502.

11

Pros and Cons of limited liability

| Pros | Cons |
|---|-----------------------------|
| Facilitates risk taking/ management | Principal-agent problems |
| Larger capital stock | Undue risk taking |
| More liquid investments | |
| Avoids expensive litigation with shareholders | |

Purpose of limited liability

- While limited liability allows for more risk taking and we have observed this in past and present crises
- Our interpretation of this brief history is:
 - Limited liability emerged primarily as an institution built to mobilize larger capital stocks than individuals would be willing to invest if personally liable
 - Hence allows economies of scale to be exploited to a much greater extent than without it

Recent concerns about limited liability and the financial crisis

Recent concerns about limited liability and the financial crisis

- Hans-Werner Sinn (2008)* placed limited liability for banks at the core of the crisis
 - "These liability constraints lead to systematic disregard of disaster risks... If things go well investors reap the full profit. If things go badly, at worst their losses would be limited to the stock of equity invested... This asymmetric situation encourages bold behaviour and risk-taking..."
 - And he opposed limited liability for individuals in mortgage transactions
- This echoes earlier concerns about the "mischievous delusion" of limited liability and the "coaches" of the wealth of former bankers

* Sinn, H. W. (2008, 6 February 2009). "What can be learned from the banking crisis." VOXEU. from <http://www.voxeu.org/index.php?q=node/2701>.

15

A credit cycle model to investigate the role of limited liability

The model

- We build on Kiyotaki and Moore's (1997)* credit cycle model to investigate Sinn's hypothesis
- Built on strong simplifying assumptions - provides a simple framework for thinking about the nature of the transmission mechanism and its dependence on parameters

* Kiyotaki, N. and J. Moore (1997). "Credit Cycles." Journal of Political Economy 105(2): 211-248.

17

Limited Liability in the Model

- Perfect foresight: No risk of bankruptcy, no real liability
- Explore the "other side" of limited liability i.e. in the model we interpret limited liability as allowing greater risk taking on two fronts
 - How much is lent
 - How easily it is lent

18

Second Interpretation

- Some ascribe the crisis to the relaxation of lending standards in the US
- E.g. Lower documentation requirements, etc.
- Simply: easier lending standards
- The model is perhaps better framed in this sense

19

Agents in the model

- Banks
- Household-firms (yeoman farmers)
- Fixed capital stock (housing)

20

Behaviour of the agents (1)

- Banks
 - Can only invest (directly) in a diminishing returns technology
- Household-firms
 - Can invest in a linear production technology

$$y_{t+1} = G(k_t)$$

$$y_{t+1} = (a + c)k_t$$

21

Linear Production Technology

- Captures high returns at low capital levels in a simple way
- Assume (as in KM) that a portion $\left(\frac{a}{a+c}\right)$ is tradable
 - This constrains the maximum savings rate and determines evolution of the model

22

Optimization Problem

- Assume both types of agents maximize a linear utility function

$$\max_{\{x_t, b_t, k_t\}} \sum_{s=0}^{\infty} \beta^{-s} x_{t+s}$$

- Linearity and identical agents implies

$$R_t = \frac{1}{\beta}$$

23

Constraints (1): House-buyers

- Flow-of-funds constraint: $y_t + b_t = Rb_{t-1} + x_t + i_t$



- Investment

- New Housing Capital $a_t(k_t - k_{t-1})$

- Depreciating Complementary Capital $\phi(k_t - \lambda k_{t-1})$

24

Constraints (2): Household-firms

- Borrowing Constraint:
 - House-buyers with negative net-worth will default
 - Hence the most accommodating borrowing constraint:
 - We interpret *unlimited liability* as inducing a more prudent/tighter constraint:

$$Rb_t \leq q_{t+1}k_t$$

$$Rb_t \leq \theta q_{t+1}k_t$$

$$0 \leq \theta \leq 1$$

25

Constraints (3): House-buyers

- To model the loan approval process:
 - Assume only a fraction π of potential investors get to invest in each period
 - Initially, π is exogenous (gives rise to cycles)
 - Slight generalization:

$$\pi(q), \pi'(q) > 0$$

26

Characterization: Household-firms (1)

- If R is small enough, household-firms will:
 - Consume only non-tradable output:
 - Borrow up to their limit:

$$x_t = ck_{t-1}$$

$$b_t = \theta \frac{q_{t+1}k_t}{R}$$

27

Characterization: Household-firms (2)

- In each period, a fraction π of household-firms can invest
 - The FBC gives the desired investment
 - Fraction $(1-\pi)$ cannot invest, and simply keep undepreciated housing:

$$k_t = \lambda k_{t-1}$$

28

Characterization: Banks

- Banks are unconstrained in equilibrium
 - Provide funds to household-firms
 - "Portfolio decision"
- Invest in DRS technology all wealth that is not lent out
 - Marginal Condition:

$$\frac{1}{R}G'(k_t) = q_t - \frac{q_{t+1}}{R}$$

29

Characterization: Banks

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User Cost of Housing

$$\frac{1}{R}G'(k_t) = q_t - \frac{q_{t+1}}{R}$$

30

Characterization: Equilibrium

- $\{K_t, B_t, q_t\}_{t=0}^{\infty}$ is fully described by 3 equations:

$$K_t = (1 - \pi) \lambda K_{t-1} + \frac{\pi}{\phi + q_t - \theta \frac{q_{t+1}}{R}} [(a + q_t + \lambda \phi) K_{t-1} - R B_{t-1}]$$

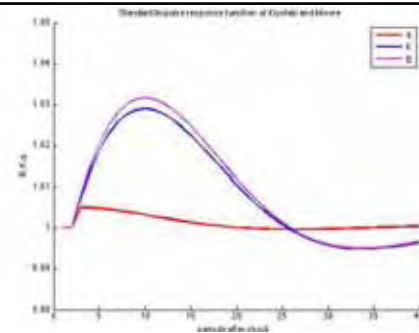
$$B_t = R B_{t-1} + q_t (K_t - K_{t-1}) + \phi (K_t - \lambda K_{t-1}) - a K_{t-1}$$

$$u(K_t) = \frac{1}{R} G' \left(\frac{1}{m} [\bar{K} - K_t] \right) = q_t - \frac{q_{t+1}}{R}$$

Calibration and Results

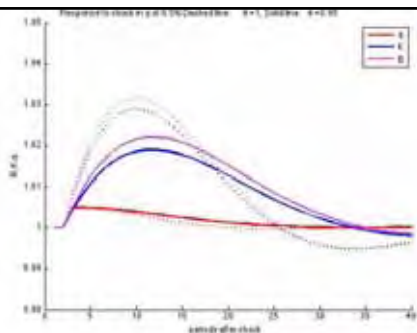
Calibration

- We follow Kiyotaki and Moore's assumptions in calibrating the model
- At this stage, the calibration is not the main concern - we are merely interested in the nature of the model in relation to a few features of the current crisis
- In Brief:
 - Household firms hold 66% of steady state capital
 - Interest rate is approximately 4%
 - Depreciation rate of complementary capital 10%



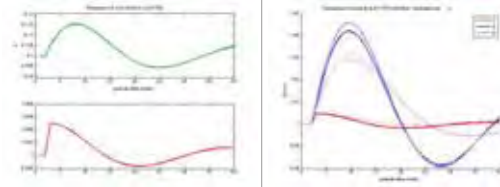
Baseline case

Credit cycle as in Kiyotaki and Moore

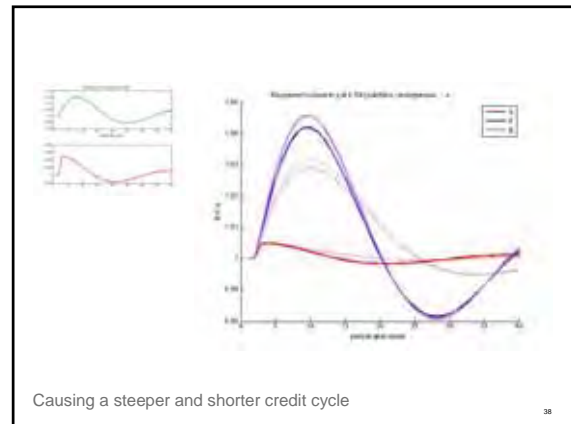
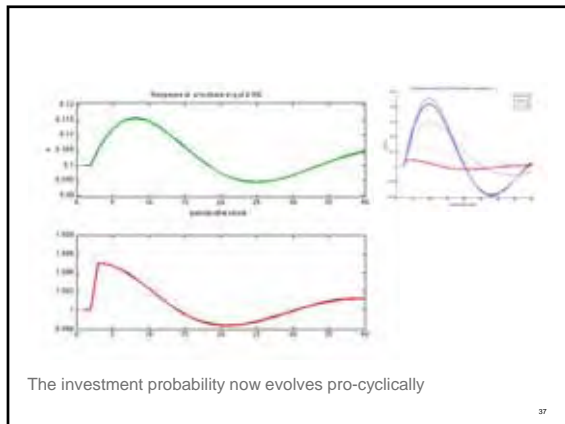


Increasing the liability of bank shareholders

The credit cycle has lower amplitude but more persistence



Endogenising the investment opportunities



Summary and conclusions

- ### Summary
- Asset price inflation and credit are central factors in the ongoing international financial crisis
 - We respond to recent arguments that the institution of *limited liability* for the shareholders of financial institutions create the breeding ground for such crises
 - We investigate this hypothesis by adjusting the credit cycle model of Kiyotaki and Moore (where asset price inflation and its impact on net worth generates a credit cycle)
 - We also allowed net worth to affect the investment opportunities open to household-firms
- 40

- ### Conclusions
- Kiyotaki and Moore showed that credit and asset price cycle can arise in perfect foresight models
 - Our model showed that degrees of liability for the bank shareholders affects the amplitude and persistence of these cycles
 - Our results do not support the hypothesis that limited liability is a central causal factor of the crisis
 - Next step: include uncertainty and information asymmetry
- 41

End