Financial Frictions in Macroeconomics

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Balance Sheet, Financial System

Assets	Liabilities
Bank loans	Bank Debt
Securities, etc.	Bank Equity

Frictions between financial institutions and their lenders.

Source of financial crisis, bank runs, rollover crises, etc.

Macro prudential policy

Balance Sheet, Financial System

Assets	Liabilities
Bank loans	Bank Debt
Securities, etc.	Bank Equity

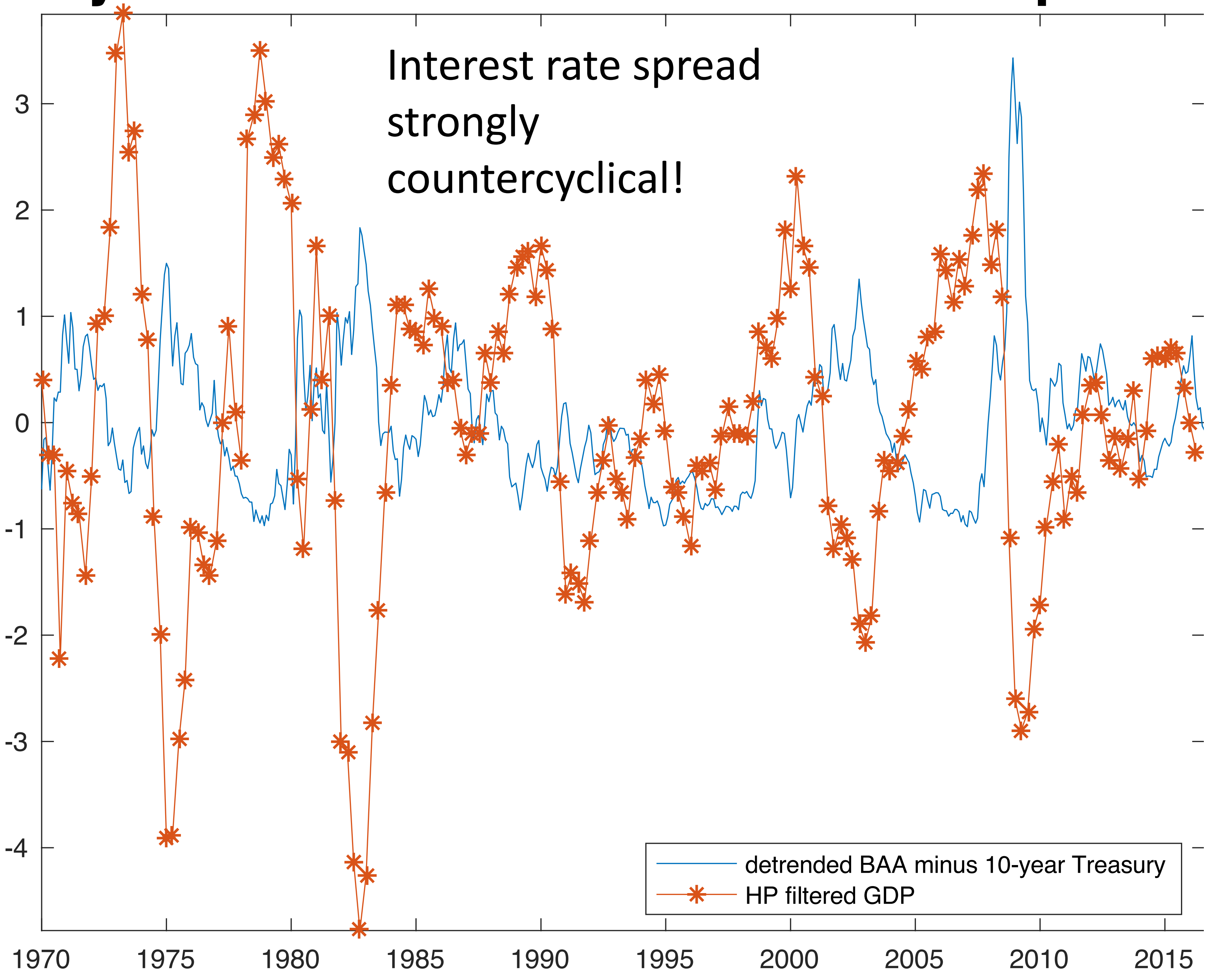
Financial frictions between bankers and borrowers.

Perhaps the primary friction in 'normal times', when macro prudential is under control.

Outline

- Financial frictions for ‘normal times’
    - Asset side of bank balance sheets.
- Provides a natural interpretation of business cycles when:
    - We adopt a particular model of financial frictions (BGG)
    - Incorporate a particular shock (Risk shock).
- Financial frictions for ‘crisis times’
    - Liability side of bank balance sheets.
    - The analysis of macroprudential policy questions:
        - What leverage restrictions should be placed on banks?
        - How should those restrictions be varied over the business cycle?
        - Should you be easy in tough times and tough in easy times?
    - Some tough practical issues.

Cyclical Behavior of Interest Rate Spread



Counter-cyclicality of Interest Rate Spread

- Consistent with the idea that rise in riskiness has something to do with recessions.

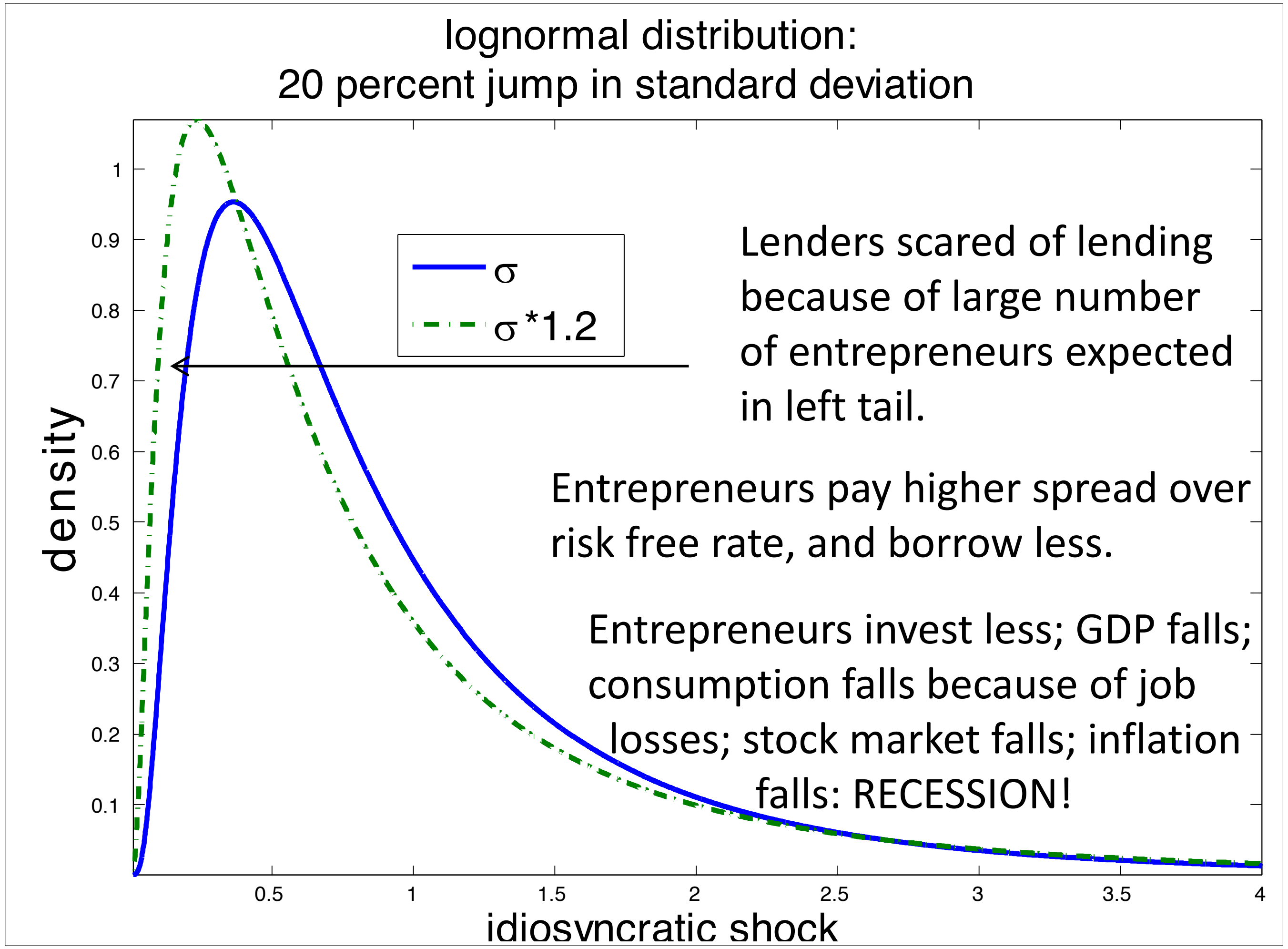
- Let’s see where this idea takes us…

- Bernanke-Gertler-Gilchrist (1999) propose of way of thinking about an economy in which the interest rate spread reflects the riskiness of individual entrepreneurs (idiosyncratic risk).
  - Of course, interest rate spreads reflect other factors too, like liquidity premia….

- Adopt a twist on the BGG Model:
  - the riskiness of entrepreneurs can vary over time.

- Put this whole mechanism in a fully specified, medium sized DSGE model, as in Christiano-Motto-Rostagno (AER2014)
  - Estimate everything using Bayesian methods.

Economic Impact of Risk Shock



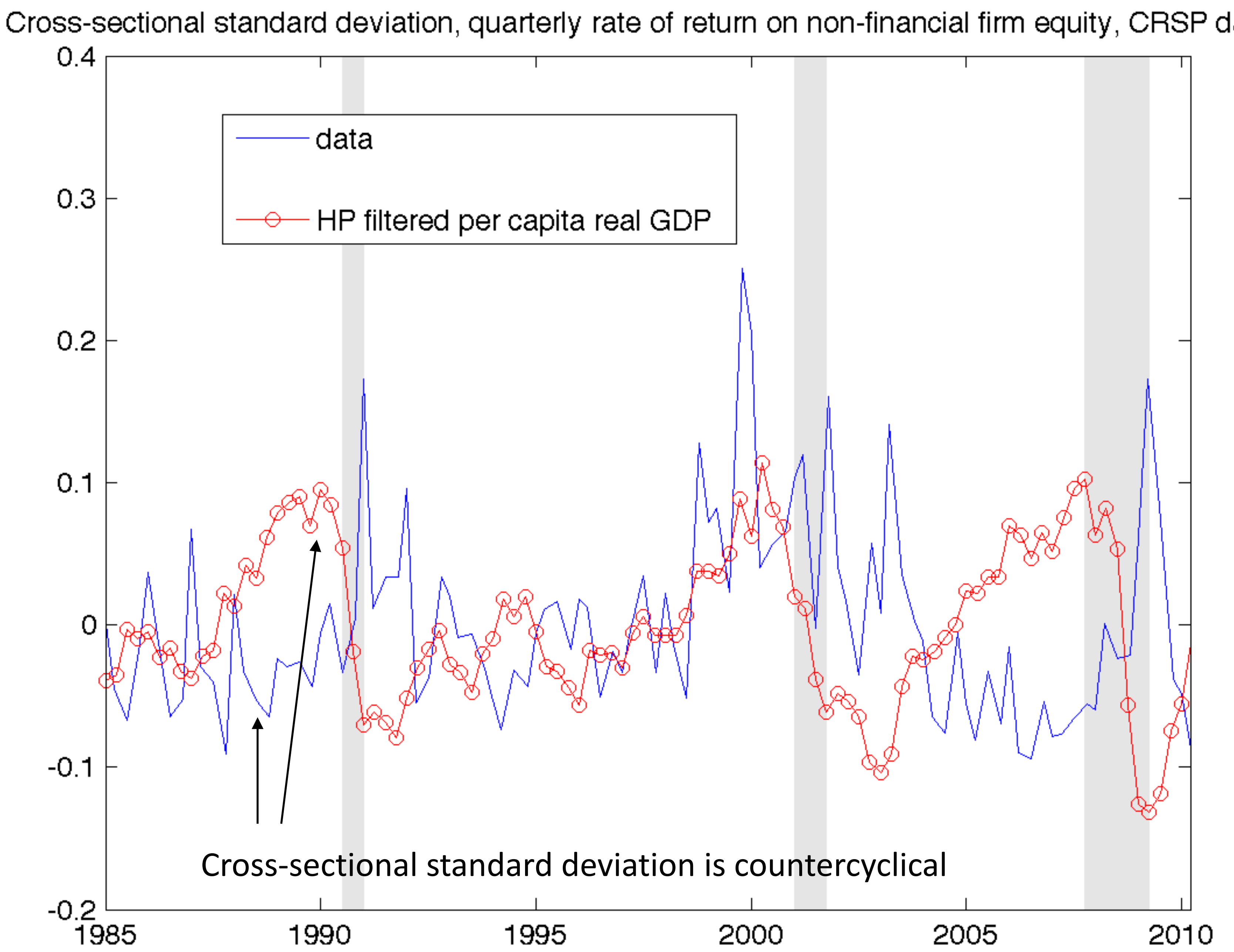
Is there direct evidence of greater cross-sectional risk in recessions?

- Yes

- Cross-sectional standard deviation of rate of return on equity.

  - Non-financial firms in Center For Research in Securities Prices (CRSP) data base.

  - Those data do show evidence of counter-cyclicality.

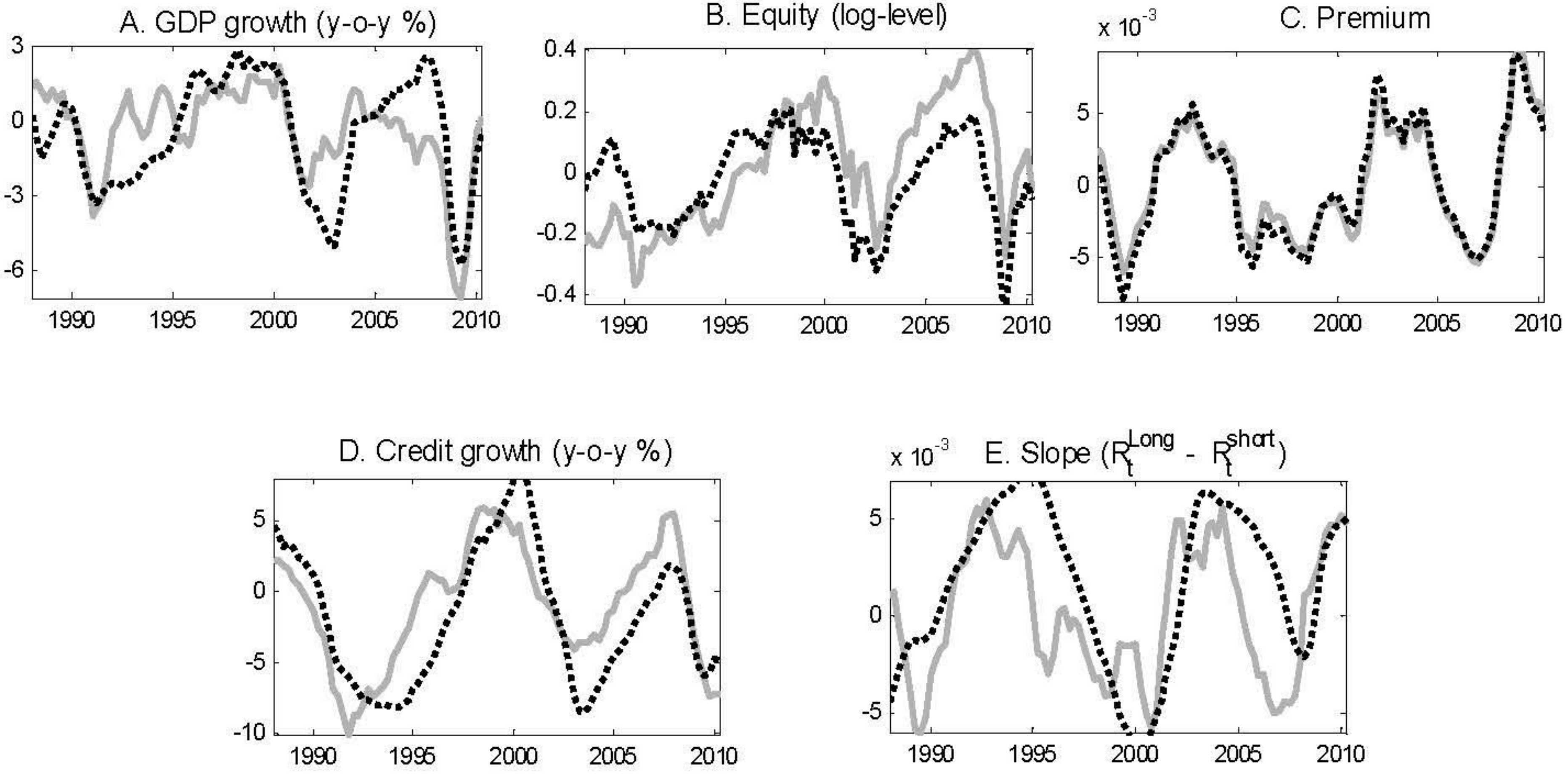


Cross-sectional standard deviation, quarterly rate of return on non-financial firm equity, CRSP data
data
HP filtered per capita real GDP
0.4
0.3
0.2
0.1
0
-0.1
-0.2
1985
1990
1995
2000
2005
2010
Cross-sectional standard deviation is countercyclical

How Much of US Business Cycles Can we Explain with the Risk Alone?

- A surprisingly large amount.
- Estimation delivers:
  - Estimates of the risk shock.
- We ask:
  - What would the data have looked like if ONLY the risk shock had been active?

Role of the Risk Shock in Macro and Financial Variables

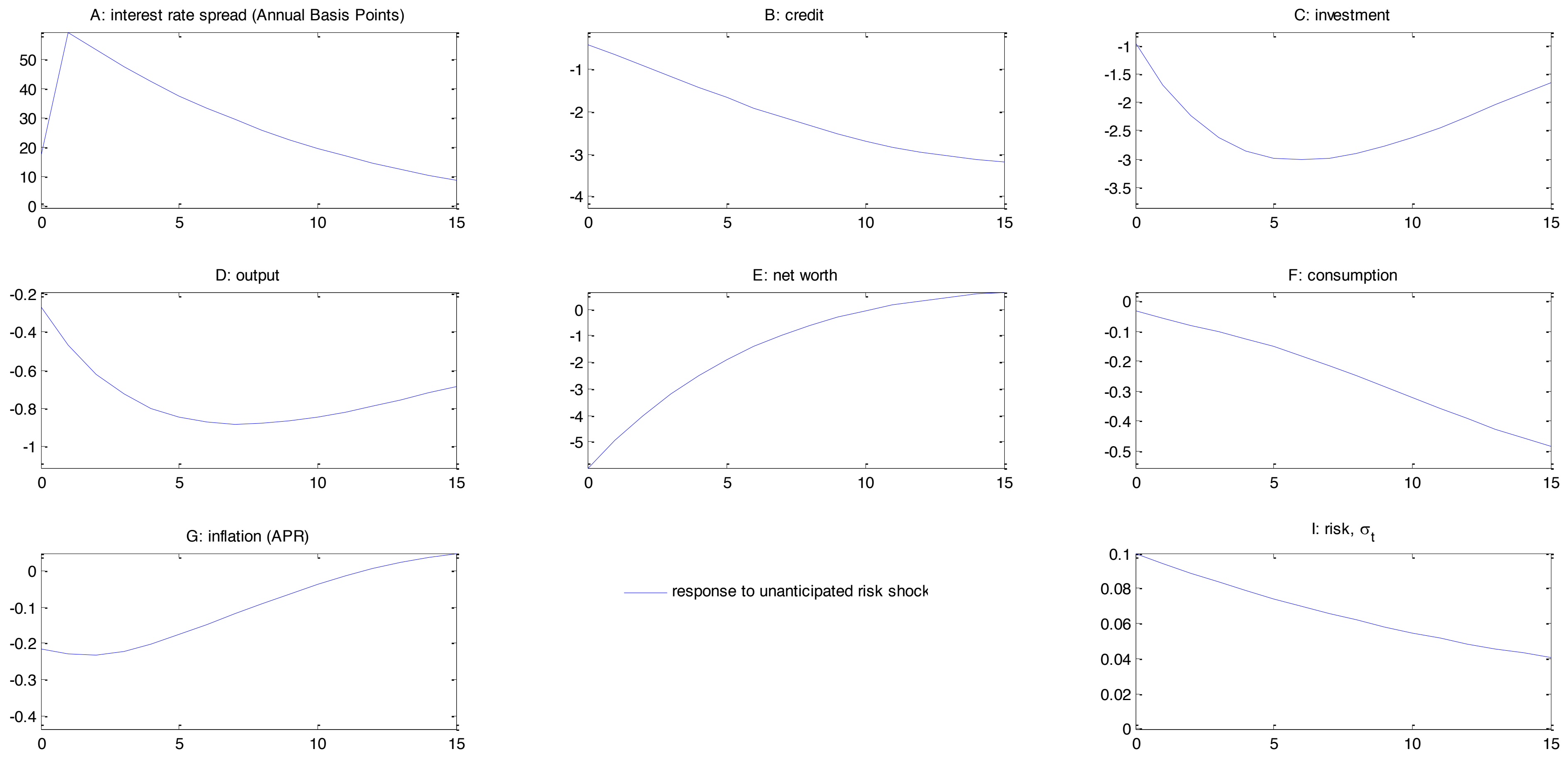


Notes: The grey solid line represents the (two-sided) fitted data. The dotted black line is the model simulations.

Why Does the Econometrics like the Risk Shock So Much?

- In part:
  - risk shock provides a straightforward interpretation of the countercyclical interest rate spread.
- Another reason:
  - The impulse response function to a contractionary risk shock looks a lot like a recession.

Figure 3: Dynamic Responses to Unanticipated and Anticipated Components of Risk Shock



Looks like a business cycle

What’s the model good for?

- Can think about how monetary policy should respond to an increase in interest rate spreads (should cut rates).

- Can be used to understand why including credit growth and the stock market in a Taylor rule might be a good idea (see, Christiano, et al, Jackson Hole paper, 2010).

- Open economy version can be used to think about financial dimension of exchange rate depreciation (see Mihai Copaciu and Cristian Bulete, Central Bank of Romania).

  - Depreciation makes domestic goods cheaper and stimulates output.
  - Depreciation imposes capital losses on unhedged borrowers in foreign currency, causing them to cut back spending and reducing output.

Financial frictions on liability side of bank balance sheets

- This is location of the financial problems in the US financial crisis.

- Macro prudential policy is about preventing those problems from happening again.

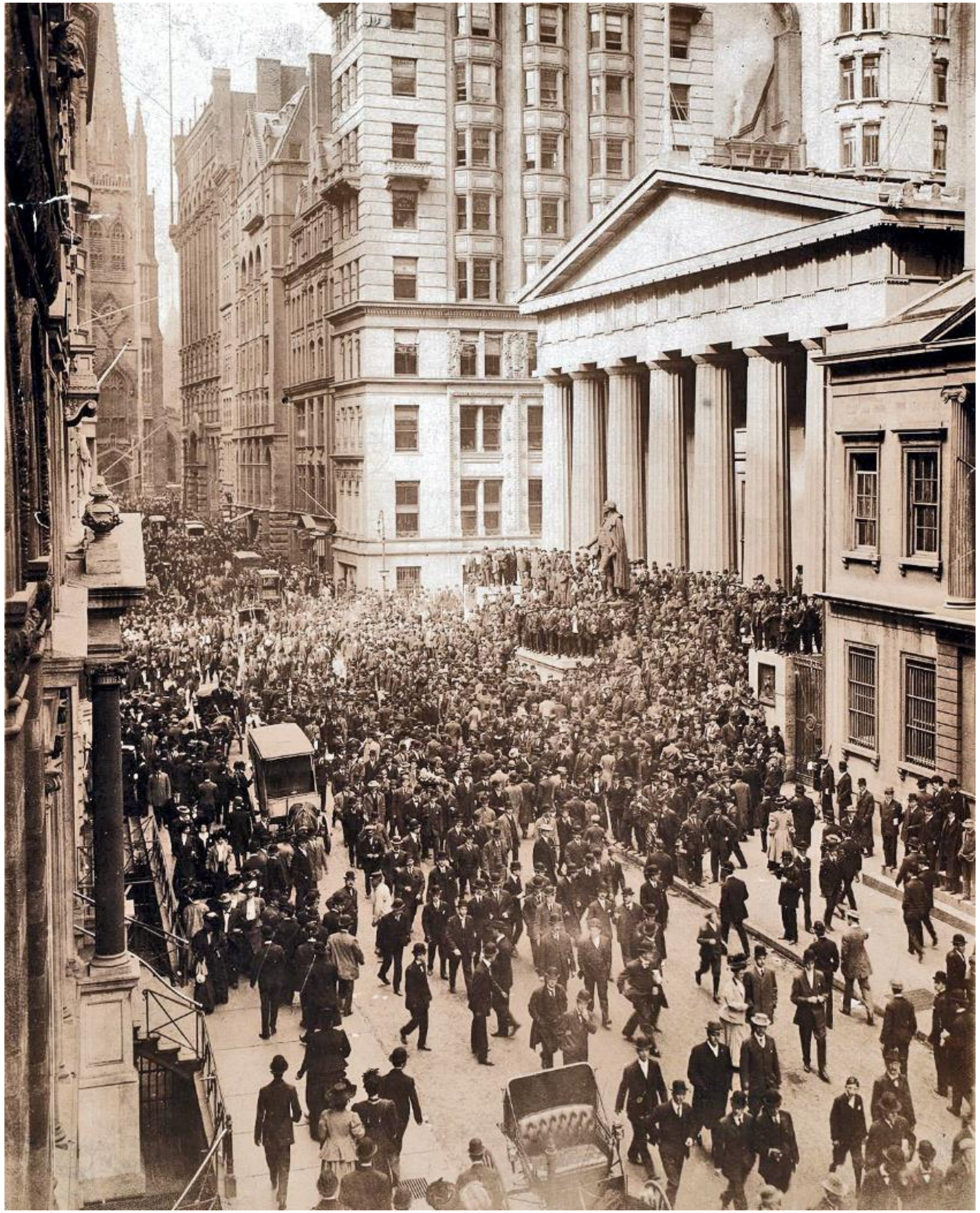
- But, must have a clear idea of what those problems were!

  - A consensus appears to have emerged: *rollover crisis hypothesis*.
  - By 2006-2007, a huge shadow banking system existed and it suffered a major run.

This is what a bank run looked like in the 19th century: Diamond-Dybvig run.

Bank runs in 2007 and 2008 were different and did not look like this at all (Gorton)!

It was a rollover crisis in a shadow (invisible to normal people) banking system.



Rollover crisis

- Consider the following bank:

Assets	Liabilities
120	Deposits: 100
	Banker net worth 20

- This bank is 'solvent': at current market prices could pay off all liabilities.

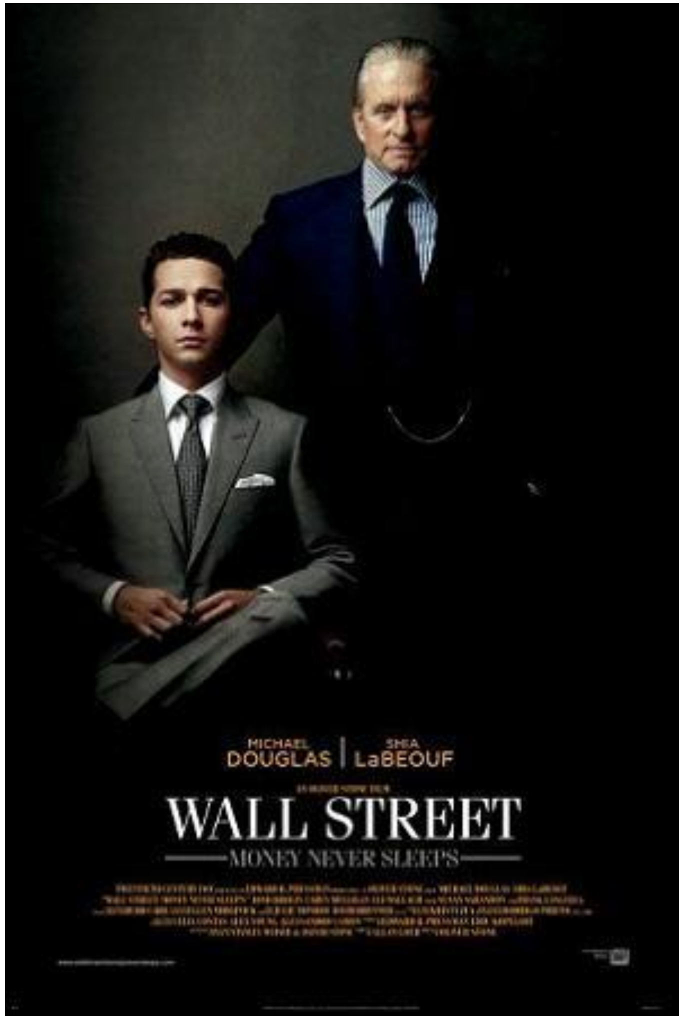
- Suppose that the bank's assets are long term mortgage backed securities and the liabilities are short term (six month) commercial paper.

  - The bank relies on being able to *roll over* its liabilities every period.
  - Normally, this is not a problem.

Rollover crisis

- Now suppose the bank cannot roll over its liabilities.
- In this case, the bank would have to sell its assets.
  - If only one bank had to do this: no problem, since the bank is solvent.
- But, suppose *all banks face a roll over problem*.
  - Now there may be a *big* problem!
  - In this case, assets must be sold to another part of the financial system, a part that may have no experience with the assets (mortgage backed securities).

The Drama of a Roll Over Crisis Brought to Life in Some Great Movies!



Rollover crisis

- A rollover crisis: when all banks in an industry (e.g., mortgage backed securities industry) are unable to roll over their liabilities.

- The only buyers of the securities have no experience with them, so they won’t buy without a price cut (*firesale*).

- Interestingly, the buyers of the securities will all complain at how *complex* they are and how *non-transparent* they are.

  - But, the real problem is that buyers in a fire sale are simply inexperienced.
  - The rollover crisis hypothesis contrasts with the *Big Short hypothesis*: assets were fundamentally *bad* (Mian and Sufi).

Rollover crisis

- When the whole industry has to sell, then bank balance sheets could suddenly look like this:

Fire sale value of assets:

Assets	Liabilities
90	Deposits: 100
	Banker net worth -10

- Multiple equilibrium: balance sheet could be the above, with run, or the following, with no run:

Assets	Liabilities
120	Deposits: 100
	Banker net worth 20

  - A run could happen, or not.

- This is exactly the sort of financial fragility that regulators want to avoid!

  - Under rollover crisis hypothesis, this was the situation in summer 2007.

Rollover Crisis: Role of Housing Market

- What matters is the actual value of assets and their firesale value.

- If bank is solvent under (firesale value), then probability of run is zero.

Pre-housing market correction

Assets	Liabilities
120 (105)	Deposits: 100
	Banker net worth 20 (5)

Post-housing market correction

Assets	Liabilities
110 (95)	Deposits: 100
	Banker net worth 20 (-5)

- Rollover Crisis Hypothesis:
  - pre-2005, no crisis possible,
  - post-2005, crisis possible.

How to think about regulation when the risk is of a rollover crisis.

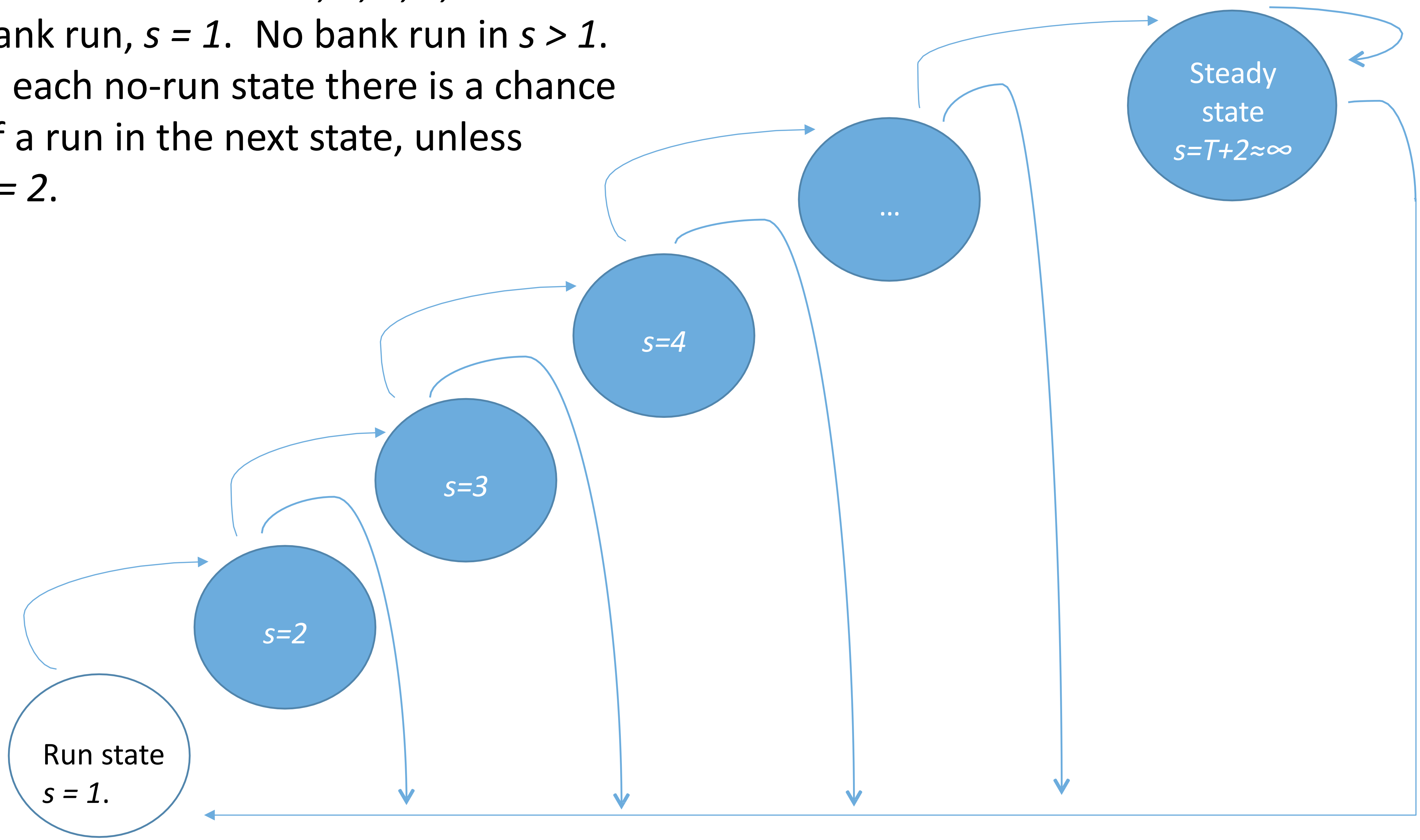
- One possibility: model the rollover crisis directly.

- Best model of rollover crisis at this time: Gertler-Kiyotaki (AER2015).

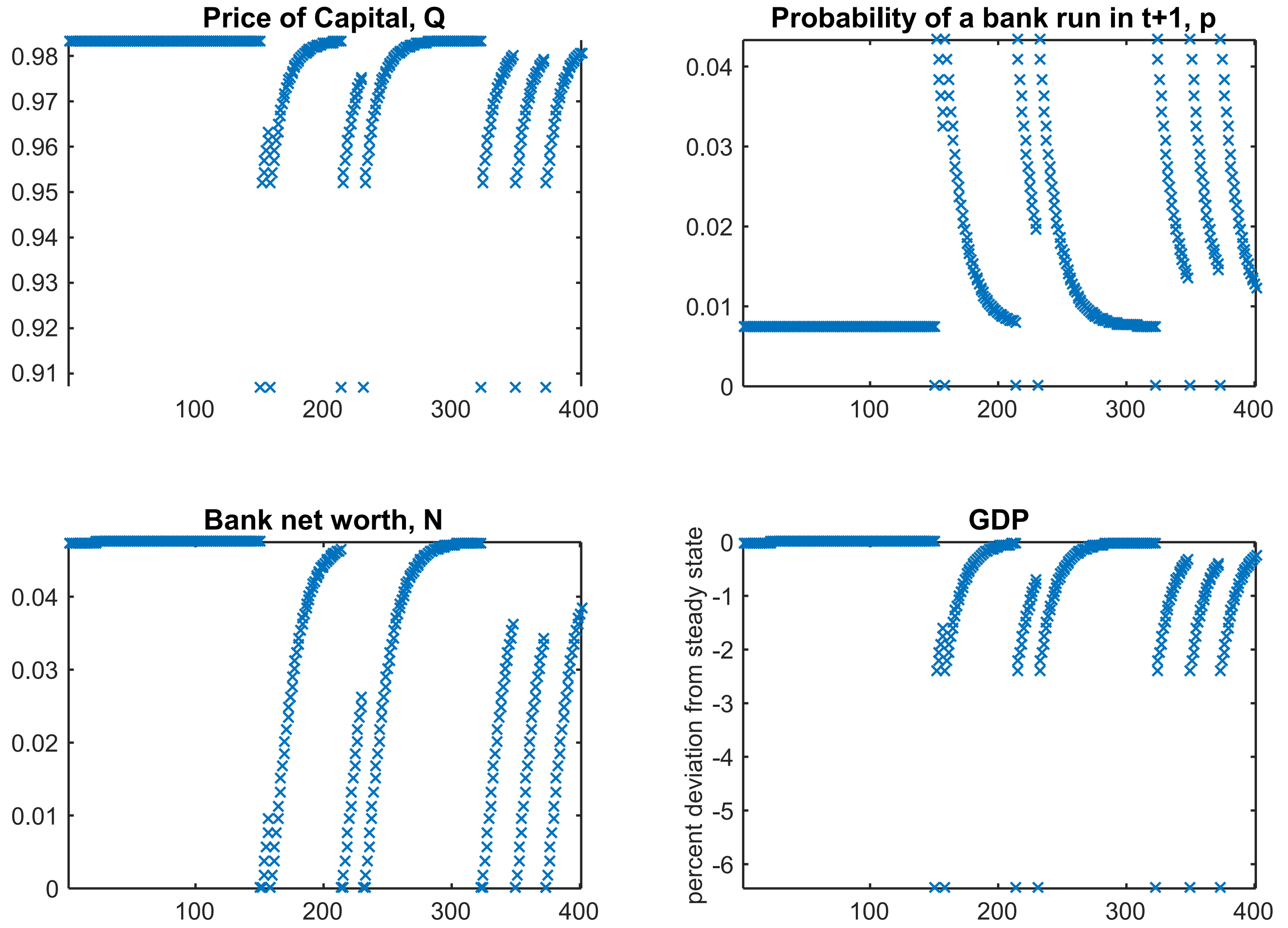
  - They adapt the rollover crisis model of sovereign debt created by Cole-Kehoe (JIE1996).

  - Cole-Kehoe related to Diamond-Dybvig.

Possible states: $s = 1, 2, 3, \ldots, T+2$.
Bank run, $s = 1$. No bank run in $s > 1$.
In each no-run state there is a chance of a run in the next state, unless $s = 2$.



One Hundred Year Stochastic Simulation



Policy Use of Model

- Investigate the impact on financial stability of leverage restrictions.
- This analysis is hard!
  - Not clear how you introduce lots of shocks, actual investment, open economy, currency mismatch, etc.
- At a deeper level, computing equilibrium requires knowing what happens in the crisis state.
  - Seems unlikely other than for pedagogic purposes.
- Alternative: assume that governments will always act as lender of last resort.
  - Construct models that do not allow rollover crisis, but do capture moral hazard implications of bailouts.

Conclusion

- I’ve reviewed models of financial frictions that appeared interesting before and after crisis.
- Models of frictions on the asset side of financial firms seem likely to always be important and interesting.
- Discussed modeling the liability side of financial firm balance sheets.
  - Difficult tradeoffs.
  - Model things correctly, but that’s perhaps intractable.
  - Take full government bailout as exogenous (so no rollover risk), and do macro prudential policy to manage the resulting moral hazard problems.