MACROECONOMICS OF FINANCIAL MARKETS

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Financial Markets and Business Cycles

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Financial Frictions in Macro

Financial markets have the potential to magnify and generate fluctuations.

Magnification of productivity shocks
- Collateral constraints
  Kiyotaki and Moore (JPE 97).
- Costly state verification
  Bernanke and Gertler (AER 89)
  Carlstrom and Fuerst (AER, 97).

Generation of cycles.
- Collateral Crises.
  Gorton and Ordonez (AER, 14)
The Role of Collateral Constraints

- Main Paper: Kiyotaki and Moore (JPE, 1997)

- Credit frictions → amplification & persistence of shocks

- Two roles for capital
  - Factor of production
  - Collateral for loans

- Negative productivity shock
  - Reduces output; reduces value of collateral
  - Reduces borrowing, which reduces output further
  - “Multiplier” effects amplifies losses
Collateral Constraints

Mechanism Summary

Credit cycles

Fig. 1

Behavior of the constrained firms. They suffer a capital loss on their landholdings, which, because of the high leverage, causes their net worth to drop considerably. As a result, the firms have to make yet deeper cuts in their investment in land. There is an intertemporal multiplier process: the shock to the constrained firms' net worth in period \( t \) causes them to cut their demand for land in period \( t \) and in subsequent periods; for market equilibrium to be restored, the unconstrained firms' user cost of land is thus anticipated to fall in each of these periods, which leads to a fall in the land price in period \( t \); and this reduces the constrained firms' net worth in period \( t \) further. Persistence and amplification reinforce each other. The process is summarized in figure 1.

In fact, two kinds of multiplier process are exhibited in figure 1, and it is useful to distinguish between them. One is a within-period, or static, multiplier. Consider the left-hand column of figure 1, marked "date \( t \)" (ignore any arrows to and from the future). The productivity shock reduces the net worth of the constrained firms, and forces them to cut back their demand for land; the user cost falls to clear the market; and the land price drops by the same amount (keeping the future constant), which lowers the value of the firms' existing landholdings, and reduces their net worth still further. But this simple intuition misses the much more powerful intertemporal, or dynamic, multiplier. The future is not constant. As the arrows to the right of the date \( t \) column in figure 1 indicate, the overall drop in the land price is the cumulative fall in present and future user costs, stemming from the persistent reductions in the credit cycles.
**Agents**

- Farmers. measure 1
  
  \[
  E_t \sum_{s=0}^{\infty} \beta^s x_{t+s}
  \]

- Gatherers, measure m
  
  \[
  E_t \sum_{s=0}^{\infty} \beta'^s x'_{t+s}
  \]

- Farmers *more* impatient \((\beta < \beta')\)
  
  (will imply that Farmers are the borrowers in equilibrium)

- Both use land \(k_t\) to produce fruit

- Value of land \(k_t q_t\) used as collateral
**Farmers**

- Farmers’ production function for fruit

\[ y_{t+1} = (a + c)k_t \]

\( a k_t = \) sellable fruit

\( c k_t = \) ”bruised fruit” which must be consumed

- Investment happens at a rate \( R = \frac{1}{\beta'} \), then

\[ a + c = x + \frac{a - x}{\beta} \]

- Assumption \( a + c > \frac{a}{\beta} \)

(farmers do not want to consume more than \( c k_t \), then sell \( a k_t \))
Farmers (Constrained)

- Can borrow $b_t$ at rate $R$
- Borrowing Constraint (inalienability of farmers’ human capital)
  \[ Rb_t \leq q_{t+1}k_t \]
- Farmers’ ”flow of funds” constraint
  \[ (a + c)k_{t-1} + b_t + q_tk_{t-1} = x_t + Rb_{t-1} + q_tk_t \]
  
  $x_t$ is consumption of fruit
Gatherers (unconstrained)

- They do not have specific skills to threat not paying.
- Gatherers’ production function for fruit

\[ y_{t+1}' = G(k_t') \]

\( G(\cdot) \) has decreasing returns to scale

- Gatherers’ budget constraint

\[ G(k_{t-1}') + b'_t + q_t k_{t-1}' = x'_t + Rb_{t-1} + q_t k'_t \]

\( x'_t \) is consumption of fruit
EQUILIBRIUM

- Sequences of land prices, allocations of land, debt, consumption for farmers and gatherers
  \( \{q_t, k_t, k'_t, b_t, b'_t, x_t, x'_t\} \)
  such that everyone’s optimizing and markets clearing.

- No uncertainty: perfect foresight
**Equilibrium Results: Farmers**

- Farmers always borrow the maximum and invest in land
  \[ b_t = q_{t+1}k_t/R \quad \text{and} \quad x_t = ck_{t-1} \]

- From the budget constraint, farmers’ land holdings are
  \[ k_t = \frac{1}{q_t - q_{t+1}/R} \left[ (a + q_t)k_{t-1} - Rb_{t-1} \right] \]

  \[ u_t \equiv q_t - q_{t+1}/R = "\text{down payment}" \]

- Farmers spend entire net worth on difference between price of new land \( q_t \) and amount against which they can borrow against each unit of land \( q_{t+1}/R \).
Farmers in the Aggregate

- Farmer aggregate landholding & borrowing

\[ K_t = \frac{1}{u_t} \left[ (a + q_t)K_{t-1} - RB_{t-1} \right] \]

\[ B_t = \frac{1}{R} q_{t+1} K_t \]

- Note: higher \( q_t, q_{t+1} \rightarrow \) farmers demand more \( k_t \)
  - can borrow more when \( q_{t+1}k_t \) (collateral) values higher
  - net worth higher when \( q_t \) higher
**Equilibrium Results: Gatherers**

- Gatherer’s demand for land.

\[
G'(k'_t)/R = u_t = q_t - \left(\frac{q_{t+1}}{R}\right)
\]

Equalize the marginal product of land \((G'(k'_t))\) with its opportunity cost \((Rq_t - q_{t+1})\).
**Market Clearing**

- Land market resource constraint

\[ mk'_t + K_t = \bar{K} \]

- Land market clearing

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

Note: \( u_t \) is decreasing in \( k'_t \) (increasing in \( K_t \)) and gatherers are not constrained, then \( R = \frac{1}{\beta'} \).

- ASS: No bubbles in land price: \( \lim_{s \to \infty} E_t(R^{-s} q_{t+s}) = 0 \)
**Steady State**

\[ u^* = (1 - 1/R)q^* = a \]

\[ u^* = G' \left( \frac{1}{m}(\bar{K} - K^*) \right) / R \]

\[ (R - 1)B^* = aK^* \]

Assumption 1: \( Ra = G' \left( \frac{1}{m}(\bar{K} - K^*) \right) < \frac{a}{\beta} < a + c. \)

Inefficient allocation because of collateral constraint.
Steady State

We are now in a position to compare consumption paths (8a), (8b), and (8c). In the steady state, the user cost equals \(a\); and so, given the farmer's discount factor \(\beta\), investment gives him discounted utility \(\beta c/(1-\beta)\), saving gives \(\beta^2 c/(1-\beta)\), and consumption gives one. By assumption 1, investment strictly dominates saving; and by assumption 2, investment strictly dominates consumption. This completes the proof of our earlier claim about farmers' optimal behavior in the neighborhood of the steady state.

Figure 2 provides a useful summary of the economy. On the horizon...
**One-time Productivity Shock**

- Say \( y_{t+1} = (1 + \Delta)(a + c)k_t \)
- Period of shock (period \( t \))

\[
u(K_t)K_t = (a + \Delta a)K^* + q_tK^* - \underbrace{RB^*}_{q^*K^*}
\]

\[\Rightarrow u(K_t)K_t = (a + \Delta a + q_t - q^*)K^*
\]

- Subsequent periods (periods \( t + s, \ s = 1, 2, ... \))

\[
u(K_{t+s})K_{t+s} = aK_{t+s-1} + \underbrace{q_{t+s}K_{t+s-1} - RB_{t+s-1}}_{=0}
\]
**One-time Productivity Shock**

- Log-linearize around steady state

- Define for variable $X_t$ the proportional change from steady state
  \[
  \hat{X}_t = \frac{X_t - X^*}{X^*}
  \]

- Period of shock (period $t$)
  \[
  (1 + 1/\eta)\hat{K}_t = \Delta + \frac{R}{R - 1}\hat{q}_t
  \]

- Subsequent periods (periods $t + s$, $s = 1, 2, ...$)
  \[
  (1 + 1/\eta)\hat{K}_{t+s} = \hat{K}_{t+s-1}
  \]

where $\eta$ denotes elasticity of land supply of gatherers to user cost.
Response of Land Price & Land Holdings

- Land price response
  \[ \hat{q}_t = \frac{1}{\eta} \Delta \]

- Overall land holding response
  \[ \hat{K}_t = \frac{1}{1 + \frac{1}{\eta} (1 + \frac{R}{R - 1/\eta})} \Delta \]
  \[ \geq 1 \]
**Response of Land Price & Land Holdings**

- **Land price response**
  \[
  \hat{q}_t = \frac{1}{\eta} \Delta
  \]

- **Overall land holding response**
  \[
  \hat{K}_t = \frac{1}{1 + \frac{1}{\eta} \left(1 + \frac{R}{R - 1/\eta}\right)} \Delta
  \]

- Say \( \eta = 1, \ R = 1.05 \)
  \[
  \hat{K}_t \approx 11\Delta
  \]
**Static Response of Land Price & Land Holdings**

- **Land price response**
  \[
  \hat{q}_t \mid q_{t+1} = q^* = \frac{1}{\eta} \frac{R - 1}{R} \Delta
  \]

- **Overall land holding response**
  \[
  \hat{K}_t \mid q_{t+1} = q^* = \Delta
  \]
Response of Output & Productivity

\[ \hat{Y}_{t+s} = \frac{a + c - Ra}{a + c} \cdot \frac{(a + c)K^*}{Y^*} \cdot \hat{K}_{t+s-1} \]

Productivity diff. Farmers’ share
Fig. 3 of the cycle is about 40 periods, or 10 years. Land price peaks at the time of the shock; that is, land price leads by seven quarters. The movement in aggregate fruit output depends on the size of parameter $c$. We set $c = 1$, so the maximum savings rate of an individual farmer is 50 percent. Output is 1 percent higher than the steady state in period 1: this is simply the direct effect of the productivity shock. The sum of the increases in output between period 2 and the midpoint of the cycle (period 22) is 1.79 percent, which exceeds the direct effect in period 1. The sum of the decreases in output over the second half of the cycle is 0.35 percent.

In section 5 of Kiyotaki and Moore (1995), we report on simulations for other parameter values. In particular, we find that a lower $\pi$ or a higher $\phi$ leads to smaller contemporaneous effects, more persistence, longer cycles, and more volatility in prices relative to quantities.

IV. Spillovers

As the model is constructed, there cannot be any positive spillovers between the farming and gathering sectors, since their combined

$33$ The parameter $c$ has no effect on the dynamics of $q_t$, $K_t$, and $B_t$ as long as it satisfies assumption 2′.
Net Worth Shock

- One time reduction in debt obligations
- Increases net worth
- Farmer increases leverage, production
- Another view of Bernanke-Paulson policies?
Wrapping Up

- Firms’ productive capital also used as collateral

- Amplification and persistency of real shocks through lower collateral value of capital

- Real effects of lower asset values and financial frictions.
CRITIQUES/COMMENTS

- Kocherlakota (QR, 2000): Quantitative importance likely to be small if land & capital share less than 0.4

- Andres Arias (WP, 2005): Calibrated RBC model with KM credit constraints deliver small amplification effects


- *Real effects of housing/stock bubbles*
THE CONCEPTUAL IDEA

- **Main Paper: Bernanke and Gertler (AER, 1989).**
- Costly state verification in a Real Business Cycle model.
- **Debt-Deflation meets Real Business Cycle.**
- **Main idea.**
  - The borrowers’ net worth determines both their risk of default and agency problems (the intermediation cost).
  - Net worth is procyclical.
  - In recessions the costs of intermediation increase, reduce the net return of investment and depress investment, magnifying the recession.
ENVIRONMENT

- Risk neutral E and L.
- E has net worth $n$.
- E’s technology:
  - $i$ units of $c$ good $\rightarrow \omega_i$ units of $k$ good
  - $\omega$ is iid over time and investors, st, $\int_0^\infty \omega d\Phi(\omega) = 1$.
  - We denote by $q$ the price of the $k$ good in terms of the $c$ good.
- A fancy costly state verification
  - $\omega$ is private information to $E$. $L$ has to pay $\mu i$ to learn $\omega$
**Contracting Problem**

- E borrows $i - n$ in $c$ goods and repays $(1 + r^k)(i - n)$ in $k$ goods.
- E defaults iff $\omega \leq \bar{\omega} \equiv (1 + r^k)\frac{i-n}{i}$.
- Then
  
  $$r^k = \frac{\bar{\omega}i}{i-n} - 1$$
EXPECTED INCOME FOR $E$ AND $L$

- E’s expected income (in terms of $c$ goods)

$$q \left[ \int_{\bar{\omega}}^{\infty} \omega d\Phi(\omega) - (1 - \Phi(\bar{\omega}))(1 + r^k)(i - n) \right]$$

$$= q_i \left[ \int_{\bar{\omega}}^{\infty} \omega d\Phi(\omega) - (1 - \Phi(\bar{\omega}))\bar{\omega} \right]$$

- $f(\bar{\omega})$

- L’s expected income (in terms of $c$ goods)

$$q \left[ \int_{0}^{\bar{\omega}} \omega d\Phi(\omega) + (1 - \Phi(\bar{\omega}))(1 + r^k)(i - n) - \Phi(\bar{\omega})\mu i \right]$$

$$= q_i \left[ \int_{0}^{\infty} \omega d\Phi(\omega) + (1 - \Phi(\bar{\omega}))\bar{\omega} - \Phi(\bar{\omega})\mu \right]$$

- $g(\bar{\omega})$
**Optimal Contract**

- The optimal contract specifies

\[
\max_{i, \bar{\omega}} q_i f(\bar{\omega}) \quad \text{st} \quad q_i g(\bar{\omega}) \geq i - n
\]

- From the participation constraint, \(i\) is increasing in \(q\) and \(n\)

\[
i = \frac{1}{1 - q g(\bar{\omega})} n
\]

- The maximization becomes

\[
\max_{\bar{\omega}} q \frac{n}{1 - q g(\bar{\omega})} f(\bar{\omega})
\]
Optimal Contract

- FOC

\[ g(\bar{\omega}) - g'(\bar{\omega}) \frac{f(\bar{\omega})}{f'(\bar{\omega})} = \frac{1}{q} \]

where

\[ f(\bar{\omega}) + g(\bar{\omega}) = 1 - \mu \Phi(\bar{\omega}) \]
\[ f'(\bar{\omega}) + g'(\bar{\omega}) = -\mu \phi(\bar{\omega}) \]

- Then, implicit function \( \bar{\omega}(q) \) increasing in \( q \),

\[ 1 - \mu \Phi(\bar{\omega}) + \phi(\bar{\omega}) \mu \frac{f(\bar{\omega})}{f'(\bar{\omega})} = \frac{1}{q} \]
The Quantitative Application

- Main Paper: Carlstrom and Fuerst (AER, 1997).
- Financial frictions provide a propagation mechanism....is this large quantitatively?
General Equilibrium Model

- Players
  - Two types of consumers
    - HHs: Households (risk averse)
    - E: Entrepreneur (risk neutral)
  - MF: Mutual Fund channels funds from HHs to E.
**General Equilibrium Model**

- **Sequence of Events**
  - $\theta_t$: Aggregate productivity shocks
  - Firms produce $c$ goods: $Y_t = \theta_t F(K_t, L_{t}^{HH}, L_{t}^{E})$
  - HHs buy $c$ goods and order new $k$ goods from the MF at a price $q_t$
  - MF finances loans to E (with the technology we discussed).
  - iid shocks to E (in $\omega$).
  - CSV contract.
  - Production of $k$ goods.
  - Solvent E sell capital to MF and purchase $c$ goods.

- Production is linear and net worth can just be aggregated in an aggregated net worth.
General Equilibrium Model

- This is calibrated with the following exercises.

- Shift of 0.1% of SS capital from HH to E.
  - This implies an increase in net worth of 13%.
  - $\uparrow I = 5.5\%$ and $\downarrow q$.
  - $\downarrow C^{HH} = 0.8\%$, $\uparrow L^{HH} = 2.2\%$ and $\uparrow Y = 1.4\%$

- A positive productivity shock on $\theta$.
  - Increase in the demand for $k$ goods but slow response on $n$.
  - Hump shaped increase in $Y$. 
Motivation

- Main paper: Gorton and Ordonez (AER 14)
- Information is at the heart of financial intermediation.
- Transparency is at the heart of new proposed regulation.
- How information production shapes business cycles?
- Should policies induce information production?
- We show information dynamics can account for fragility, magnification, persistence and asymmetry of cycles.
**Peeking at the Results**

- In a world of collateralized short-term debt, symmetric ignorance about the quality of collateral may be efficient.
  - Firms with bad collateral get loans that they otherwise would not. "Ignorance Credit Boom".
- but fragile to small shocks that induce asymmetric information.
  - Firms with good collateral do not get loans that they otherwise would. "Collateral Crises".
- **Endogenous tail events.** Larger booms lead to larger crises.
**Setting**


\[ K' = \begin{cases} 
A \min\{K, L^*\} & \text{with prob. } q \\
0 & \text{with prob. } (1 - q)
\end{cases} \]

\[ qA > 1. \text{ Optimal scale } K^* = L^* \]

- Households: \( \bar{K} > K^* \).

- Firms: \( L^* \) and a unit of land.
**Setting**


\[
K' = \begin{cases} 
A \min\{K, L^*\} & \text{with prob. } q \\
0 & \text{with prob. } (1 - q)
\end{cases}
\]

$qA > 1$. Optimal scale $K^* = L^*$

- Households: $\bar{K} > K^*$.

- Firms: $L^*$ and a unit of land.

\[
\begin{cases} 
C > K^* & \text{with prob. } p \\
0 & \text{with prob. } (1 - p)
\end{cases}
\]

Only households can privately learn the truth at a cost $\gamma$. 
INDUCE INFORMATION

- Symmetric Information.
- Lenders break even and debt is risk free

\[ p(qR_{IS} + (1-q)xC) = \gamma + pK \quad \text{and} \quad R_{IS} = xC \]

Then

\[ x = \frac{pK + \gamma}{pC} \leq 1 \]
Induce Information

\[ E(\text{Profits}) = E(K') \]

\[ K^*(qA - 1) \]

\[ pK^*(qA - 1) - \gamma \]

Beliefs \( p \)
Do Not Induce Information

- Symmetric Ignorance.

- Lenders break even and debt is risk free

\[ qR_{II} + (1 - q)pxC = K \quad \text{and} \quad R_{II} = pxC \]

Then \( x = \frac{K}{pC} \leq 1 \)
Do Not Induce Information

- Symmetric Ignorance.
- Lenders break even and debt is risk free

\[ qR_{II} + (1 - q)pxC = K \quad \text{and} \quad R_{II} = pxC \]

Then \( x = \frac{K}{pC} \leq 1 \)

- Subject to loans not triggering information acquisition.
Do Not Induce Information

\[ E(\text{Profits}) = E(K') \]

Graph:
- Vertical axis: \( pC(qA - 1) \)
- Horizontal axis: Beliefs \( p \)
- Points:
  - \( (0, 0) \)
  - \( (1, K^*(qA - 1)) \)
**Do Not Induce Information**

\[ E(\text{Profits}) = E(K') \]

\[ pC(qA - 1) \]

\[ p(1-q) \left[ \frac{K}{p} - K \right] + (1-p)0 \leq \gamma \]
Do Not Induce Information

\[ E(\text{Profits}) = E(K') \]

\[ K^* (qA - 1) \]

\[ pC(qA - 1) \]

\[ K \leq \frac{\gamma}{(1 - p)(1 - q)} \]

Beliefs \( p \)

0

1
Do Not Induce Information

\[ \text{E(Profits)} = \text{E}(K') \]

\[ \frac{\gamma}{(1 - p)(1 - q)} (qA - 1) \]
**Optimal Information**

\[ E(\text{Profits}) = E(K') \]
Optimal Information

\[ E(\text{Profits}) = E(K') \]

A larger \( \gamma \) can increase borrowing!
**Optimal Information**

\[ W = \int_{0}^{1} K(p)(qA - 1)f(p) \, dp \]


**Setting Dynamics**

How this distribution of beliefs evolves over time?

- Dynamic extension.

  - OG: "young" households, "old" firms.

  - Land is storable, $K$ is not.

  - Land is transferred across generations.

  - We assume away bubbles and multiplicity.

  - There are no fire sales.

  - Price is $pC$ (i.e., single match and buyers’ negotiation power).
**Timing**

- Firm w/ collateral \( p \)
  - Borrows \( K \) w/ II or IS debt (conditions \( R \) and \( x \))
  - Lender can privately observe collateral type.

- Project realization
  - Debts are paid off and any info is revealed (\( p' \))
  - Firms sell land at \( p'C \) to households.

**Market for loans**

**Market for land**
**TIMING**

- Firm w/ collateral p
- Borrows K w/ II or IS debt (conditions R and x)
- Lender can privately observe collateral type.
- Project realization
- Debts are paid off and any info is revealed (p’)
- Firms sell land at p’C to households.

**Market for loans**

**Market for land**

**Idiosyncratic and Aggregate Shocks**
**Evolution of Collateral Types**

- Important assumption: **Mean reversion of collateral.**

- Simplifying assumptions
  - \( \hat{p} \): Fraction of good land.
  - Idiosyncratic shocks
    - Occur with probability \((1 - \lambda)\)
    - Land becomes good with probability \(\hat{p}\).
    - The shock is observable, the realization is not.
Simpler Aggregation

\[ W_t = [0f(0) + K(\hat{p})f(\hat{p}) + K^* f(1)](qA - 1) < W^* = K^*(qA - 1) \]
Information Sensitive Dynamics

\[ W_{0}^{IS} = \hat{p}K^{*}(qA-1) \]

\[ (1 - \hat{p}) \]
**Information Sensitive Dynamics**

\[ \lambda (1 - \hat{p}) \]

\[ (1 - \lambda)(1 - \hat{p}) \]

\[ (1 - \lambda)p \]
Information Sensitive Dynamics

\[ W_t^{IS} = \hat{p}K^*(qA-1)-(1-\lambda)\gamma < W^* \]
Information Inensitive Dynamics

\[ W_{0}^{II} = \hat{p}K^*(qA - 1) \]
Information Insensitive Dynamics

\[ W_{1{II}} = [(1 - \lambda)K(\hat{p}) + \lambda\hat{p}K^*] (qA - 1) \]
\[ W_{II}^2 = [(1 - \lambda^2) K(\hat{p}) + \lambda^2 \hat{p} K^*] (qA-1) \]
**Information Insensitive Dynamics**

\[ W_3^{II} = \left[ (1 - \lambda^3)K(\hat{p}) + \lambda^3 \hat{p}K^* \right] (qA - 1) \]
Information Inensitive Dynamics

\[ W_{t}^{II} = [(1 - \lambda^t)K(\hat{p}) + \lambda^t \hat{p}K^*] (qA - 1) \rightarrow W^* \]

\[ W_{t}^{II} = [(1 - \lambda^t)K(\hat{p}) + \lambda^t \hat{p}K^*] (qA - 1) \rightarrow W^* \]

\[ (1 - \lambda^t) \]
NEGATIVE AGGREGATE SHOCKS

A fraction \((1 - \eta)\) of good collateral become bad.
NEGATIVE AGGREGATE SHOCKS

SMALL: Nothing Happens
NEGATIVE AGGREGATE SHOCKS

LARGE: Credit Crunch
NEGATIVE AGGREGATE SHOCKS

A BIT LARGER: Wave of Information
Numerical Example

Numerical Example

- **Small**
- **Large**
- Always produce information about idiosyncratic shocks
NUMERICAL EXAMPLE

Always produce information about idiosyncratic shocks

Aggregate Consumption

Small

Bit Larger

Large
**Numerical Example**

![Graph showing standard deviation of beliefs over periods for Small, Large, and Bit Larger scenarios.](image-url)
A Planner

- Assume a planner that maximizes the discounted utility of cohorts
  \[ U_t = E_t \sum_{\tau=t}^{\infty} \beta^{\tau-t} W_t. \]
- Optimal range of information production is wider.
- The planner can implement the optimum by subsidizing a fraction \( \beta \lambda \) of the information cost \( \gamma \).
A Planner: Cutoffs

\[ E(\text{Profits}) = E(K') \]
A Planner: Cutoffs

\[ E(\text{Profits}) = E(K') \]

Effective cost of information
\[ \gamma (1 - \beta \lambda) \].
EXTENSIONS

- Endogenous complex securities.
- Real Shocks.
- Two Sided Information Production.
- Crises without shocks.
**Endogenous Security Structure**

Two securities with different $p$
Endogenous Security Structure

Pooling Collateral
**Endogenous Security Structure**

Complexity of Securities (Larger $\gamma$)
A Real Source of a Credit Crunch

A reduction in the success probability $q$ can lead to a credit crunch.
A Real Source of a Credit Crunch

A reduction in the success probability $q$ can lead to a credit crunch.
Suggestive Evidence Information Production
Perraudin and Wu (2008)
**Suggestive Evidence Information Production**

Perraudin and Wu (2008)
Final Remarks

- Symmetric ignorance may be socially desirable, but it is vulnerable to a sudden loss of confidence in its symmetry.

- Macroeconomic implications:
  - Larger “ignorance credit booms” lead to larger crises.
  - The planner may not want to eliminate fragility.
  - Dispersion of beliefs (and of credit and production) is endogenous. We are testing this implication of the mechanism empirically (Kyriakos, Gorton and Ordonez, 18?).