"Capital Requirements in a Quantitative Model of
Banking Industry Dynamics"
By Corbae and D'Erasmo

Comments by Charles M. Kahn

For Conference on Monetary Economics
honoring Warren Weber
Federal Reserve Bank of Atlanta
February 17-18, 2012

- Kahn, C.M., "The Use of Complicated Models as Explanations: A Re-examination of Williamson's Late 19th Century America", *Research in Economic History*, Vol. 11, 1988, pp. 185-216.

- Williamson, J.G. *Late nineteenth-century American development: a general equilibrium history*, Cambridge University Press 1974.

Elements of the Corbae-D'Erasmo Model

- Borrowers have in aggregate an upward sloping supply of one-period risky projects
  - Returns partly depend on aggregate technology shocks
  - Limited liability
  - Return characteristics and reservation value private information
  - Higher borrowing rates induce riskier choices.

Finance

COLLEGE *of* BUSINESS
at ILLINOIS

Elements of the Model

- Potential Depositors
  - Risk averse
  - Risk free storage alternative
  - Taxed lump sum
  - Matching technology for meeting borrowers or making deposits in banks

COLLEGE *of* BUSINESS *at* ILLINOIS

- Elements of the Model

- Banks hold loans and securities (riskless government bonds and interbank loans)
- Banks provide diversification of lending risk to depositors
- Banks borrow through deposits and interbank loans
- Banks face fixed costs and variable costs for lending
- One large monopolistic bank and a competitive fringe
- Cash can be disbursed as dividends or lent to other banks

- **Elements of Model**

Constraints on banks
- Capacity constraint on deposits (stochastic, identified with "liquidity shock" but assumed not binding for "big bank")
- Limited liability
- Raising equity prohibitively expensive
- Liquidation charge for exit; charge for entry
- Regulatory constraints
  - Capital requirement relative to assets
  - Liquidity requirement relative to deposits
  - Collateral constraint for borrowing

- Bank decisions

- Big bank chooses loans, deposits and asset holdings, taking into account its monopoly power.

- Question: Infinite cost to running negative balance; doesn't that mean that dividends are zero until exit?

- Calibration

- Aggregate technology shocks follow business cycle frequencies
- For small banks, constraint on deposit size assumed always binding, with observed autocorrelation and variance of residual.
- Cost structures for banking from data
- Deposit rate from data (but is it assumed binding?)

Counterfactual:

Increase in bank capital requirements

- Simplest model:
  - Reduces the probability that a bank will subsequently default (First order)
  - Steers asset mixture away from high requirement activities
  - Discourages entry (First order, but long run)
  - May encourage immediate exit

COLLEGE *of* BUSINESS
at ILLINOIS

- Simplified model

- What estimate would a value at risk model yield for the reduction?
  - Critical level of assets, probability of asset values falling below.
  - How much does the increase in capital reduce this probability (mechanically)

- ## Simplified Model

- How does the increase in interest rates in the model (6.50% -> 6.64% = 0.14 percentage points compare to a back of the envelope calculation?
- The cost of increased capital requirements is first of all an increase in the cost of bank lending
  - As bank capital requirements increase from 6% to 8%, productive activities decrease from 94% to 92% of bank assets.
  - Net interest rate margin x productive activities = fixed costs (zero profits).
  - Marginal cost of producing a loan 1.60% per dollar.
  - Interest rate spread 5.45%.
  - Thus loan rate should go up by
  (5.45 - 1.60) x (2/92) = .08 percentage points.

- Of course, many other interactions in this model

- Monopoly power changing the interest rates
- Risk responses by borrowers
- Changed incentives to pay out dividends
- Changed incentives to exit
- Interactions with aggregate shocks

But which, if any, of these are important?
(Answer: Different parts for different questions)

- Conclusion

- The Corbae-D'Erasmo model is
        coherent and relevant,
        but complex.

- To understand whether it is significant, need to perform the same procedure—dissection into simpler models—on variety of specific counterfactuals.

COLLEGE *of* BUSINESS *at* ILLINOIS