The blind monks and the elephant: contrasting narratives of financial crisis

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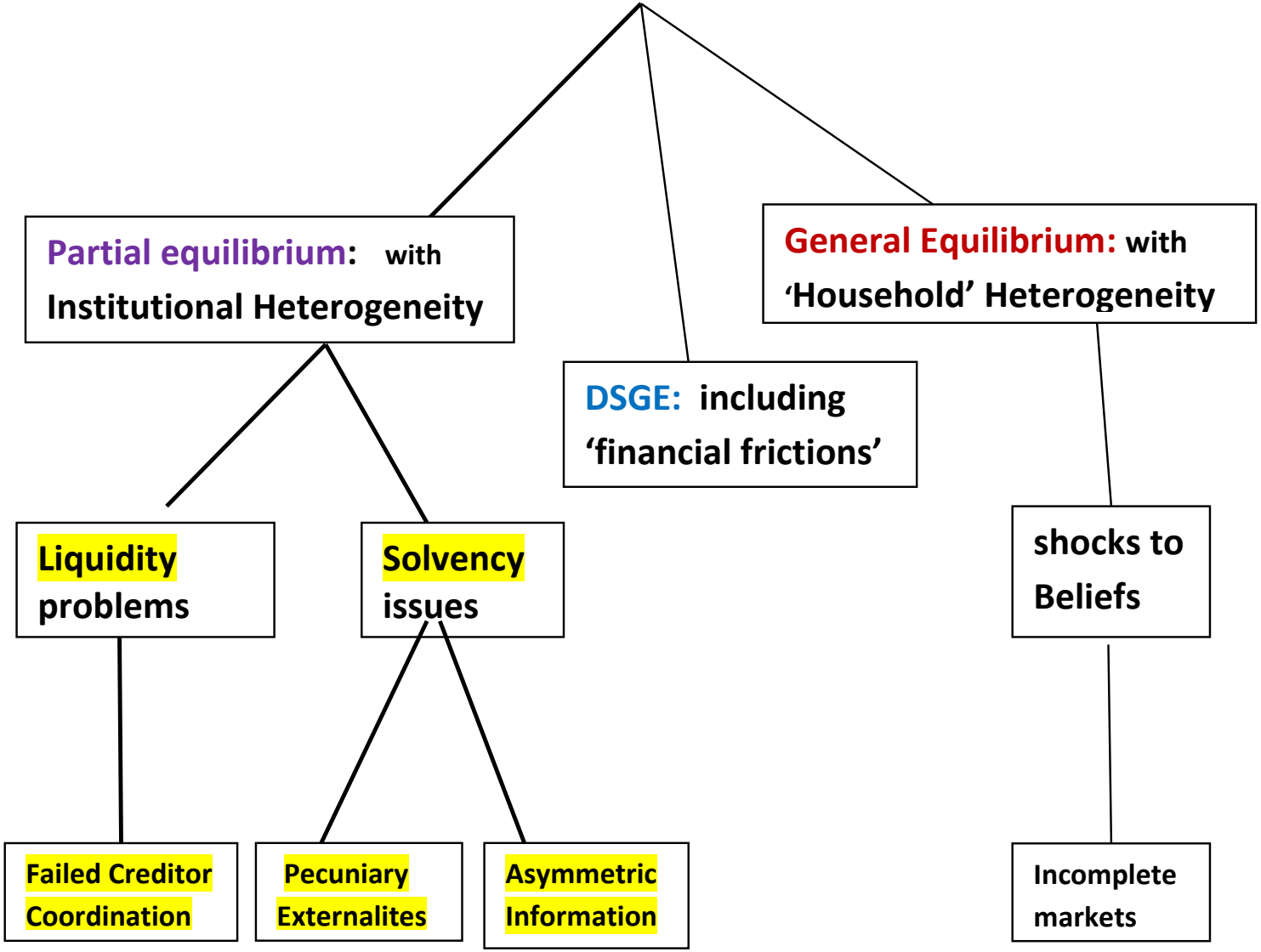
A story of the US subprime crisis, including...

- Basel regulators who are ‘captured’
- Investment Banks that use VaR --- but generate ‘pecuniary externalities’ nevertheless
- Credit Rating Agencies who mis-rate MBS for Investment banks to mis-sell.
- Result: a financial system that is potentially ‘catastrophic’, with legal evidence of misconduct
- plus a hint at the possible political consequences

Different Perspectives



Focus of this paper : partial equilibrium

- Take 3 explanations **each apparently sufficient**

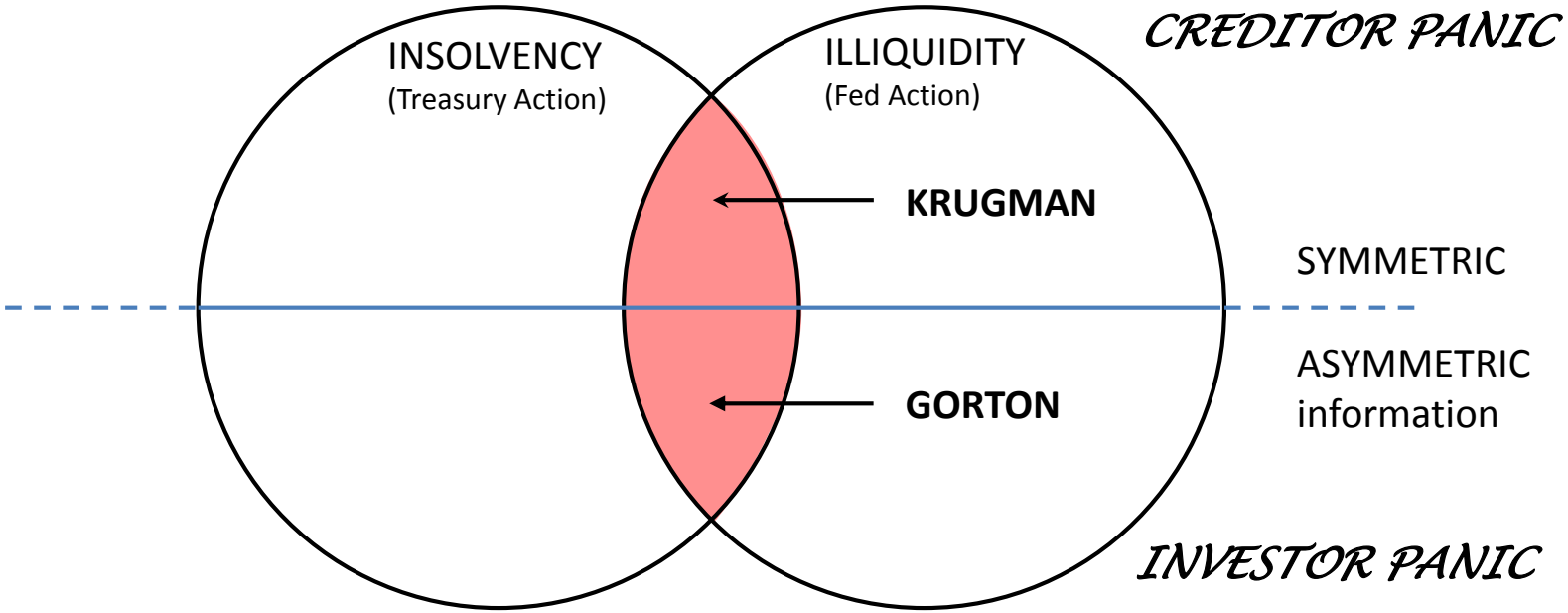
1. **Insolvency** due to externalities, after shocks (Shin,2010)

2.**Insolvency** due to cheating that is uncovered (Akerlof and Shiller, 2015)

3. **Illiquidity** (Gorton 2009, Krugman,2018)

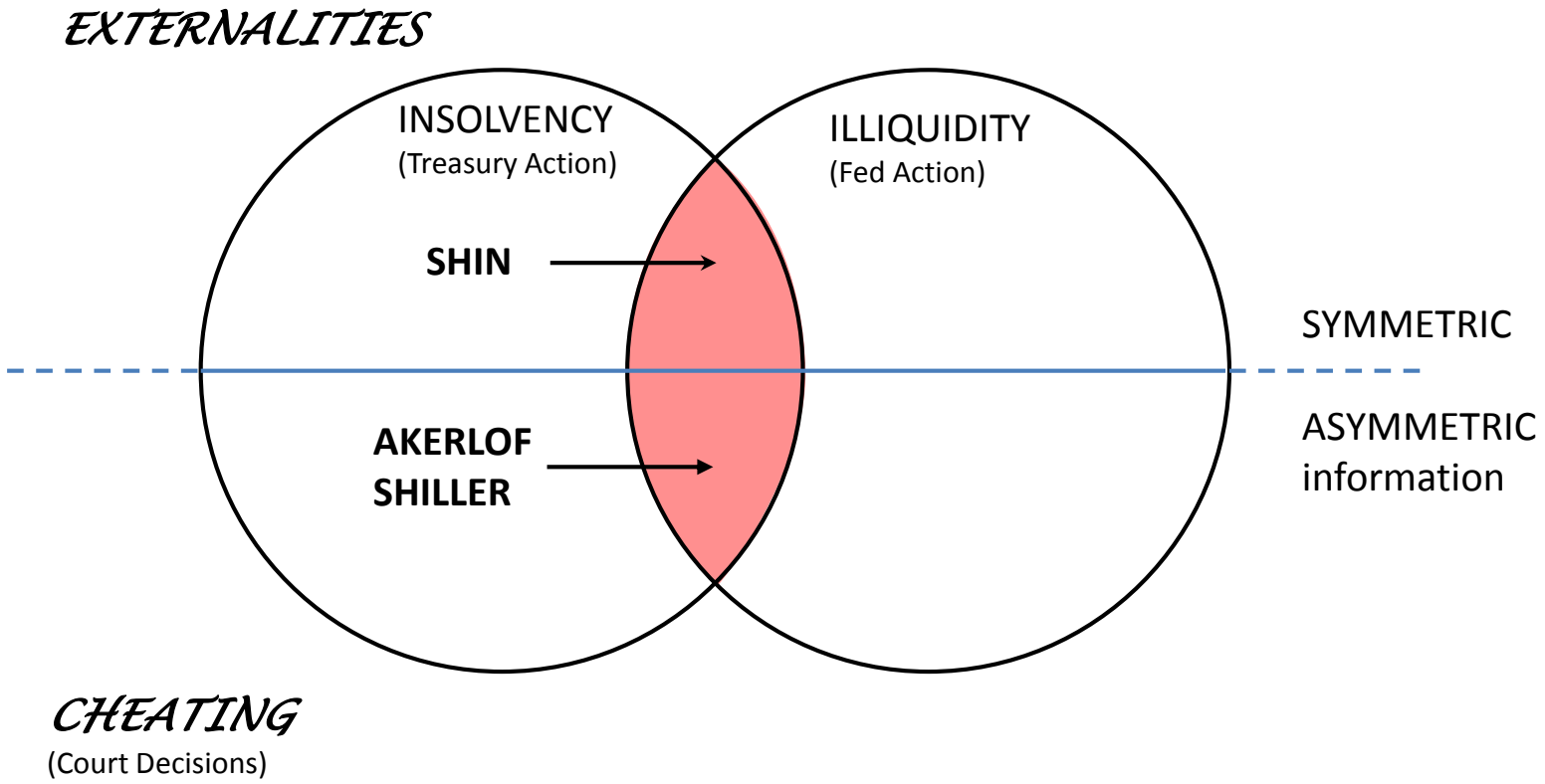
- For guidance we turn to policy actions, by Fed and Treasury, and legal decisions

Preview of a familiar story (Diamond/Dybvig): Illiquidity leading to Insolvency



Notes: Gorton, 2009; Krugman 2018

Preview of some new perspectives: Insolvency leading to Illiquidity



Notes: Shin,2010; Akerlof and Shiller,2015,

Hindu parable of the Blind Men and the Elephant:
Rigveda, 1500 - 1200 BC

Each person, guided only by touching a different part of its anatomy - be it the trunk, the tail, the body, or a leg – gives a correct but partial characterisation of the noble creature

'Reality is one, though wise men speak of it variously' Rigveda

- The conclusion of the parable tempts one to ask: should these seemingly conflicting accounts not be combined?
- For guidance, we turn to the evidence of **law courts** and the actions of **policy-makers** in the Fed and Treasury.
- What did the extraordinary policy actions taken by these agencies reveal about the nature of the crisis? Was there sufficient evidence of misbehaviour to prosecute the players involved?

We begin with **externalities:** and the LSE critique of BASEL II

Basel Accords I and II suffered from the **Fallacy of Composition** – i.e. ensuring each institution behaves well ensures the system as a whole is safe and sound.

Danielsson et al (2001), in an 'Academic Response to Basel II' from LSE, warned of:

- ignoring the role of *externalities*
- and putting *unwarranted trust in Credit Rating Agencies* . Shin's analysis supports this critique.

‘Pecuniary’ externalities

- The externalities referred to (‘**pecuniary externalities**’) are the amplification of common shocks to fundamentals coming via asset prices - because of balance sheet rules imposed on the financial sector to check moral hazard.
- How to understand such pecuniary externalities?
- Hyun Shin suggests a metaphor - a pedestrian footbridge

Problem with the Millenium Bridge, London

When the London Millennium footbridge was opened in June 2000, it swayed alarmingly and had to be closed (for 18 months) so that the structure could be strengthened.

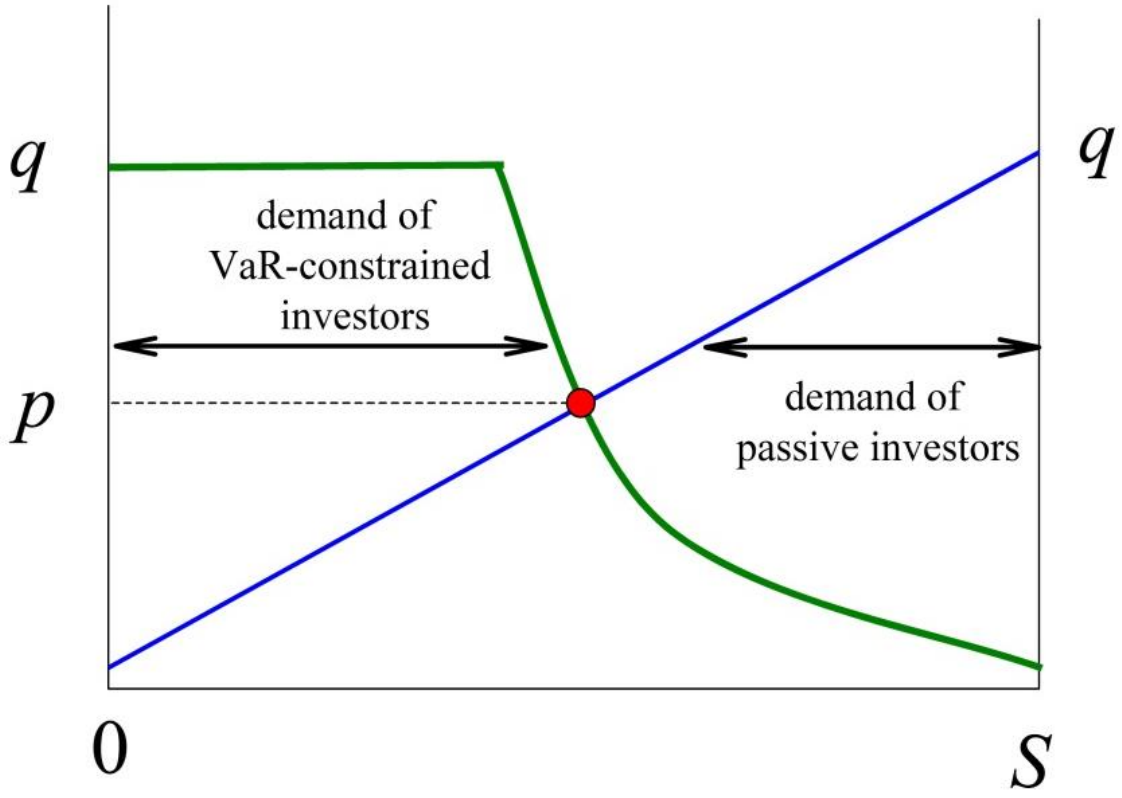
Shin's Millenium Bridge Feedback

Initial gust of wind →	**Bridge moves**	→	**Adjust stance**
	↑		↓
	Further adjust stance	←	**Push bridge**

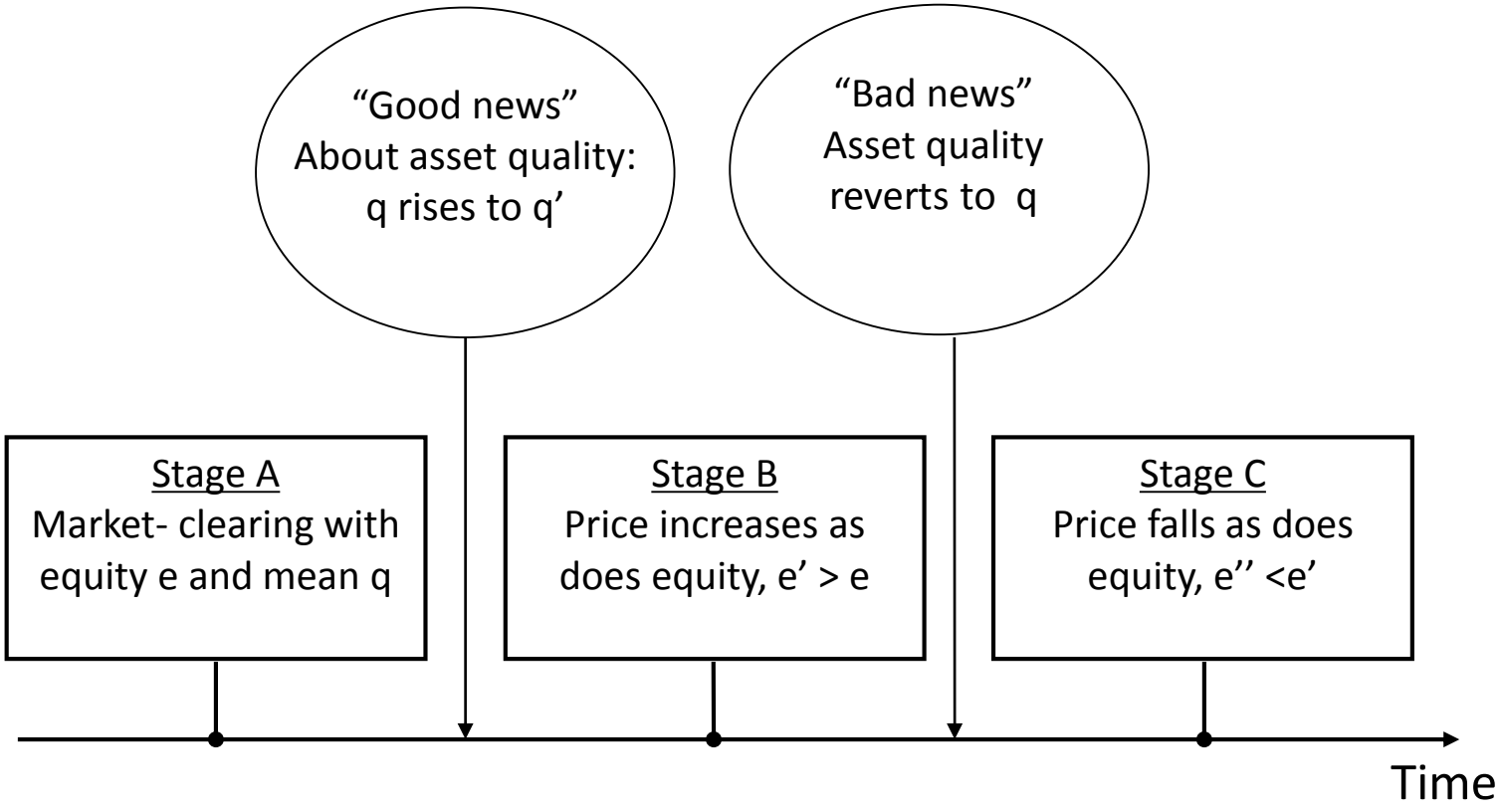
Back to economics - Investment Banking and Solvency shocks, Shin (2010)

- Two assets: a riskless bond paying zero interest; and a risky asset with random payoff Q, **uniformly distributed over [q – z, q + z]** where q > 0, so:
- $\boldsymbol{E[Q] = q}$ $\qquad\qquad$ $Var(Q) = \frac{z^2}{3}$
- **Two types of investors, passive and active,** each endowed with initial equity e. Investors' portfolio payoff (end of period wealth) is $W \equiv e + (Q - p)y$ where y represents quantity of the risky asset holdings and p is the price of the risky asset.
- For equations, see slides in annexes at end

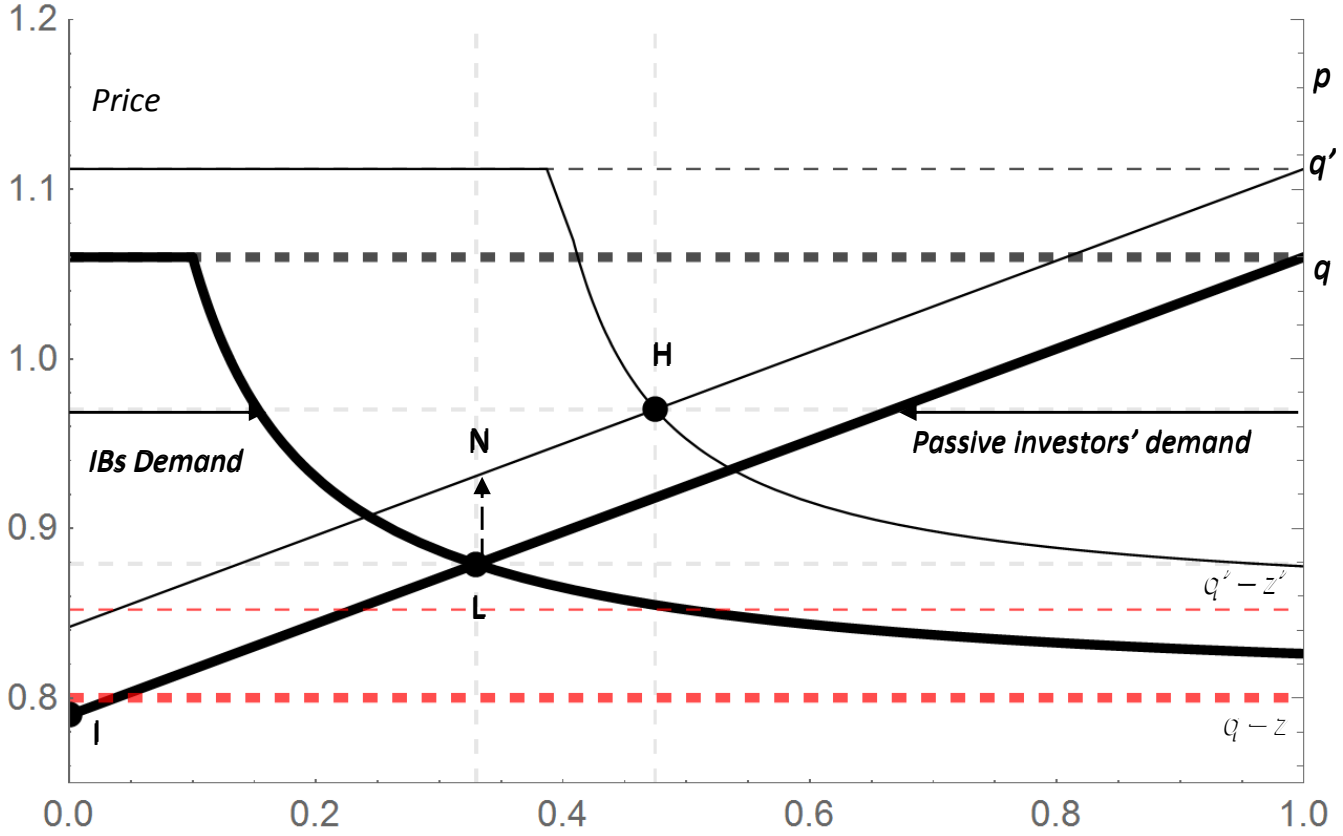
Shin's 2-sector model of demand for risky assets by Investment Banks & own-money investors



Sequence of events: with big, but reversible, 'news shocks' that can lead to insolvency



Effect of improved asset quality; later reversed



Impact of improvement is from L to H including the externality, but only to N without externality. Here reversal causes catastrophe, as equilibrium shifts to I.

Initial equilibrium and effects of dq=0.05, later reversed

	Initial Equilibrium	*Positive Shock*	*Shock reversal*
Equilibrium			
Price	0.88	0.97	0.79
ya	0.33	0.47	0.
IBs Balance Sheet			
Asset	0.29	0.461	0.
Debt	0.264	0.405	0.
Equity	0.026	0.056	−0.03
Percent Change in Equity		116	−152.67
Leverage	11.153	8.221	0.

(q=1.06,z=0.26,e=0.03,τ=0.08)

So ‘pecuniary externalities’ can prove sufficient for collapse; but the shocks are exogenous

- Where reversal of good news leads to insolvency, the **financial system exhibits** what mathematicians such as Zeeman (1974) refer to as **‘catastrophic’ behaviour** – highly asymmetric responses to symmetric movements in exogenous forces.
- So ‘pecuniary externalities’ sufficient for collapse if the unanticipated quality shocks are **sufficiently large:**
- Weakness of story is that the sequence of large shocks is **exogenous.**

• Allowing for **asymmetric information** helps to make the sequence endogenous.

Application of ‘catastrophe theory’ to the stock market by Christopher Zeeman, *JME* (1974)

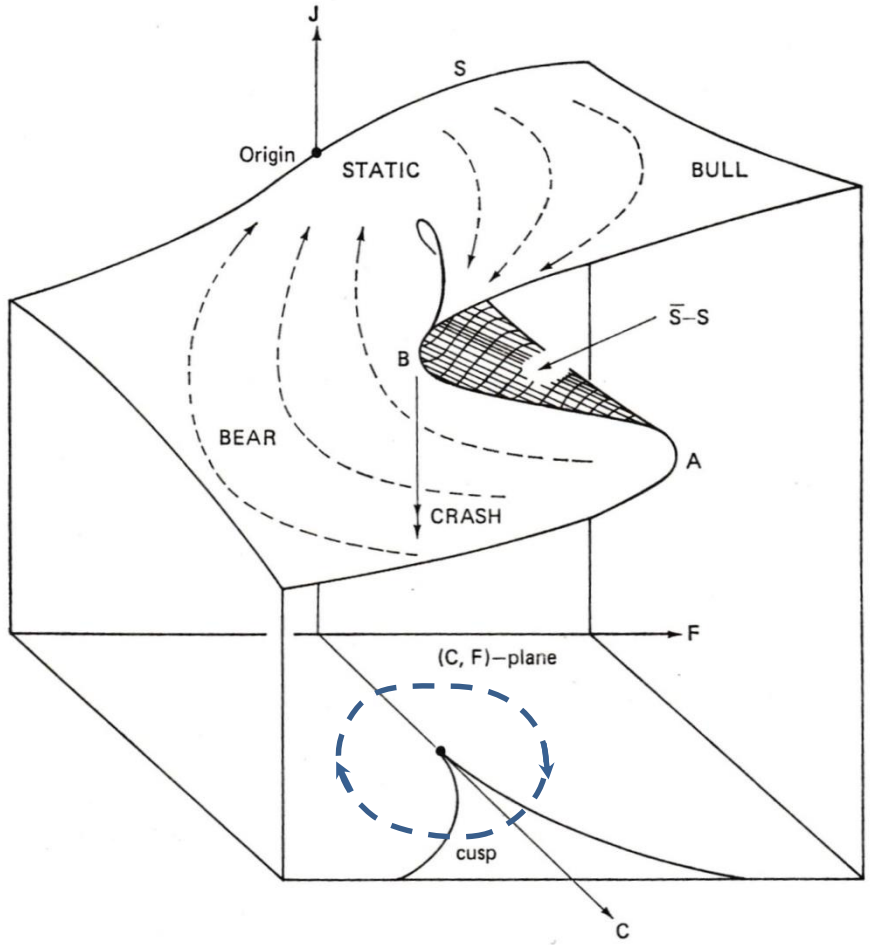


Fig. 3. Note: For convenience we have drawn the (C, F)-plane not through the origin $J = 0$, but below the origin as $J = k$, where k is a negative constant.

Note representation of cusp by ‘wishbone’ projection on the floor;

where the clockwise cycle of exogenous forces is shown in blue

Interpret this as Shin's model with F as fundamental (quality); C as pecuniary externality; and vertical as price. Effect of Macro-pru shown in blue!

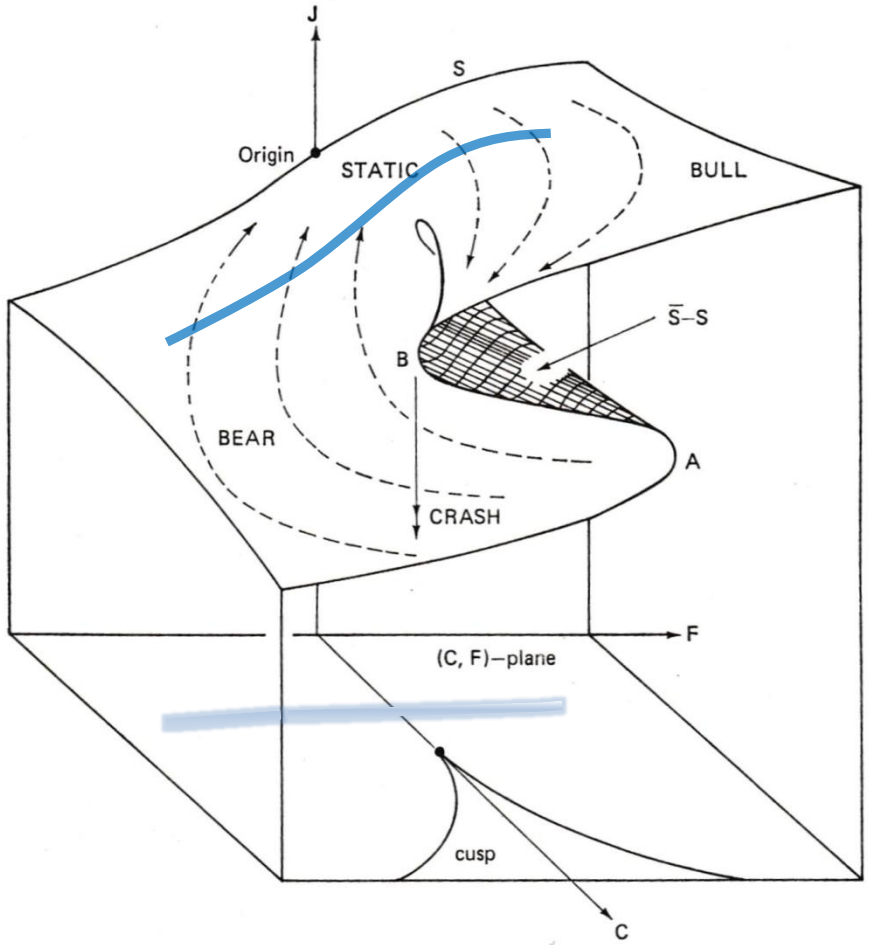


Fig. 3. Note: For convenience we have drawn the (C, F)-plane not through the origin $J = 0$, but below the origin as $J = k$, where k is a negative constant.

By eliminating the 'pecuniary externality', the driving force has lower dimension, now moving back and fore along line of blue on the floor, avoiding the 'wishbone' on the floor

Now for George Akerlof and Robert Shiller (2015) who argue that investment banks were exploiting asymmetric information

- With **asymmetric information**, markets may misallocate risk and resources; as those with superior information seek to exploit those without.
- They cite US Investment Banking and the Credit Rating Agencies as cases in point.
- As we will show, **legal evidence** supports this perspective;
- So too has Mervyn King

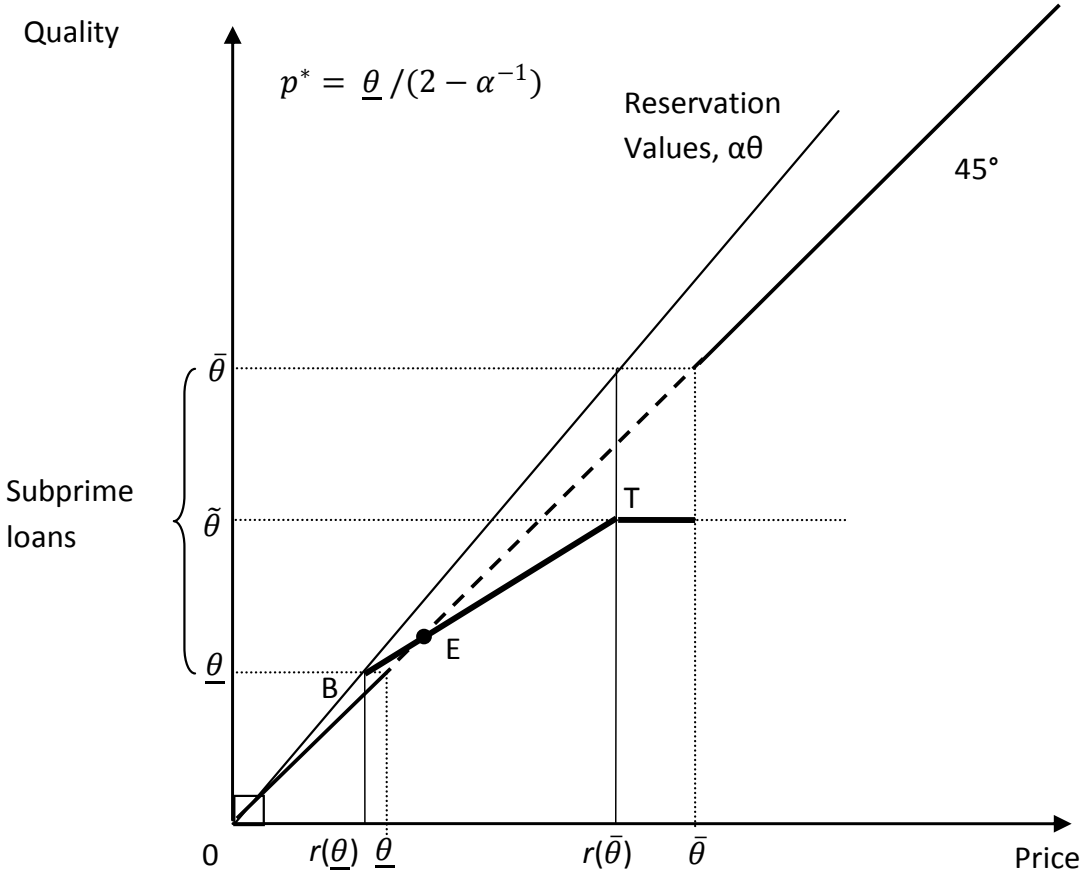
Mervyn King, Governor of the Bank of England, during the crisis, is quoted as saying:

- Before 2007-08 …very smart people in the financial sector thought it was fun and completely acceptable to use the fact that you were very smart to exploit people who were less smart.
- So people on the trading floors would think: "The trustees of pension funds who deal with us, they don't really know what's going on so we can sell them stuff that's not worth very much." Jenkins(2007)

The securitisation of subprime assets: adverse selection; ratings; and cheating

- As well as holding asset backed securities (on their balance sheets and in SPVs), Investment Banks played a key role in securitizing mortgages.
- But the securitisation process made it difficult for investors to assess the quality of their investments.
- To analyse to the role of IBs and CRAs in packaging and marketing MBS, consider the adverse selection model of Akerlof (1970)

Market equilibria with Asymmetric and Symmetric information: Akerlof(1970)



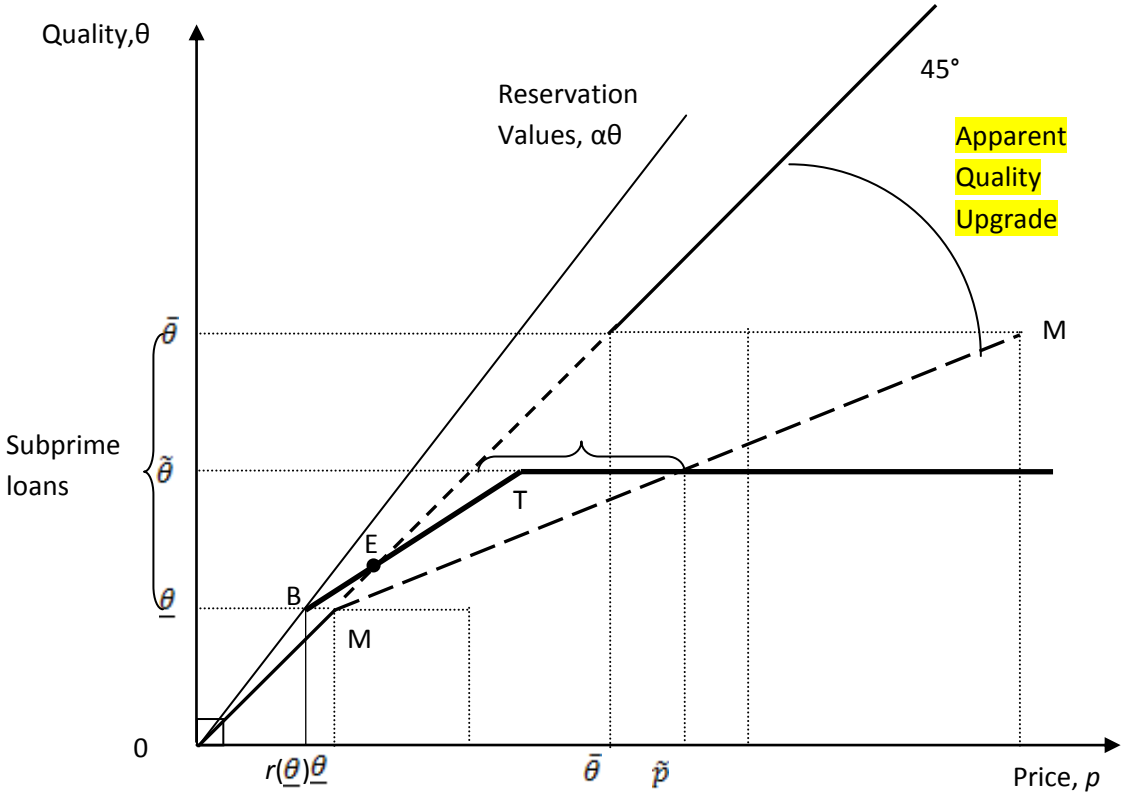
Explanation of equilibria with Asymmetric and Symmetric information - but no cheating

- Given a uniform distribution of quality, the equilibrium with adverse selection predicted by Akerlof will be at E, where the schedule of expected average quality BT crosses the 45 degree line.
- So price matches the average quality of assets left on the market after top quality assets have been withdrawn
- Evidently *correct* authentication could add to the average value of MBS traded, see dashed line in Figure.

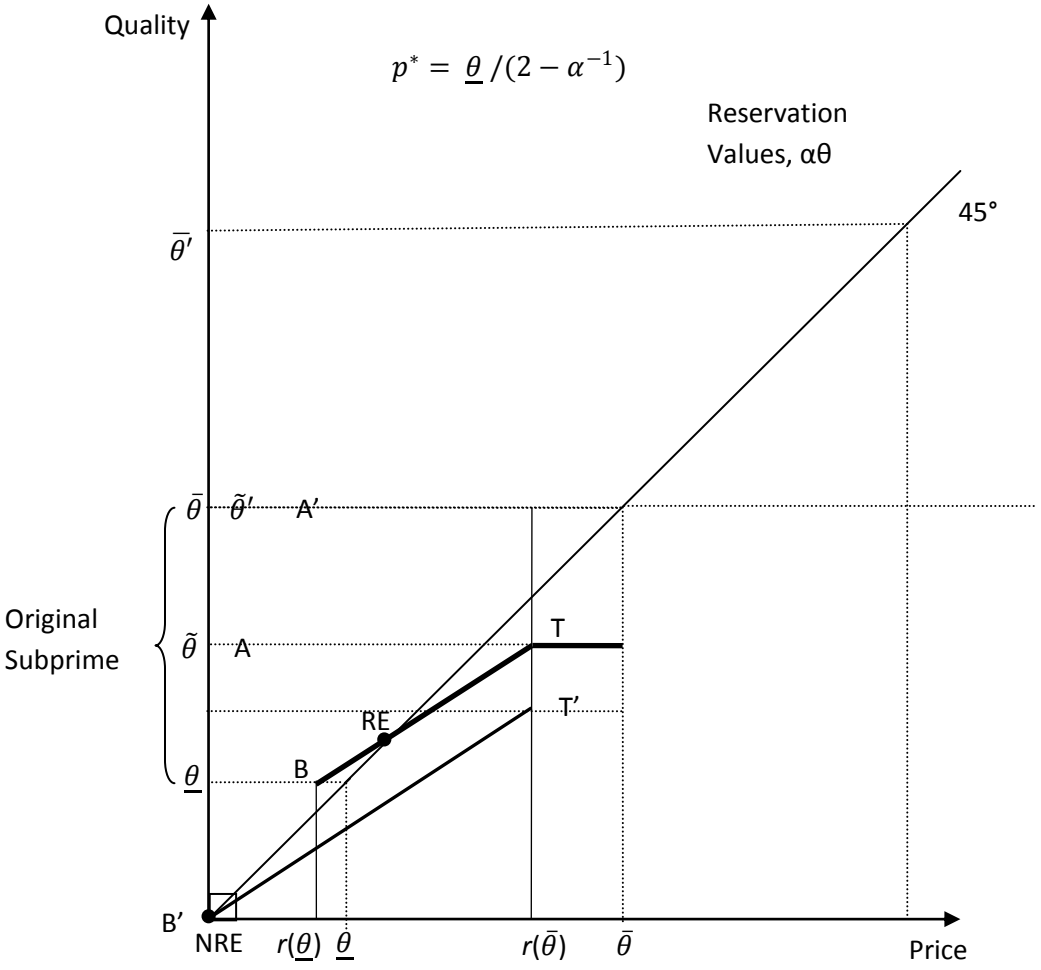
Faking the Ratings

- With collusion between the sellers and CRAs, however, buyers can be misled as to quality.
- Assume , for example, the lower bound remains unchanged, but the *perceived* upper bound increases - doubling the spread
- Then the *apparent* quality range of 'authenticated' assets on the market will have a mean at the high end of the actual distribution – see figure.

Market equilibria with symmetric information, and with cheating (inflated ratings, taken at face value)



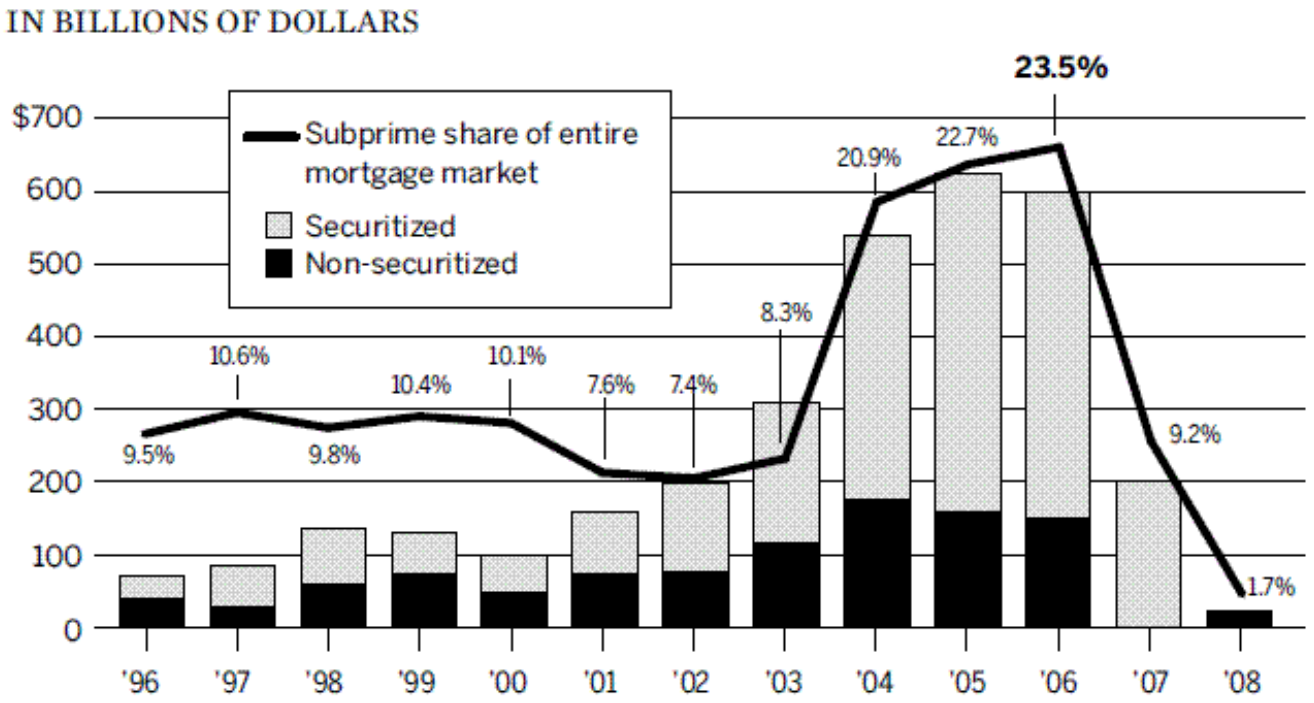
Despair and disillusion: buyers lower downside of seller's distribution, leading to collapse



Collapse of subprime market: explanation

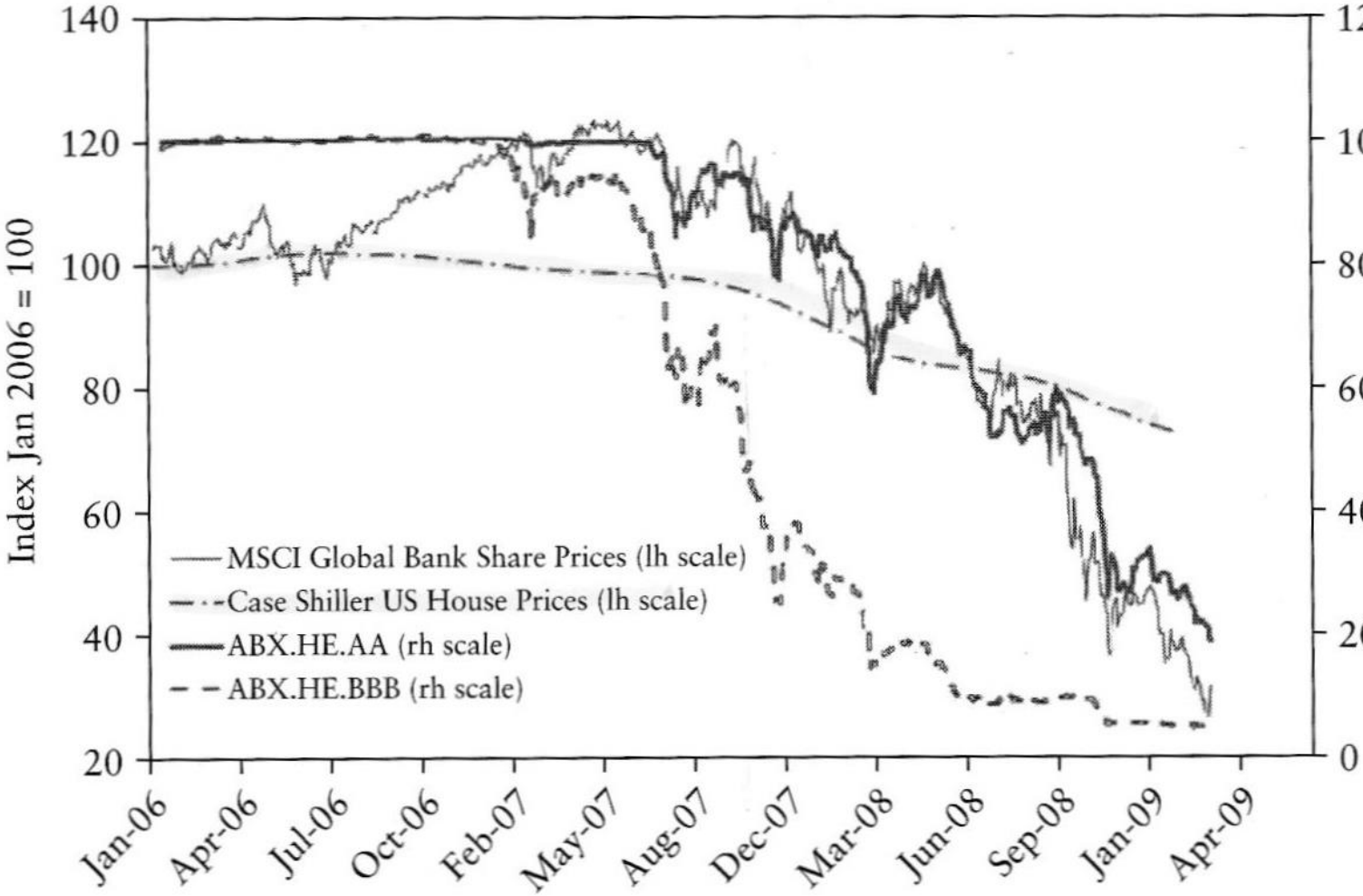
- When it is discovered that many of the assets are not in fact worth what was expected, buyers will become more wary of subprime.
- Specifically, let prices be determined as for adverse selection, with buyers returning the upper bound to its correct value, but reducing the lower support to zero.
- Then - just like the second hand car market in Akerlof (1970) – the market for securitised assets will collapse, as shown by the lower average quality schedule B'T' which meets the 45 degree line at the origin.
- So cheating is sufficient for collapse too.

Boom and collapse of U.S. subprime mortgage originations



NOTE: Percent securitized is defined as subprime securities issued divided by originations in a given year. In 2007, securities issued exceeded originations.

US House prices, and MBS netted of insur
Gorton's signal of illiquidity



Liquidity runs: cause or consequence?

- Gary Gorton is famous for arguing that the root cause of the crisis was the 'Panic of 2007', when the cost of insuring packets of MBS rose alarmingly.
- He blamed the 'opacity' of securitisation, which meant that insurance costs could rise through even though the MBS were fine.
- Bengt Holmstrom attributed the rising cost to the flawed business model - which only worked when house prices are rising.
- Conflict of Interest: Note that Gorton had been working as a consultant for AIG on how to insure ABS

Liquidity run and Fed support in 2008

- With Wall Street investment banks at the peak **rolling over a quarter of their balance sheets every night**, there is no question that banks were exposed to liquidity risk
- The Fed had to grant Morgan Stanley and Goldman Sachs Bank Holding Co status - and lots of liquidity - to help them staunch accelerating outflows in Sep 2008.
- This is presumably what Krugman is referring to as the Diamond-Dybvig moment.
- But not simple DD: by then MBS were a 'Dead Duck'!

The 'Big Five' US Investment Banks (as of early 2008)	**Size, Assets end 2007**	**Fate after crisis**	**'Big Eight' Banks (Current Survivors)**	**Credit losses and write downs 2007-8**	**Capital injections October 2008**	**Subsequent fines for Mis-selling of MBS**
Goldman Sachs	$1,120b (26; $43b)*	Became Bank H Co	Goldman Sachs	$10b (0.7)**	$10b	$5b
Morgan Stanley	$1,045b (33; $32b)	Became Bank H Co	Morgan Stanley	$19b (2.1)	$10b	$3b
Merrill Lynch	$1,020 (32; $32b)	**T/O** by Bank of America, Sep, 2008	Bank of America	ML: $73b (7.5) BoA: $57b (1.8)	$25b	$17b (+$37b 'set aside')
Lehman Bros	$691b (31;$22b)	**Liquidation,** Sep 2008	_	$30b (5.0)	_	_
Bear Sterns	$396b (33;$12b)	**T/O** by J P Morgan, Mar 2008	J P Morgan	$41b (2.8)	$25b	$13b
	5 IBs only		Citigroup	$114b (4.0)	$25b	$7b
Totals	**$4,272b (30, $141b)**			**$344b**	**$95b**	**$45b**

*In brackets *leverage; equity *** ratio of losses and write downs to 2006 pre-tax earnings *Memo item: 1% of $15tr US GDP is approx. $150b*

Highlights from Table
Capital Injections and Fines on IBs

- Assets of IBs ex ante $\$4{,}272 \approx \frac{1}{4} GDP$
- Equity of IBs ex ante $\$141\text{b} \approx \frac{1}{30} Assets$
- Capital injections 2008 $\$70\text{b} \approx \frac{1}{2} Equity$
- Fines on IBs for mis-selling $\$38\text{b} \approx \frac{1}{4} Equity$

Plus

- Fines on CRAs for mis-rating $2.4b

Complementary, not competing explanations ?

- In her recent speech at Jackson Hole, Janet Yellen argued that the vulnerabilities within the US financial system in the mid-2000s were “numerous and familiar from past financial panics”.
- This idea - that threats to stability of the sort that we have considered, namely shocks to solvency (internal and external) and to liquidity – should be complements and not substitutes is of more than technical interest.
- It helps to show why the US financial system was so exposed to radical failure.

To conclude:

- *Reality is one, though wise men speak of it variously. Rigveda*
- In some versions of the parable of the elephant, a sighted person joins the group; describes the entire elephant from various perspectives; and explains how they are reconciled.
- Perhaps Janet Yellen was playing the part of the all-seeing observer, armed with the wisdom of hindsight – and that of George Akerlof too?

Epilogue: Political effects?

- Michael Lewis* sees the Trump phenomenon '**an unfortunate aftershock of the financial blunders of last decade'**. The collapse of the US mortgage market and the subsequent bailout of the banks left Americans of varying political views feeling that **the system was rigged**, he says.
- "I think of this as echoing of the 2008 financial crisis. The marketplace for politicians just did something as weird as the marketplace for securities did, and it did it in part because of what the market did."
- **"Without the financial crisis, we don't get Trump as president. ...**It's definitely a necessary condition."

** In FT interview*

END

- Slides on references, legal matters and equations follow

Some references

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Fines on IBS for mis-selling MBS

- 'These financial institutions (IBs) knowingly, routinely, falsely, and fraudulently marked and sold these loans as sound and reliable investments. Worse still bankers at these institutions continued to mislead investors about their own standards and to securitize loans with fundamental credit, compliance, and legal defects'. Eric Holder, the U.S. attorney general
- Total fines on IBs came to $38b

Collusion with CRAs

- In February, 2015 S&P settled for a fine of $1.5b - ‘ S&P executives admitted that they made decisions about testing and rating CDOs based at least partly on the effect they might have on relationships with the banks issuing them’ .
- In January of 2017, Moody’s settled for a sum of $0.9b.
- Both credit rating agencies have thus agreed to pay substantial settlements; with S&P apparently admitting what Akerlof and Shiller allege.

Legal evidence – why ‘DPAs’?

- To help establish asymmetry of information, we have appealed to the ‘fines’ imposed on banks and rating agencies for mis-selling and mis-rating.
- But ‘not a single high-level executive has been successfully prosecuted in connection with the recent financial crisis’, Rakoff (2014).
- In order to change ‘corporate culture’, the policy pursued is to secure “**deferred prosecution agreements”** in which the company, under threat of criminal prosecution, agrees to pay a fine and to take remedial measures to prevent future wrong-doing.

How the law may be stymied

- Product complexity gives room for sellers to manipulate the quality being offered to investors, also proves to be a ‘grey area’ for court cases.
- DoJ says it’s difficult to prove fraudulent intent on the part of high-level management of the banks and companies in cases that involve the mis-selling of innovative financial products.
- It has also been alleged that, subject to lobbying, Congress has starved the prosecutors of the resources needed to go further than DPAs.

Passive investors

- Risk averse investors are passive (as they cannot leverage to finance their investments), with 'mean-variance' preferences

$U(W) \equiv E(W) - \frac{1}{2\tau}\sigma_W^2$ where τ represents risk tolerance. Their demand for risky assets is

- $y_P = \begin{cases} \frac{3\tau}{Z^2}(q-p) & if \quad q > p \\ 0 & if \quad otherwise \end{cases}$

Active investors: Investment Banks

Risk neutral investors are active as they use leverage to finance their investments, subject to a VaR constraint. Investment bank optimization is described by

$$\max_{y} E(W) \qquad s.t. \qquad VaR = (p - q + z)y \leq e$$

where $E(W) = (q - p)y + e$

and the VaR constraint implies the borrowing is no greater than the worst realized payoff on the risky asset, $py - e \leq (q - z)y$

Demand by IBs; and market clearing

- Since $E(W)$ is linear in y, for q > p, the VaR constraint is binding and the demand for risky asset by investment banks becomes:
- $$y_A = \begin{cases} \frac{e}{z-(q-p)} & if \quad q > p \\ 0 & otherwise \end{cases}$$
- *Market-clearing*
- For $q > p$ and assuming that aggregate supply of risky assets is fixed and equal to 1, the market clearing condition $y_P + y_A = 1$ gives the equilibrium price:

MacroPru - some tools

- Kashyalp et al.(2014) list 5 tools:

1. Banks' capital requirements
2. Banks' liquidity requirements
3. Deposit insurance
4. LTV restrictions
5. Tax on dividends

- For Shin, the appropriate tax is a

6. Pigouvian tax on capital gains