

COLLATERAL CRISES

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MOTIVATION

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- ▶ How information production shapes business cycles?
- ▶ Should policies induce information production?

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”.

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- ▶ Endogenous tail events. Larger booms lead to larger crises.

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PEEKING AT THE RESULTS

- ▶ A planner would like to produce more information than private agents but would not always want to eliminate fragility.
- ▶ After crises, **recoveries** are faster if
 - ▶ Information is replenished when there are NOT credit policies.
 - ▶ Information is NOT replenished when there are credit policies.

SOME LOOSE EVIDENCE

- ▶ Jorda, Schurlarick, Taylor (2011) study 14 developed countries over 140 years (1870-2008)
 - ▶ "Our overall result is that credit growth emerges as the single best predictor of financial instability..."
- ▶ More recently...
 - ▶ Credit boom since 1990s and large credit drop in 2008.
 - ▶ Small shock, sudden and large collapse.

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- ▶ More recently...
 - ▶ Credit boom since 1990s and large credit drop in 2008.
 - ▶ Small shock, sudden and large collapse.
- ▶ Empirically our mechanism seems to be at work behind these facts.

RELATED LITERATURE

- ▶ Financial Intermediation.
 - ▶ **Reallocation of funds:** *Diamond (85), Boyd and Prescott (86).*
 - ▶ **Provision of trading securities:** *Diamond and Dybvig (83), Gorton and Pennacchi(90), Dang et al (11).*

RELATED LITERATURE

- ▶ Macroeconomics and Crises
 - ▶ **Magnification and Persistence:** *Bernanke, Gertler and Gilchrist (96), Kiyotaki and Moore (97), Krishnamurthy (09)*
 - ▶ **Fragility:** *Diamond and Dybvig (83), Allen and Gale (04).*
 - ▶ **Leverage Cycles:** *Geanakoplos (97 and 09), Mendoza and Bianchi (11), Perri and Quadrini (11)*
 - ▶ **Information and Asymmetric Cycles:** *Veldkamp (06), Ordonez(10), Andolfatto et al. (11).*

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 - ▶ **Information and Asymmetric Cycles:** *Veldkamp (06), Ordonez(10), Andolfatto et al. (11).*
- ▶ We show information dynamics can account for fragility, magnification, persistence and asymmetry of cycles.

ROAD MAP

- ▶ Single Period.
- ▶ Dynamics.
- ▶ Planner.
- ▶ Some Extensions.
- ▶ Some Evidence.

SINGLE PERIOD

SETTING

- ▶ Mass 1 of risk-neutral firms and households.

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

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

- ▶ Households: $\bar{K} > K^*$.
- ▶ Firms: L^* and a unit of land.

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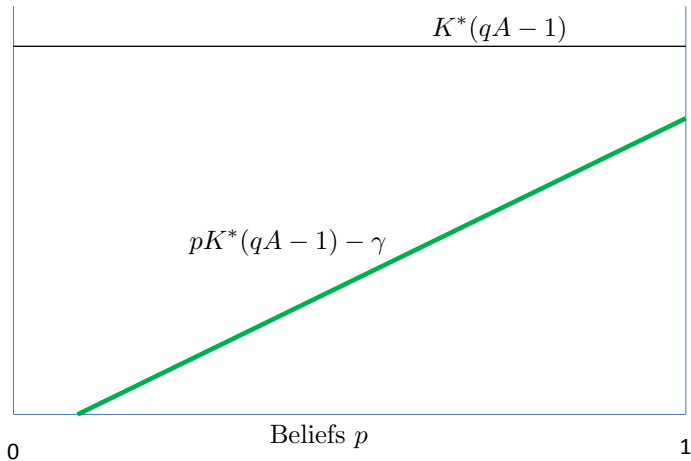
- ▶ Households: $\bar{K} > K^*$.
- ▶ Firms: L^* and a unit of land.

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

Only households can privately learn the truth at a cost γ .

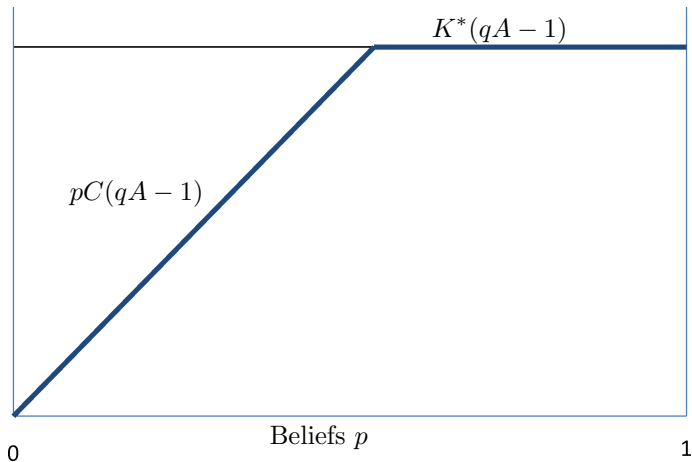
INDUCE INFORMATION

$$E(\text{Profits}) = E(K')$$



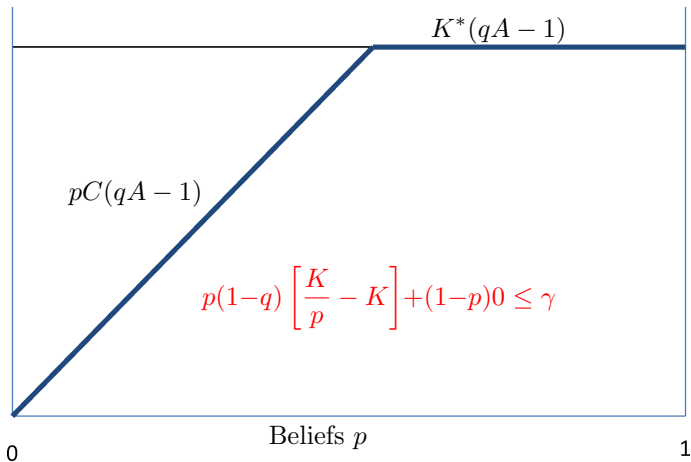
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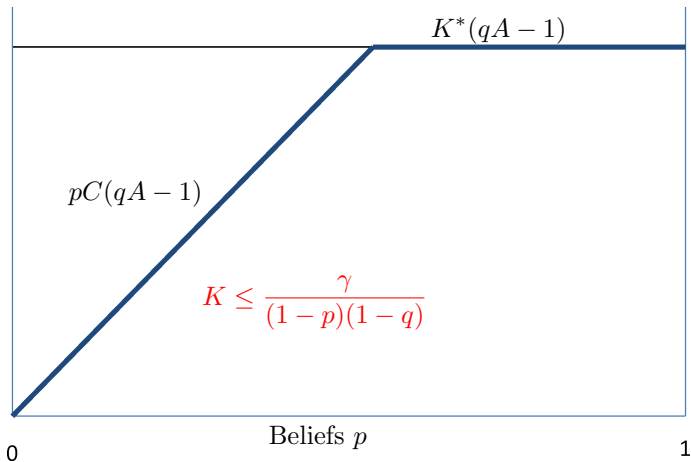
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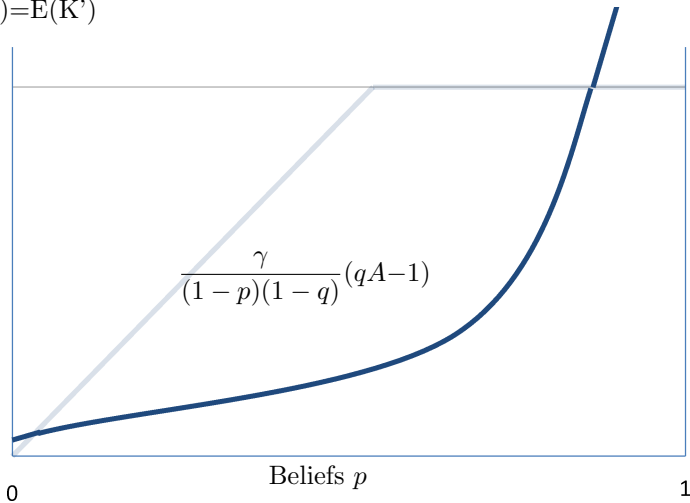
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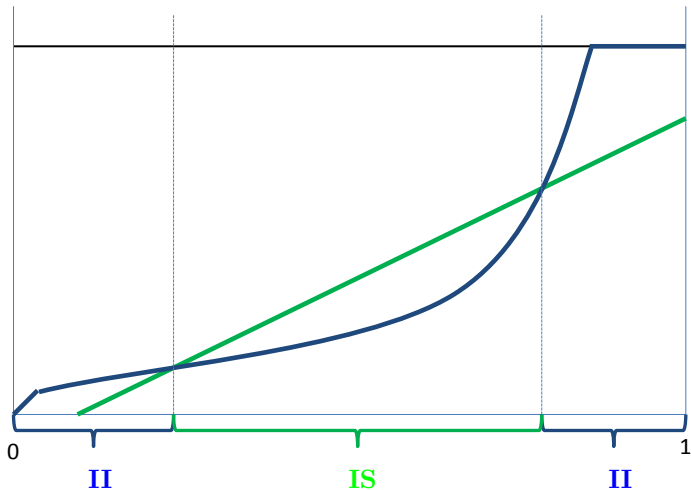
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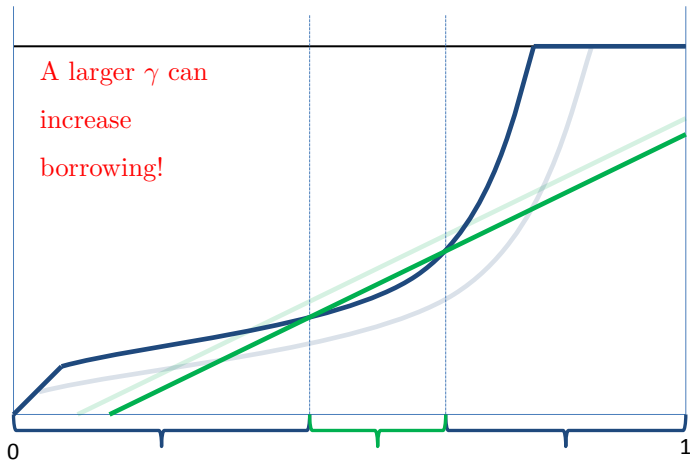
OPTIMAL INFORMATION

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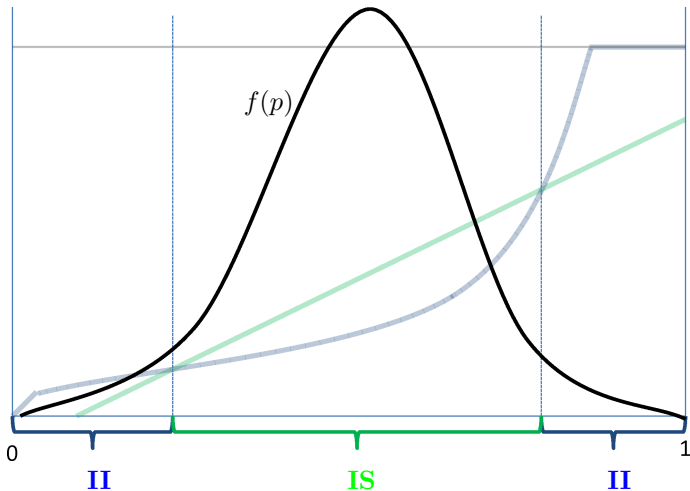
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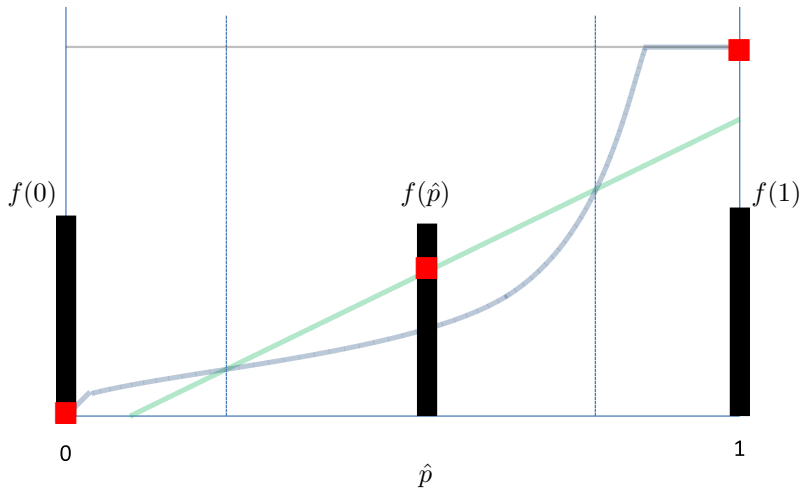
OPTIMAL INFORMATION

$$W = \int_0^1 K(p)(qA-1)f(p)dp < \mathbf{W}^* = \mathbf{K}^*(\mathbf{qA} - \mathbf{1})$$



SIMPLER AGGREGATION

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



DYNAMICS

SETTING DYNAMICS

How this distribution of beliefs evolves over time?

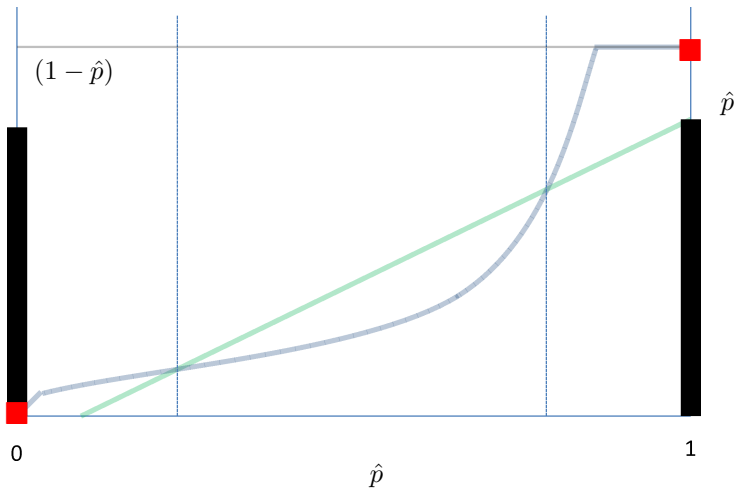
- ▶ Dynamic extension.
 - ▶ OG: "young" households, "old" firms.
 - ▶ Land is storable, K is not.
 - ▶ Land is transferred across generations.
 - ▶ We assume away bubbles and multiplicity.
 - ▶ There are no fire sales.
 - ▶ Price is pC (i.e., single match and buyers' negotiation power).

EVOLUTION OF COLLATERAL TYPES

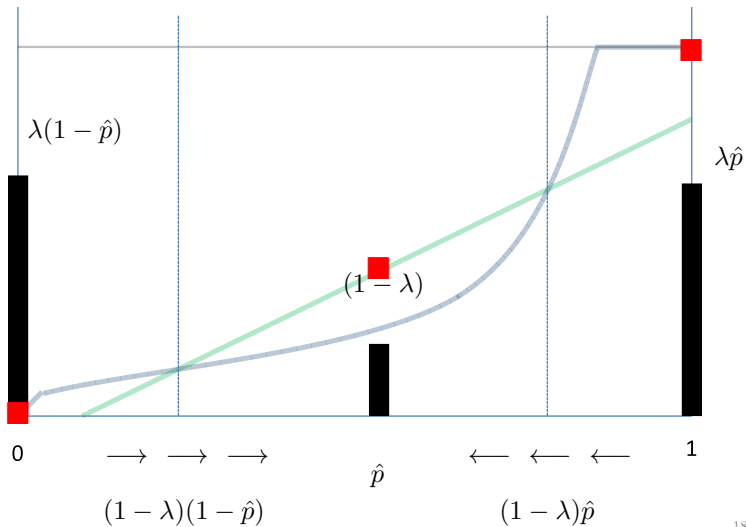
- ▶ Important assumption: Mean reversion of collateral.
- ▶ Simplifying assumptions
 - ▶ $\hat{p}$: Fraction of good land.
 - ▶ Idiosyncratic shocks at the end of each period.
 - ▶ Occur with probability $(1 - \lambda)$
 - ▶ Land becomes good with probability $\hat{p}$.
 - ▶ The shock is observable, the realization is not.
 - ▶ At $t = 0$, all information is known.

INFORMATION SENSITIVE DYNAMICS

$$W_0^{IS} = \hat{p}K^*(qA-1)$$

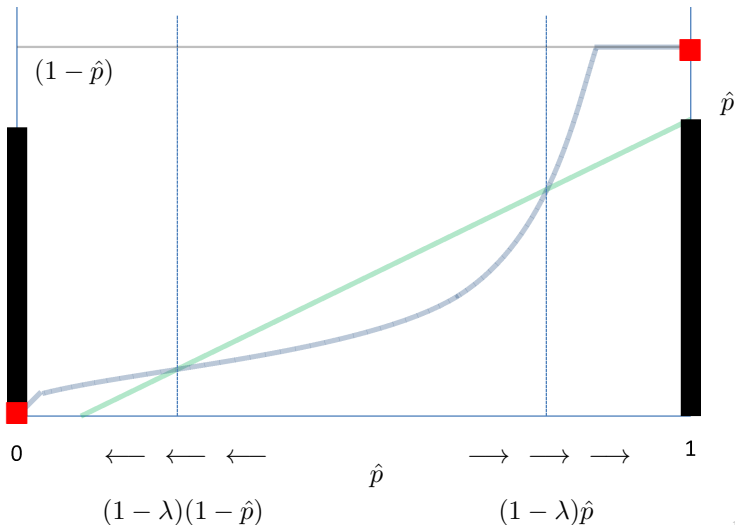


INFORMATION SENSITIVE DYNAMICS



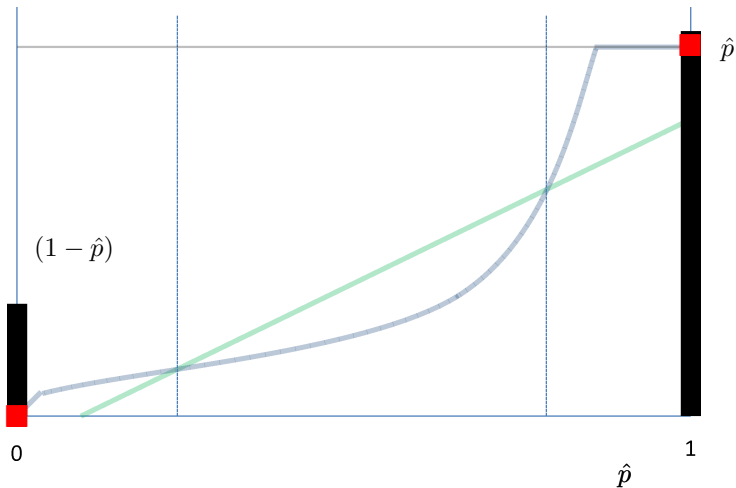
INFORMATION SENSITIVE DYNAMICS

$$W_t^{IS} = \hat{p}K^*(qA-1)-(1-\lambda)\gamma < \mathbf{W}^*$$



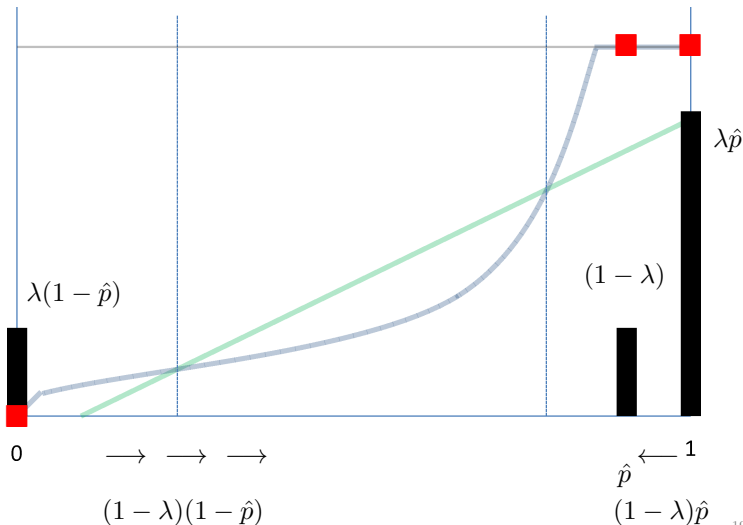
INFORMATION INSENSITIVE DYNAMICS

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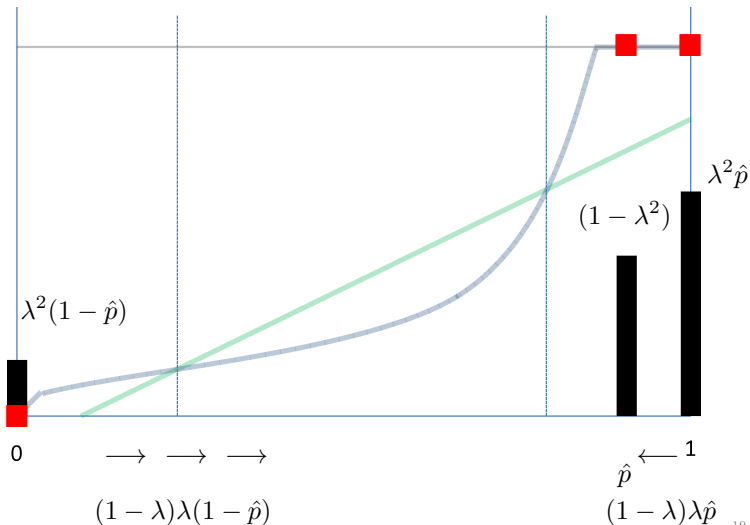
INFORMATION INSENSITIVE DYNAMICS

$$W_1^{II} = [(1 - \lambda)K(\hat{p}) + \lambda\hat{p}K^*] (qA - 1)$$



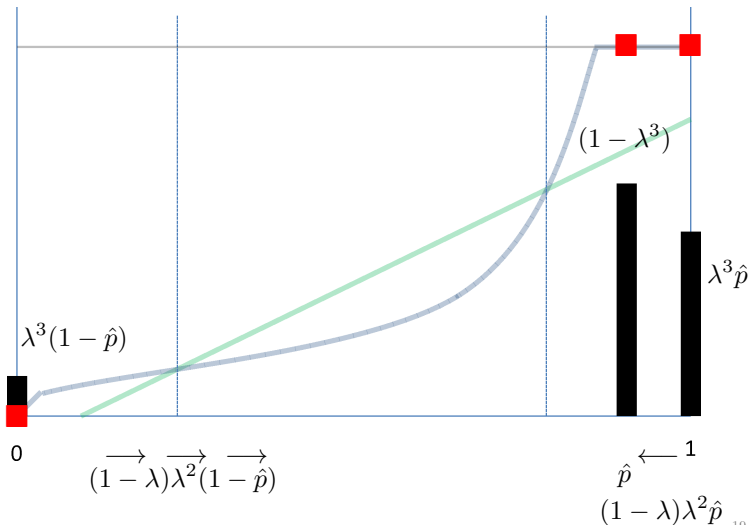
INFORMATION INSENSITIVE DYNAMICS

$$W_2^{II} = [(1 - \lambda^2)K(\hat{p}) + \lambda^2\hat{p}K^*] (qA-1)$$



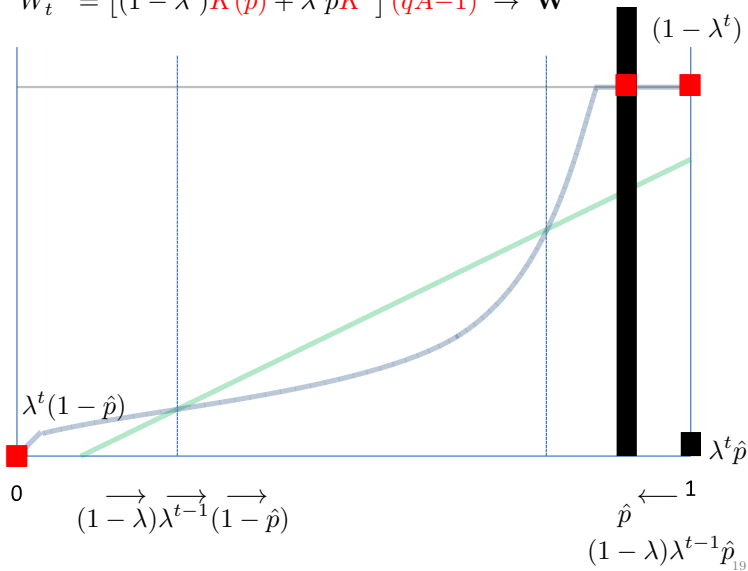
INFORMATION INSENSITIVE DYNAMICS

$$W_3^{II} = [(1 - \lambda^3)K(\hat{p}) + \lambda^3\hat{p}K^*] (qA-1)$$



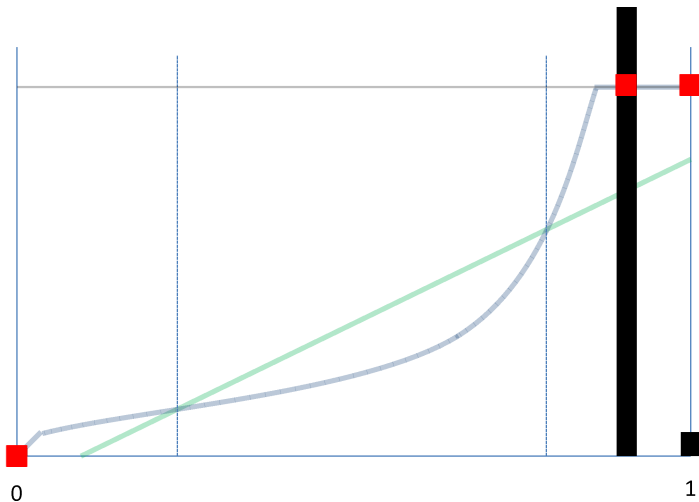
INFORMATION INSENSITIVE DYNAMICS

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



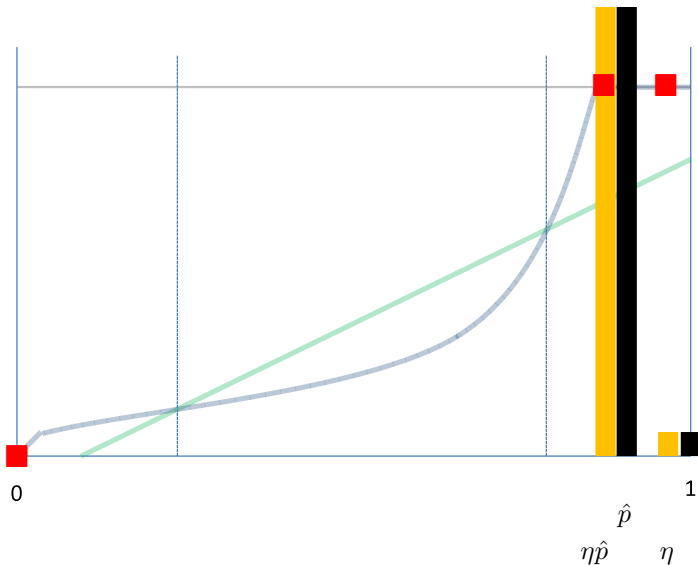
NEGATIVE AGGREGATE SHOCKS

A fraction $(1 - \eta)$ of good collateral become bad.



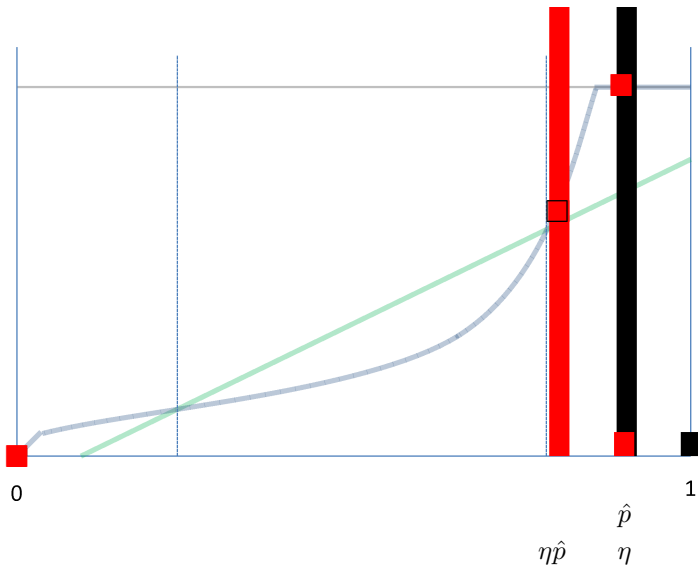
NEGATIVE AGGREGATE SHOCKS

SMALL: **Nothing Happens**



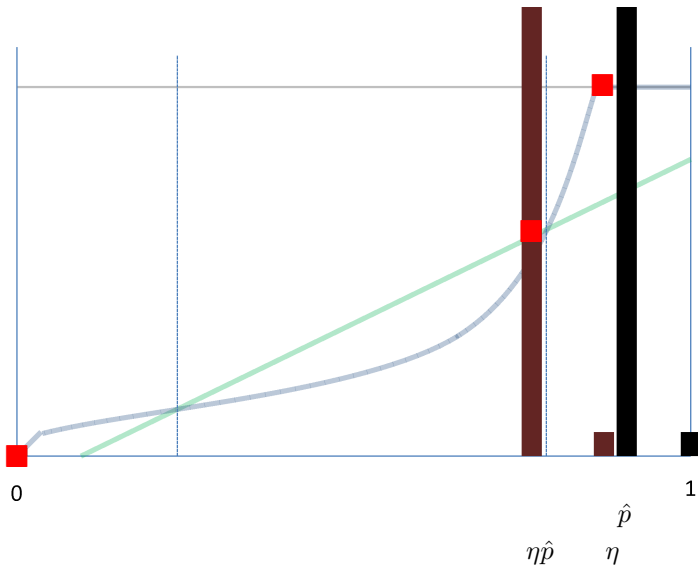
NEGATIVE AGGREGATE SHOCKS

LARGE: Credit Crunch

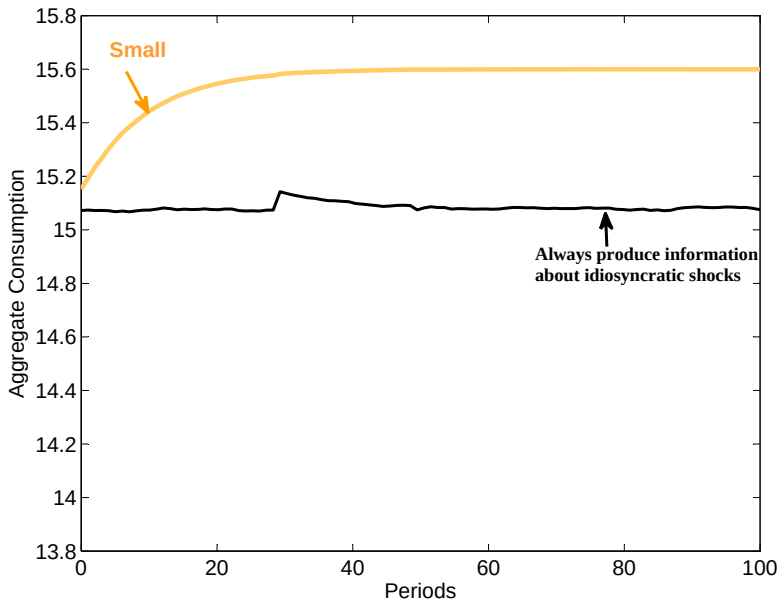


NEGATIVE AGGREGATE SHOCKS

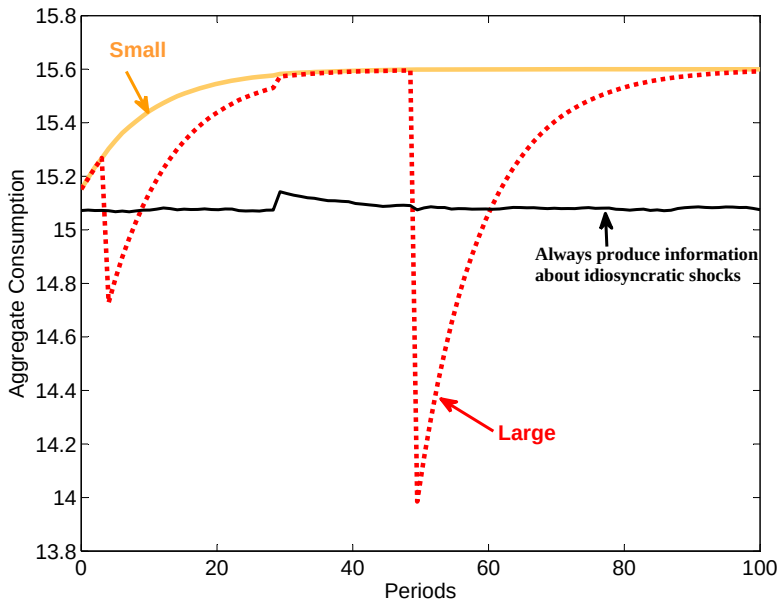
A BIT LARGER: Wave of Information



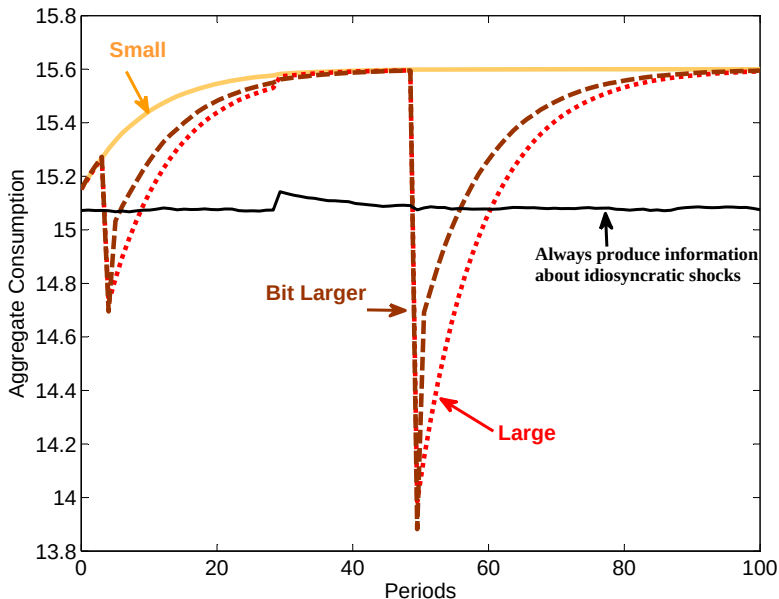
NUMERICAL EXAMPLE



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PLANNER

A PLANNER

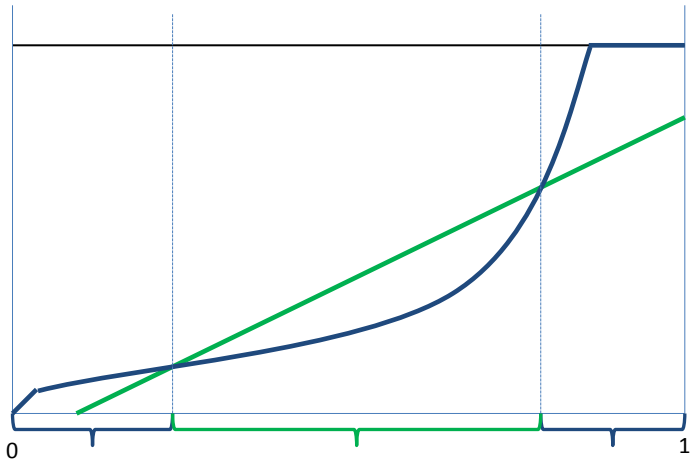
- ▶ Assume a planner that maximizes the discounted utility of cohorts

$$U_t = E_t \sum_{\tau=t}^{\infty} \beta^{\tau-t} W_{\tau}.$$

- ▶ Optimal range of information production is wider.
- ▶ The planner can implement the optimum by subsidizing a fraction $\beta\lambda$ of the information cost γ .

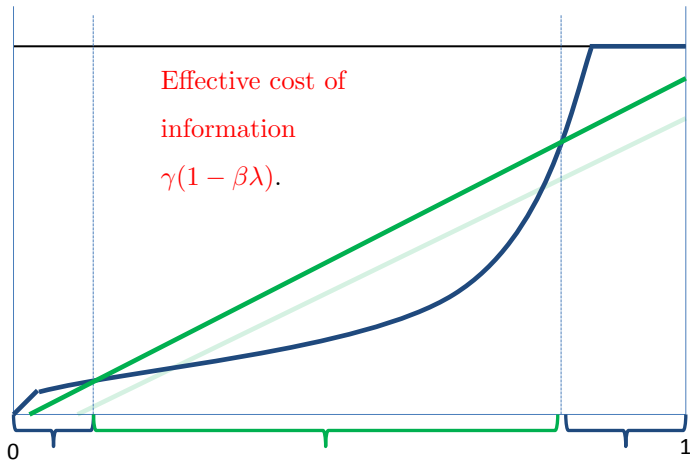
A PLANNER: CUTOFFS

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PREVENTIVE POLICIES

- ▶ The possibility of a negative aggregate shock **does not always justify acquiring information**, reducing current output to insure against potential reductions in future output.

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- ▶ Under certain conditions (guaranteed if $\eta > \hat{p}$), incentives to acquire information increase with
 - ▶ The likelihood of the expected shock.
 - ▶ The size of the expected shock.

EX-POST POLICIES

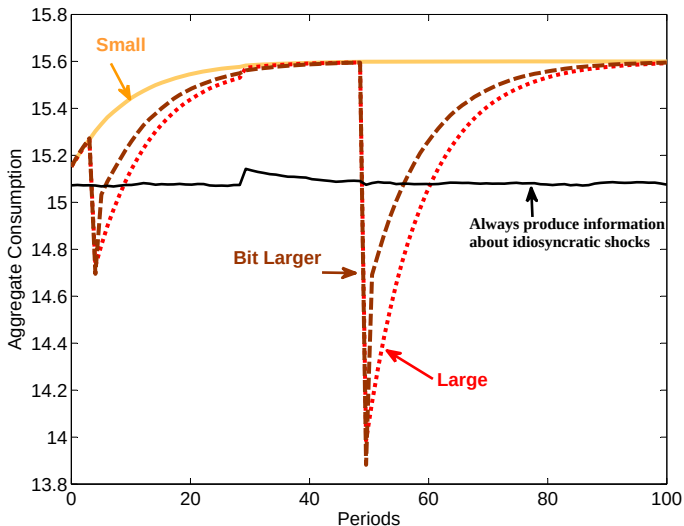
- ▶ Collateral Policies:

- ▶ Restore $\hat{p}$. *e.g., buy and guarantee collateral.*
- ▶ More effective when information is not produced.

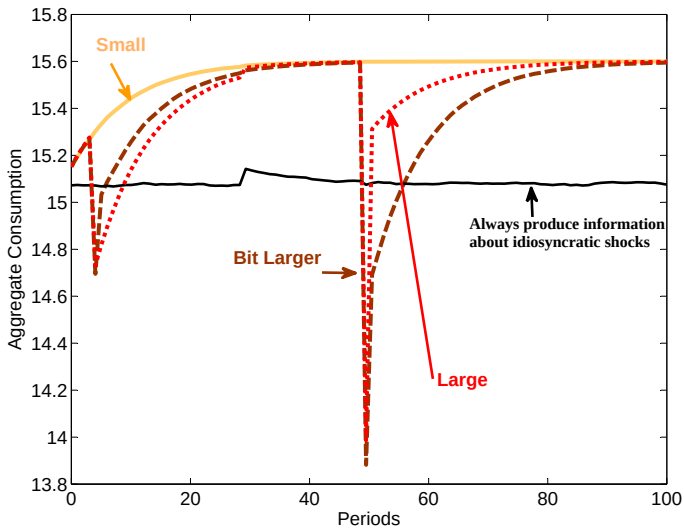
- ▶ Lending Policies:

- ▶ Avoid information acquisition. *e.g., subsidizing firm loans.*
- ▶ More effective in the presence of collateral policies.

WITHOUT COLLATERAL POLICIES



WITH COLLATERAL POLICIES



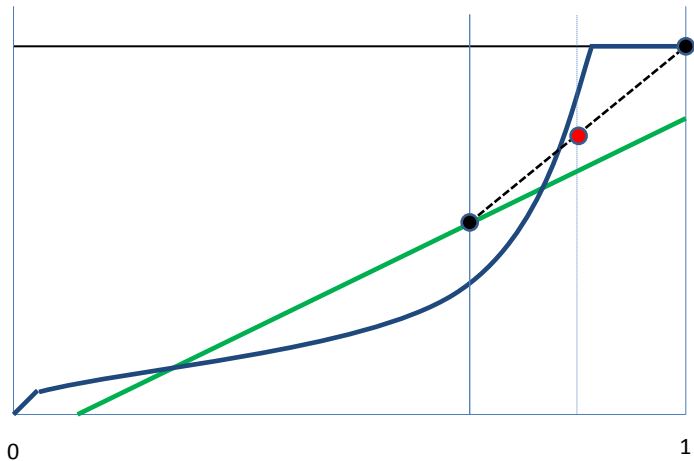
SOME EXTENSIONS

EXTENSIONS

- ▶ Endogenous complex securities.
- ▶ Real Shocks.
- ▶ Two Sided Information Production.
- ▶ Crises without shocks.

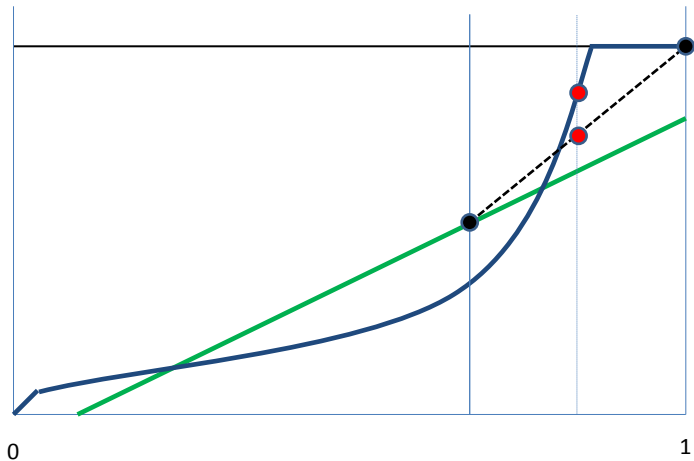
ENDOGENOUS SECURITY STRUCTURE

Two securities with different p



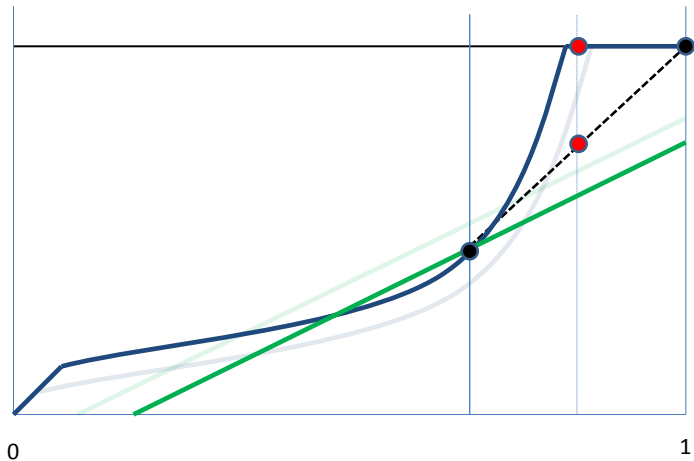
ENDOGENOUS SECURITY STRUCTURE

Pooling Collateral



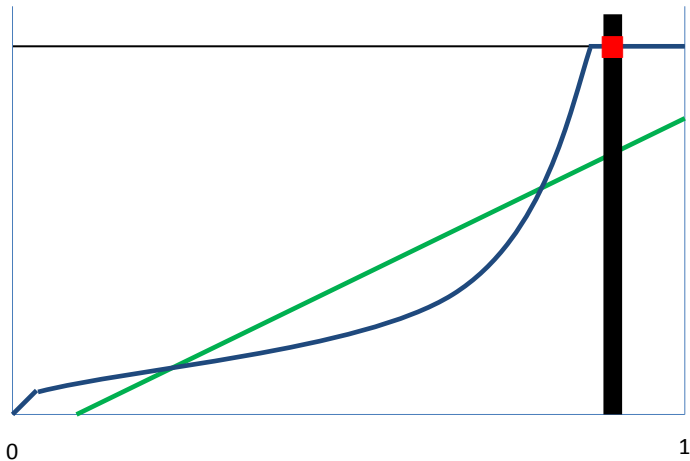
ENDOGENOUS SECURITY STRUCTURE

Complexity of Securities (Larger γ)



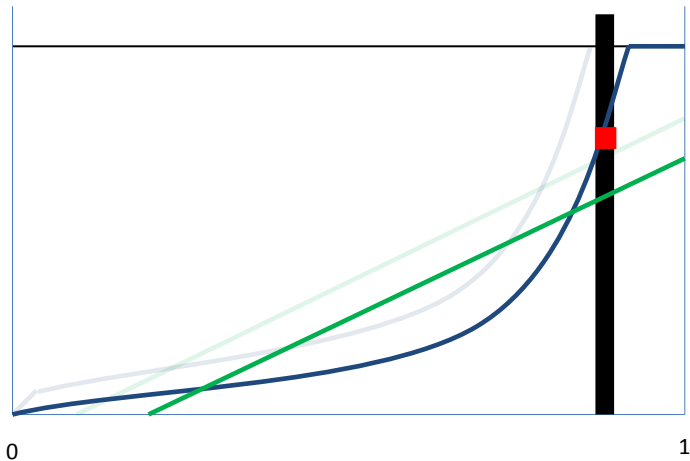
A REAL SOURCE OF A CREDIT CRUNCH

A reduction in the success probability q can lead to a credit crunch.



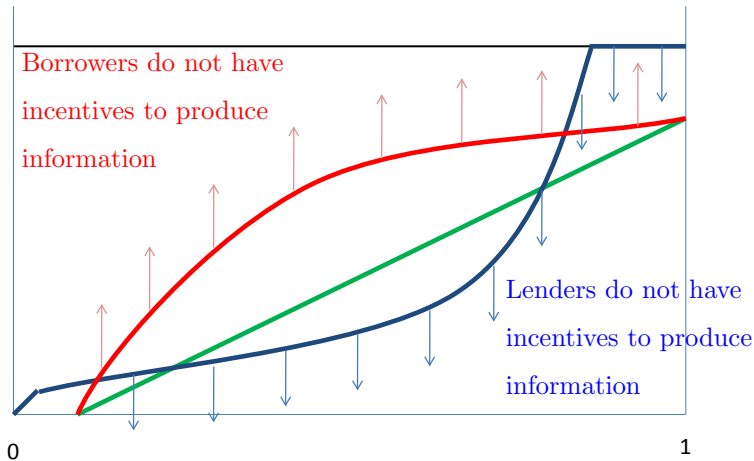
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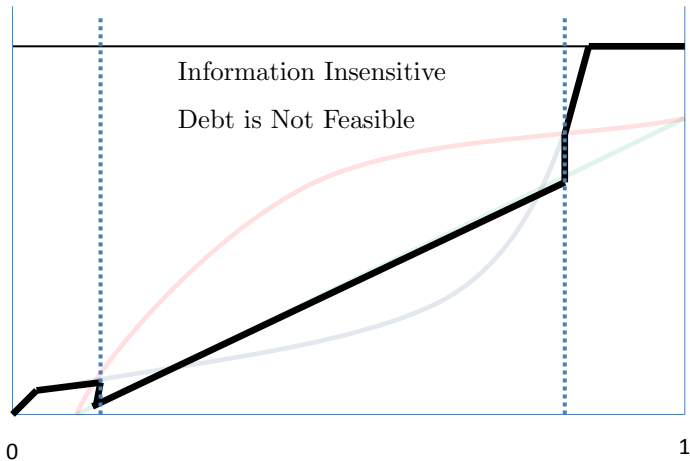
TWO-SIDED INFORMATION PRODUCTION

What if borrowers also can acquire information privately at a cost γ ?



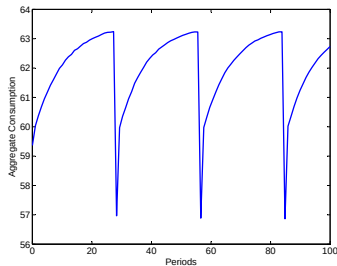
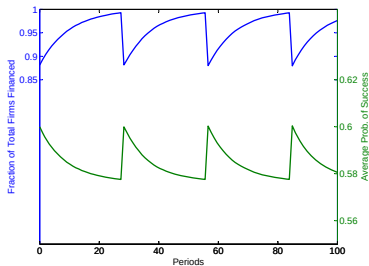
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PURELY ENDOGENOUS CYCLES

- ▶ Decreasing marginal probability of success.
- ▶ Individual q non observable.



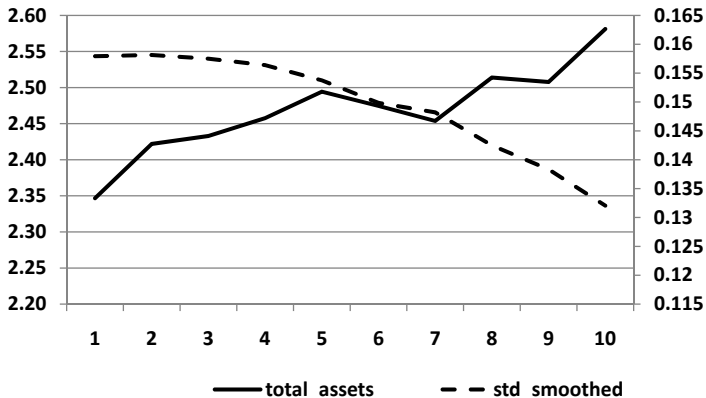
SOME EVIDENCE

SOME SUGGESTIVE EVIDENCE

- ▶ In booms, **negative** relation between credit and belief dispersion.
- ▶ 29 credit boom events: 12 pre-Fed (1863-1914) and 17 post-Fed.
 - ▶ Credit Boom Dates: Davis (2006).
 - ▶ Credit: Bank Total Assets. (from "Call Reports")
 - ▶ Dispersion of Beliefs: Std. Dev. of the cross section of stock returns. (from NYSE (1815-1925) and CRSP (1926-2011)).

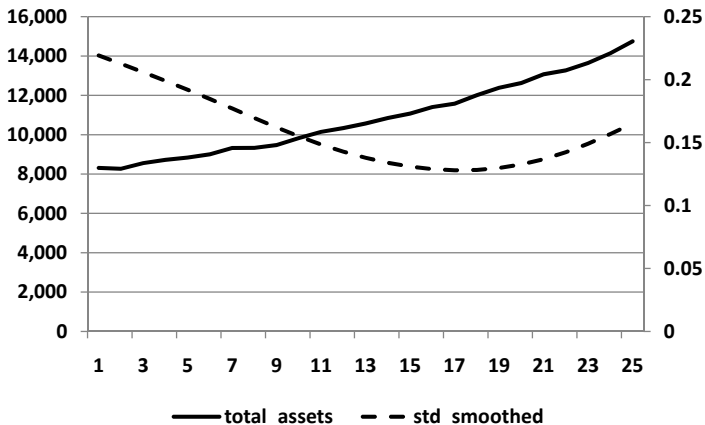
EXAMPLES OF CREDIT BOOMS

Pre Fed: Boom from 05/1885 to 03/1887.



EXAMPLES OF CREDIT BOOMS

Post Fed: Boom from 11/2001 to 12/2007.



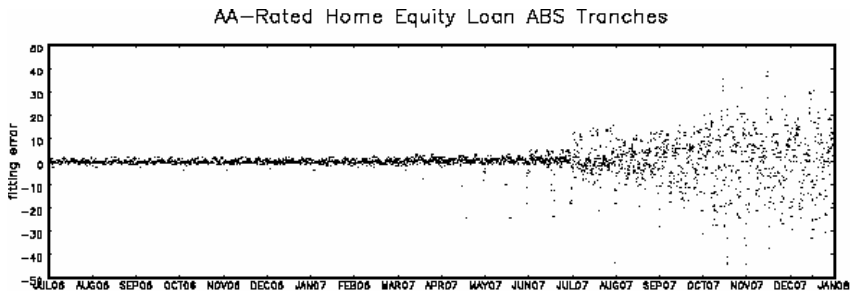
CORRELATIONS

Means	Change in Beliefs	Change in K-P Filtered Beliefs	Change in Total Assets
National Banking Era, 1863-1914	0.70	-0.019	0.061
Federal Reserve Era, 1914-2010	-0.122	-0.013	0.137
Whole Period: 1863-2010	-0.035	-0.016	0.105

Correlations	Change in Beliefs and Change in Total Assets	Change in K-P Beliefs and Change in Total Assets
National Banking Era, 1863-1914	-0.366	-0.326
Federal Reserve Era, 1914-2010	-0.085	-0.002
Whole Period: 1863-2010	-0.226	-0.045

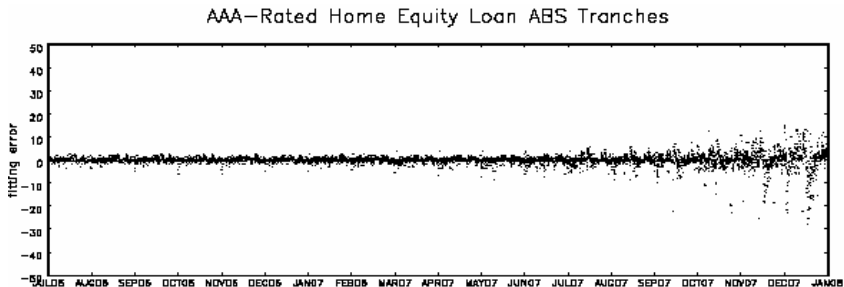
EVIDENCE INFORMATION PRODUCTION

Perraudin and Wu (2008)



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.
 - ▶ Recoveries.
 - ▶ NO expansionary policies: Information speeds up recoveries.
 - ▶ Expansionary policies: Information delays recoveries.
 - ▶ Dispersion of beliefs (and of credit and production) is endogenous.

We tested this implication of the mechanism empirically.
- ▶ Optimal information production when collateral is productive?