ECON 747 – LECTURE 12:
RISKY DEBT AND THE FINANCIAL ACCELERATOR: APPLICATIONS, EXTENSIONS, ISSUES, ALTERNATIVES

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Spring 2025

OVERVIEW

- We have investigated in detail the models of Bernanke and Gertler (1989) [BG1989] and Bernanke, Gertler, and Gilchrist (1999) [BGG1999]
- This lecture walks you through a variety of related work
  - Papers with similar focus as BGG1999
  - Applications to other settings
    - E.g. financial intermediation, risk shocks, ...
  - Issues and limitations of CSV-financial accelerator models
  - Generating credit spreads without limited information

MORE ON CSV AND THE FINANCIAL ACCELERATOR

ANOTHER CSV MODEL

- An additional very influential CSV model that studies financial acceleration is Carlstrom and Fuerst (1997)
- Similar to BGG1999, this paper embeds a limited information contracting problem – in which agency costs arise endogenously and entrepreneur net worth alleviates this friction – in a *quantitative* macro model
- A related paper is Fuerst (1995)

CARLSTORM-FUERST: SETTING

- Just like BGG199, Carlstrom and Fuerst (1997) first set up a financial contract in partial equilibrium
- They assume entrepreneurs are long-lived and have a higher discount factor than households; multi-period contracts are ruled out on the grounds of anonymity of credit markets
- Based on assumptions on investment and monitoring technology they achieve that investment is linearly related to net worth $\rightarrow$ facilitates aggregation
- They embed the resulting dynamics in what they call a computable general equilibrium model

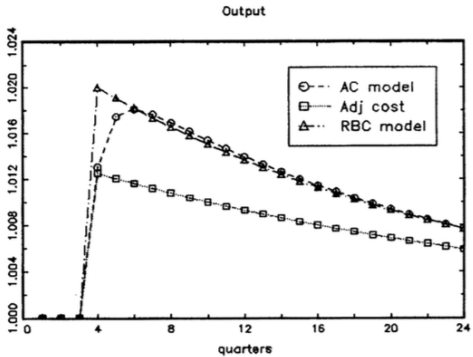
CARLSTORM-FUERST: ANALYSIS

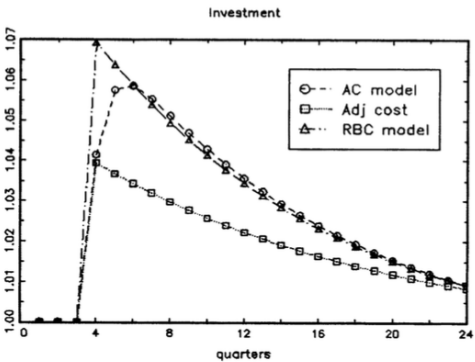
- The focus of the paper is to match the dynamic profile of standard business cycle variables, such as output, investment
- The model generates hump-shaped responses of these variables to real shocks
  - The idea is that households delay their investment decisions until agency costs are as low as possible, which is several periods after a productivity shock. Agency costs fall with time because the shock increases the return to internal funds, which redistributes wealth from households to entrepreneurs.
- Recall that BGG1999, on the other hand, focus on the interaction with nominal rigidities and on the transmission of monetary policy shocks

CARLSTORM-FUERST: ANALYSIS

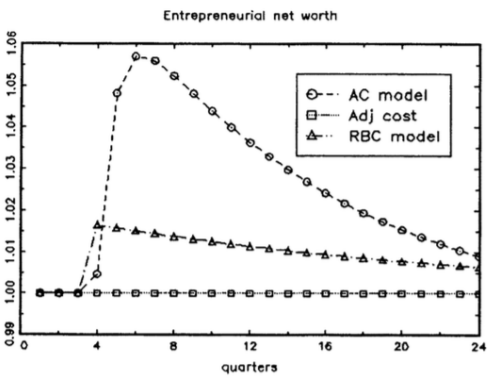
- The paper benchmarks the resulting dynamics against a standard RBC model
- We already know that the standard RBC model cannot generate hump-shaped dynamics, and most of the propagation comes from the persistence of the exogenous disturbances
- For comparison, they consider a model with capital adjustment costs
- The financial frictions model can be seen as a business cycle model in which a sort of adjustment costs arises endogenously

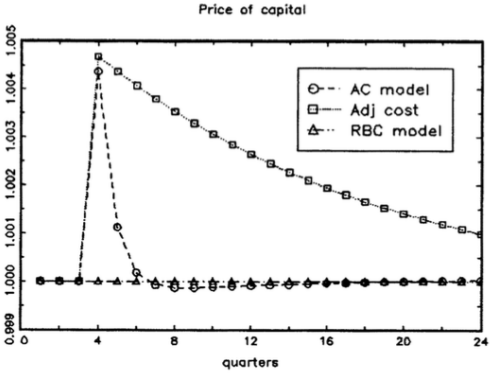
CARLSTORM-FUERST: IRFS



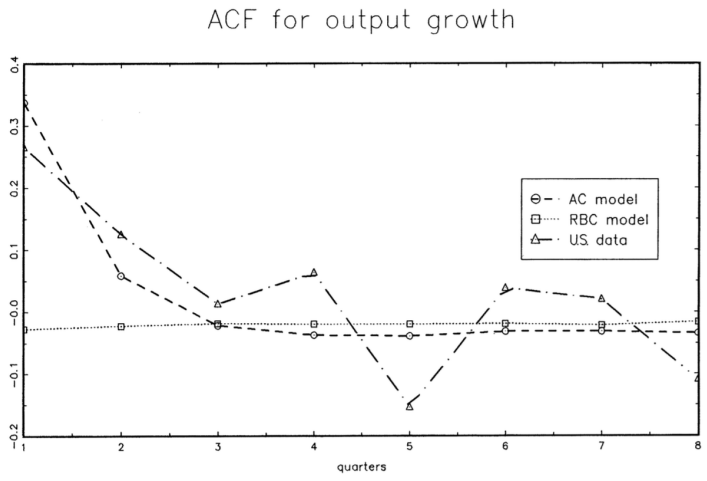


CARLSTORM-FUERST: IRFS





CARLSTORM-FUERST: ACFS



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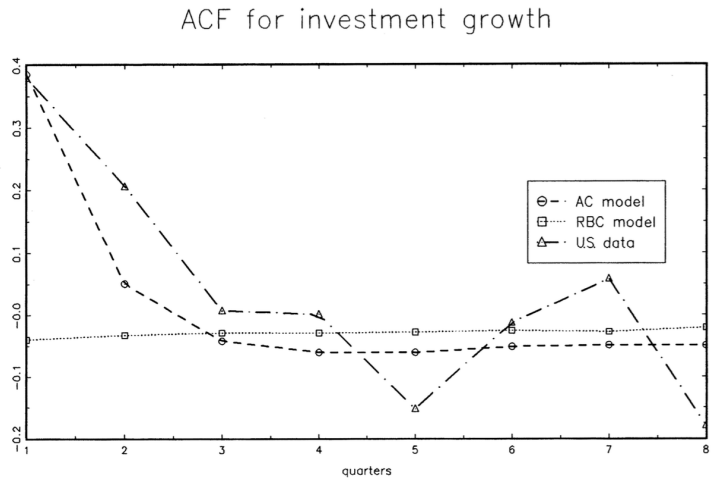


APPLICATIONS: FINANCIAL INTERMEDIATION

FINANCIAL INTERMEDIATION

- In the models we have seen so far in this course, lending and borrowing happens directly between agents, e.g. between households and entrepreneurs
- Towards the end of this course, we will turn towards financial intermediation
  - Explicitly consider agents that channel funds between lenders and borrowers
  - In particular banks
- From a technical point of view this will be easy to understand for you:
  - A lot of macro models with financial intermediation assume that financial intermediaries face a (CSV-type) financial friction!

FINANCIAL INTERMEDIATION

- An example is Gertler and Karadi (2011)
- Households lend to financial intermediaries, and intermediaries lend to firms (entrepreneurs)
- The flow of resources between households and intermediaries in subject to a friction that endogenously renders the financial intermediary net worth important
  - Strictly speaking, the friction in Gertler and Karadi (2011) is not based on a full-blown CSV problem, but a more direct moral hazard constraint
  - Like in BGG1999, this gives a linear relationship between capital purchases (lending) and net worth
- As a consequence, there is a two-way feedback between economic activity and balance sheet health (net worth) of financial intermediaries

APPLICATIONS: "RISK SHOCKS"

RISK SHOCKS

- Christiano, Motto, and Rostagno (2014) set up a model very similar to BGG1999
- Idea: costly state verification is subject to "risk shocks"
- This has some analogy to Jermann and Quadrini (2012) in the literature focusing on enforcement constraints: the frictions is directly hit with a shock

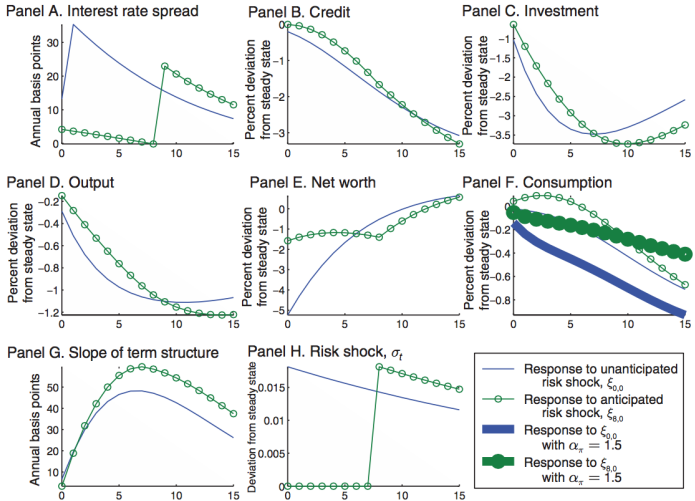
RISK SHOCKS

- Remember from BGG1999:
  - Individual entrepreneur's return on capital is $\omega^j R^k_{t+1}$
  - ω^j is drawn from a distribution $F(\omega)$
  - Setting gives rise to a cutoff $\bar{\omega}$
  - Note that $F(\omega)$ is constant
- In the risk shocks paper, the authors assume the following:
  - $F(\omega)$ is time-varying, subject to stochastic shocks
  - In particular, the cross-sectional standard deviation of $\log \omega^j$ is denoted by σ_t
  - Shocks to σ_t are referred to as risk shocks

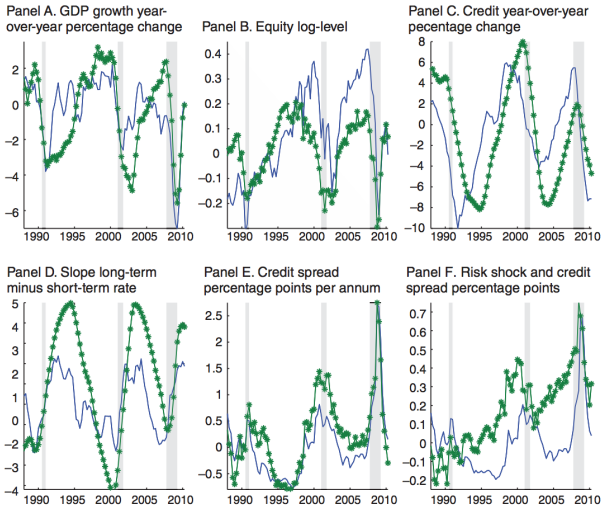
RISK SHOCKS

- Just as in BGG1999 the structure of the model is otherwise a New Keynesian DSGE model with a variety of other frictions and shocks
- They estimate this model on US data
- Study the contribution of risk shocks to macroeconomic fluctuations
- You will replicate this estimation procedure in Assignment 4 using Dynare

RISK SHOCKS: IRFS



RISK SHOCKS: CONTRIBUTION



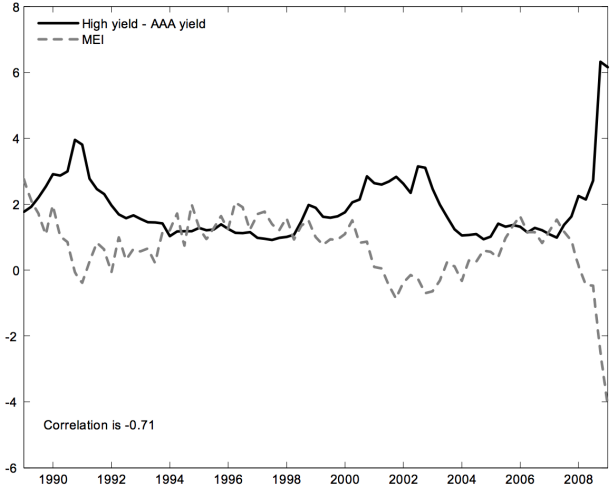
RISK SHOCKS VS. INVESTMENT SHOCKS

- In estimated DSGE models, investment shocks play an important quantitative role
- Recall the basic mechanics from Bernanke-Gertler

$$k_{t+1} = \underbrace{(\kappa - h_t\gamma)}_{\text{csv friction}} i_t + (1-\delta)k_t$$

- This connection was noted by Justiniano, Primiceri, and Tambalotti (2011) (see chart on next slide)

INVESTMENT SHOCKS & CREDIT MARKET CONDITIONS



RISK SHOCKS VS. INVESTMENT SHOCKS

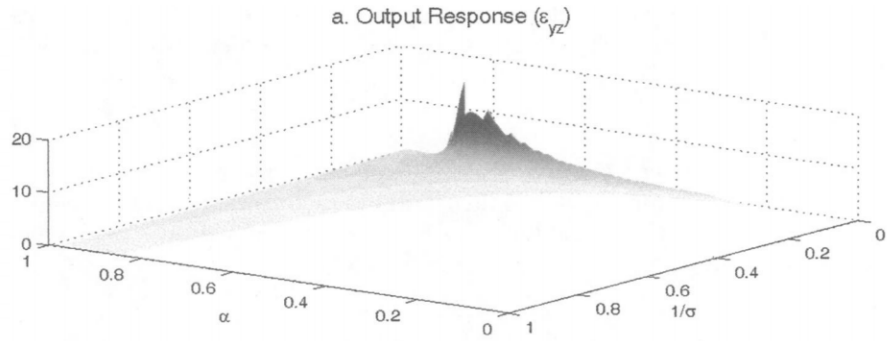
- In Christiano, Motto, and Rostagno (2014), risk shocks "take over" the quantitative role of investment shocks
- A way to distinguish these shocks is the response of the stock market, that is, the firms' market value
  - Responds positively to negative investment shock
  - Responds negatively to risk shock
- Since the stock market is procyclical in the data, risk shocks have a better chance at matching the stock market cyclicality than investment shocks do

ISSUES AND LIMITATIONS OF CSV MODELS OF FINANCIAL ACCELERATORS

ISSUES AND LIMITATIONS

- How serious can we take these models?
- Are there limitations to using these models to think about the business cycle?
- We have already looked at such limitations for the class of models that studies borrowing constraints on risk-free debt
  - Cordoba and Ripoll (2004), Kocherlakota (2000), as well as Cao and Nie (2017)

REMEMBER THIS?



ISSUES WITH CSV

- Fuerst (1995) highlights that the endogenous propagation achieved with a CSV frictions depends on model structure and calibration, e.g. size of the capital share
- A more striking caveat to the BGG-type financial accelerator is laid out by Carlstrom, Fuerst, and Paustian (2016)
- These authors highlight that the contract in BGG1999 is in fact not the optimal contract! (so BGG1999 have de facto ruled out a certain set of contracts)

THE OPTIMAL CONTRACT

- A comment on the BGG paper by VV Chari:

  "These authors have an economy with risk neutral agents called entrepreneurs and risk averse agents called households. They claim that an optimal contract in the presence of aggregate risk has the return paid by entrepreneurs to be a constant, independent of the current aggregate shock. I have trouble understanding this result. Surely, entrepreneurs should and would provide insurance to households against aggregate shocks. One way of providing such insurance is to provide a high return to households when their income from other sources is low and a low return when their income from other sources is high. My own guess is that if they allowed the return to households to be state contingent, then aggregate shocks would have no effects on the decisions of households and would be absorbed entirely by entrepreneurs. Before we push this intriguing financial accelerator mechanism much further, I think it would be wise to make sure that we get the microeconomics right."

THE OPTIMAL CONTRACT

- Carlstrom, Fuerst, and Paustian (2016) find that the optimal contract features indexation to the aggregate return on capital, household consumption, and the return to internal funds
- Triple indexation significantly dampens fluctuations in leverage and the risk premium $\Rightarrow$ essentially no financial accelerator
- Some analogy to the Cao and Nie (2017) finding for the Kiyotaki-Moore type amplification
  - In addition to the friction that is the focus, some contracts are ruled out (implicitly), and this is important for generating amplification

CONTRACTS AND AMPLIFICATION

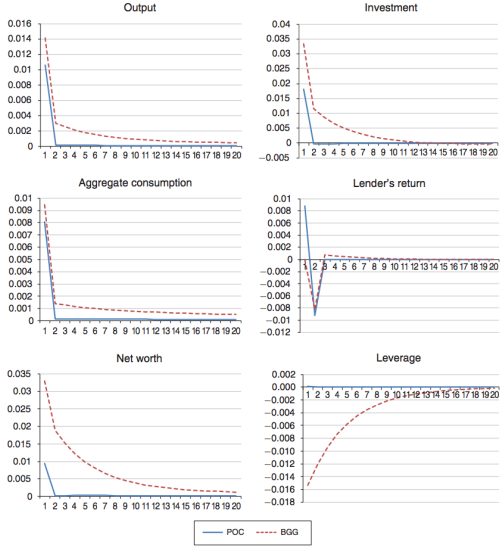


FIGURE 1. INDEPENDENTLY AND IDENTICALLY DISTRIBUTED TFP SHOCK WITH FLEXIBLE PRICES

ALTERNATIVE WAYS TO GENERATE CREDIT SPREADS

RECALL THIS PICTURE ...

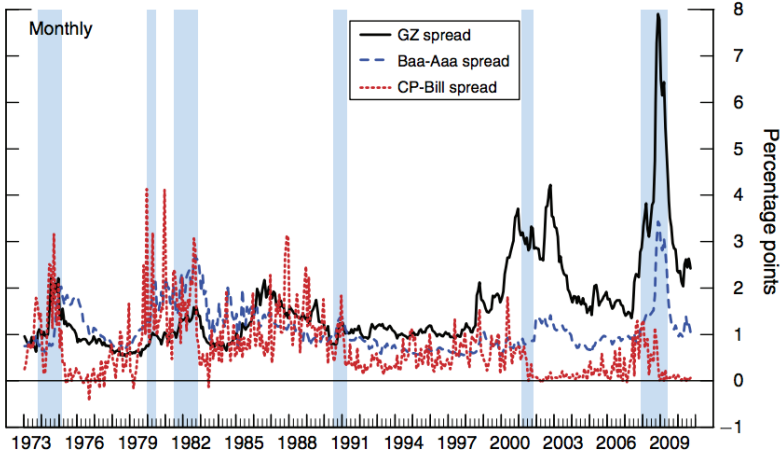


FIGURE 1. SELECTED CORPORATE CREDIT SPREADS

MOTIVATION

- Models with CSV are appealing, as they generate an endogenous difference between internal and external financing costs
- I want you to be aware that imperfect information is not the only way to generate credit spreads / risk premia
  - E.g. commitment problems with in long-term debt contracts (Gomes, Jermann, and Schmid, 2016; Jungherr and Schott, 2020)
- Two examples today (there are others):
  1. Idiosyncratic risk and incomplete markets: Di Tella and Hall (2019)
  2. Multiplicity: Cui and Kaas (2018)

IDIOSYNCRATIC RISK AND INCOMPLETE MARKETS

- Idea of Di Tella and Hall (2019): *inefficient* recessions without nominal rigidities
- There are households and entrepreneurs, and there is complete information
- Entrepreneurs face idiosyncratic risk that cannot be insured
  - Receive idiosyncratic shock with standard deviation σ_t

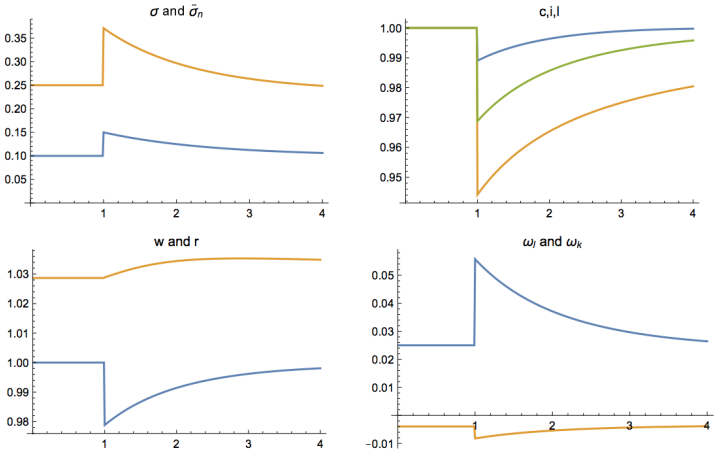
IDIOSYNCRATIC RISK AND INCOMPLETE MARKETS

- Idiosyncratic risk gives rise to precautionary motive
- Aggregation allows writing aggregate factor payments with a premium term
- The resulting interest rate is of the form

$$r_t = \underbrace{r_t^*}_{\text{perfect risk sharing}} - \underbrace{\frac{c_{e,t}}{c_t}\tilde{\sigma}^2_{c,e,t}}_{\text{lower interest rate}}$$

- $\tilde{\sigma}^2_{c,e,t}$ captures the precautionary motive and is related to σ_t^2
- Study shock to σ_t, quite similar to Christiano, Motto, and Rostagno (2014)

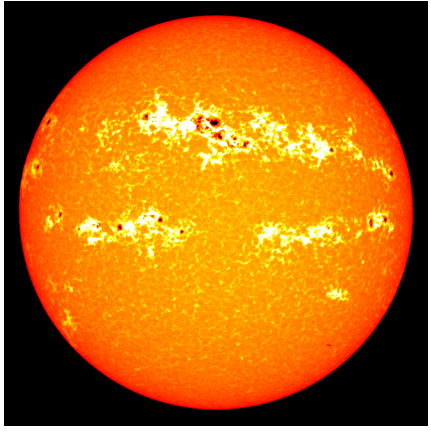
IRFS TO IID RISK SHOCK



MULTIPLICITY AND SUNSPOTS

- Under certain conditions, dynamic macro models exhibit *multiple equilibria*
  - Requires some form of aggregate increasing returns to scale, e.g. through the presence of externalities
  - See Benhabib and Farmer (1994) for a key reference
- "Sunpots" arise $\rightarrow$ self-fulfilling beliefs can move economy from one equilibrium to another
- We will see some more of this in the Lecture 13: multiplicity plays a role in bank run model of Diamond and Dybvig (1983)

SUNSPOTS



MULTIPLICITY WITH BORROWING CONSTRAINTS

- We will not go into the technical details behind the conditions under which multiplicity arise, and how models with multiplicity can be characterized
- Borrowing constraints – in combination with conditions on technology giving increasing returns in the aggregate – give rise to multiplicity!
- Essentially, a borrowing constraint features endogenous variables on both sides
- Equilibria arise with both sides high and both sides low

MULTIPLICITY

- Cui and Kaas (2018) use these insights to think about the cost of external funds
- The idea is that risk premia can arise from self-fulfilling beliefs
- Suppose there is a multiplicity of equilibria:
  - One with lots of lending + firms doing well
  - The other one with little lending + firms doing poorly
- If we are in the first one, and lenders realize that there is the possibility that beliefs may "tip" and the economy moves to the other equilibrium
- They want to be compensated for this risk, which gives rise to a spread
- Similar idea in recent JMP of Guntin (2022)

SPREADS AND DEFAULTS

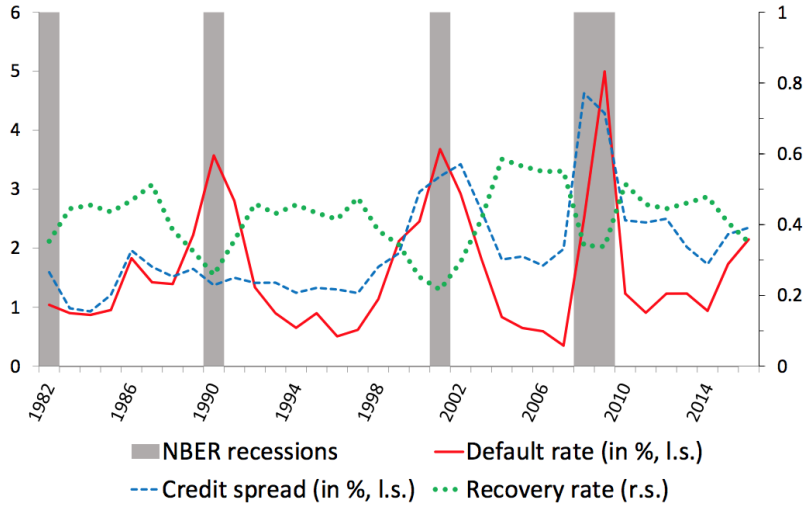
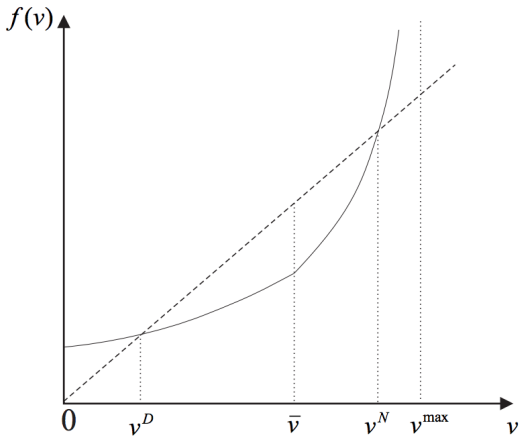
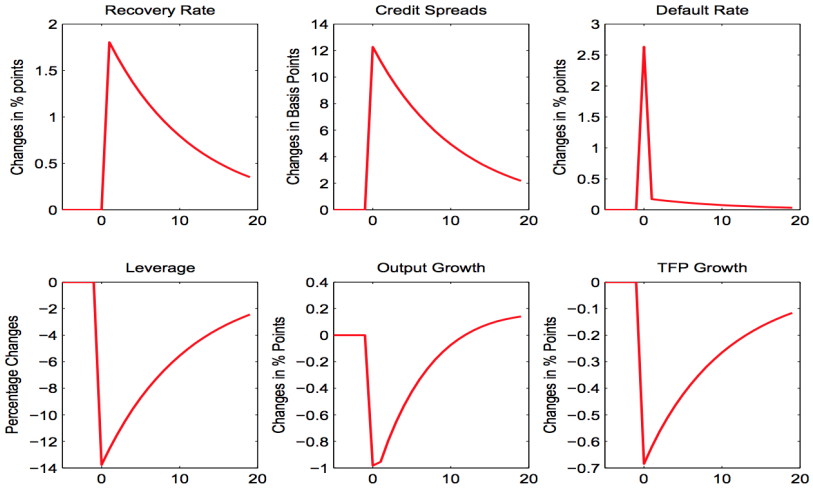


Figure 1: **Co-existence of Default and No-Default Equilibria**



SUN SPOT SHOCKS

Figure 3: **Impulse Responses to a Sunspot Shock**



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