

Bank of England
Centre for Central Banking Studies
CEMLA 2013

What we thought we knew.

David G. Barr*

November 21, 2013

*Any views expressed are those of the author and not necessarily those of the Bank of England.

Contents

1 Overview: Main themes.	3
2 Basel I.	3
3 Basel II.	3
3.1 Introduction.	3
3.2 Three (or four) Basel II risks:	4
3.2.1 Definition of ‘Residual risk’.	4
3.3 Basel II’s Three pillars:	4
3.4 Basel II - applause.	5
3.5 Basel II - recent criticisms.	5
3.6 Basel I/II and data for banks’ balance sheets.	6
3.6.1 Acharya and Schnable’s analysis.	6
3.7 Key points from Basel and capital requirements.	8
4 Economic commentary in 2006.	9
4.1 From the Bank of England’s Financial Stability Report (2006).	9
4.1.1 Reasons to be cheerful.	9
4.1.2 Reasons to be circumspect.	11
4.1.3 Reasons to be glum: Two ‘extreme but plausible scenarios’.	12
4.1.4 Summary of FS risks.	14
4.1.5 Recommended actions.	14
4.2 From the IMF’s GFSR (2006).	15
4.2.1 But first, from the Turner Review (2009).	15
4.2.2 The GFSR’s eyes were open in April 2006.	15
4.2.3 GFSR, September 2006.	18
5 An academic’s view in the IMF: Raghuram Rajan (2005).	19
5.1 Recent changes in the financial system.	19
5.2 What should be done?	23
5.3 Larry Summers’ response.	24
6 References.	24

1. Overview: Main themes.

“This crisis was avoidable.” (Federal Crisis Inquiry Commission)

- Basel I and II
- Conjunctural analysis of macro and financial conditions.
- Policy and academic discussions.
 - Mainly about the financial system and its vulnerabilities.

2. Basel I.

- Key point: Basel I introduced **risk-weighted capital requirements**, which were refined in Basels II and III.
- Introduced in 1988 (implemented from 1992) it was designed to:
 1. Create a level playing field across countries.
 2. Ensure that lenders were sufficiently capitalised to protect depositors and the financial system.
- Capital requirements were based on single risk weights for a limited set of assets e.g. mortgages, consumer loans, corporate loans etc.
- It was vulnerable to **‘regulatory capital arbitrage’** which is...
 - ...asset-side restructuring aimed at the reduction of required capital in ways that do not reflect genuinely lower risk. (See Acharya and Schnabl (2009), discussed below.)

3. Basel II.

3.1. Introduction.

- Improved the measurement of credit risk and captured operational risk.

- Implemented began end-2006.
- So, although not in place in 2006, it was the ‘direction of travel’ for banking supervision.
- Aimed to bring about closer alignment between regulatory and economic capital requirements, in an **effort to reduce regulatory capital arbitrage**.

“The fundamental objective...has been to develop a framework that would further strengthen the soundness and stability of the international banking system...” BCBS (2006)

“A significant innovation of the revised Framework is the greater use of assessments of risk provided by banks’ internal systems as inputs to capital calculation.” BCBS (2006).

3.2. Three (or four) Basel II risks:

- Credit.
- Operational.
- Market.
- (Residual risk.)

3.2.1. Definition of ‘Residual risk’.

Systemic	Pension
Concentration	Strategic
Reputational	Liquidity

3.3. Basel II’s Three pillars:

1. **Minimum capital requirements.** Two approaches to their calculation:

- Standardised: provides some set risk weights with others based on **rating agencies'** public ratings.
 - Internal ratings based: basically **more sophisticated**, with lenders allowed to use their own risk models.
 - Market and operational risk also covered by Pillar 1.
2. **Supervisory review**: Assessment of risks that may require capital support but are not captured by Pillar 1 e.g. interest rate mismatch between assets and liabilities, residual risk (see above), leading to bank-specific add-ons to capital requirements.
 3. **Market discipline**: Requires lenders to publish information about their approach to risk management.

3.4. Basel II - applause.

“It brings life to the concept of capital requirements as a function of the **actual risks** which banks undertake...And it extends many of the principles long developed in the area of **market risk, into that of credit risk**. The very essence of the banking business.” Andrew Large, Bank of England, Deputy Governor (2003)

3.5. Basel II - recent criticisms.

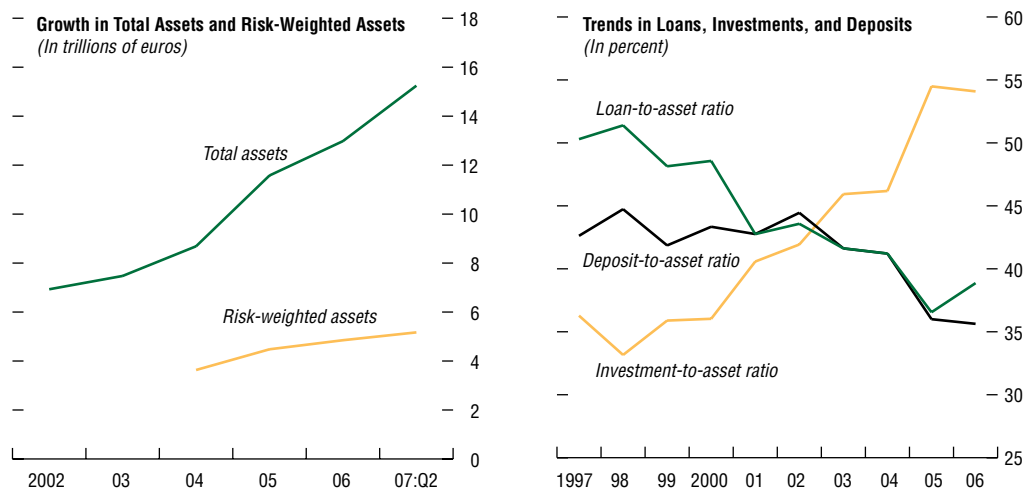
- OECD (2012) observations:
 - Capital requirements based on rwa encourage innovation to **avoid the requirements**, and away from banks' core functions.
 - This may have contributed to, or even **reinforced, adverse systemic shocks** in the crisis.
- World Pensions Council (2012) observations:
 - It encouraged the use of private credit rating agencies.

3.6. Basel I/II and data for banks' balance sheets.

3.6.1. Acharya and Schnable's analysis.

- Banks appeared to become safer over the years to 2007:

Balance Sheet Profiles for 10 Large Publicly Listed Banks



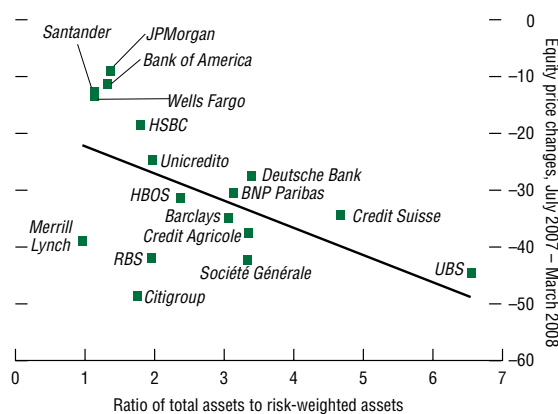
Sources: Thomson Financial; and IMF staff estimates.

Figure 1: Banks' balance sheets: IMF (2007) and Acharya and Schnable (2009).

- Their balance sheets doubled from 2004 to 2007.
- But their holdings of rwa grew by just 30%.
- They increased their trading and investment activities (e.g. ABS, hedging), which attracted **lower risk weights**.
 - (Weights are/were around 1 for corporate loans, around zero for MBS.)
- But...what we didn't know in 2006...
 - **Banks with low ratios of total assets to rwa** (roughly, low regulatory capital ratios) did better in terms of equity price changes during July 2007 - March 2008 than those with high ratios.

- * The Basel approach designated these as more-risky banks, so they **should have fared worse** than those with high total assets to rwa.

Figure 1.17. Bank Equity Price Changes and Balance Sheet Leverage
(In percent)



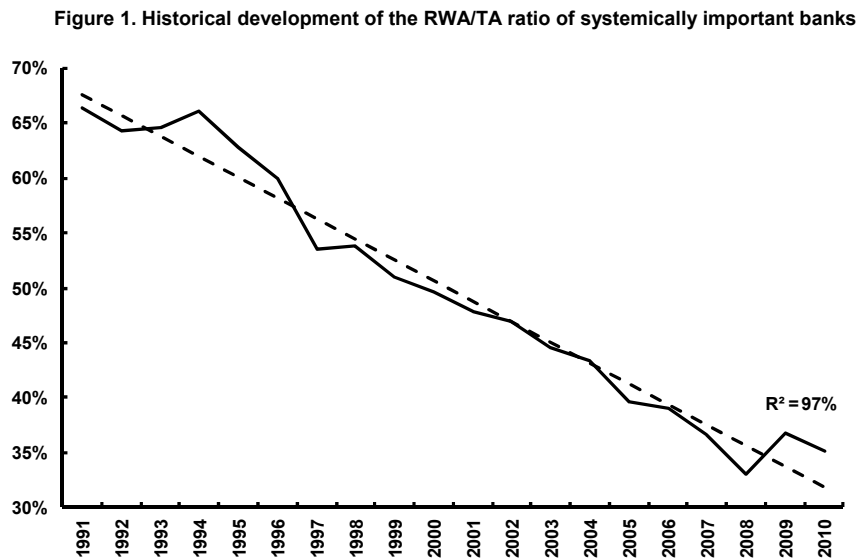
Sources: Bloomberg L.P.; and IMF staff estimates.

Figure 2: Leverage and price changes, IMF (2007) and Acharya and Schnable (2009).

- Does this suggest that **capital ratios are not useful?**
- No, because...
 - * Some of the **risky assets were underweighted** under Basel I i.e. they were actually more risky than the rwa scheme allowed for.
 - * The risky banks were just gaming the system i.e. moving into underweighted assets, and raising their Basel capital ratios, without raising their economic capital ratios.
 - * This is, therefore, indirect evidence of **regulatory capital arbitrage**.
- Was this gaming known about in 2006? Well the banks certainly knew!
- Either way, **banks were widely believed to be undercapitalised in**

2006.

- OECD (2012)



Source: The Banker Database, Author's calculations and estimates, See Appendix 1. For a similar chart for selected individual banks, see Figure 14 in Blundell-Wignall and Atkinson (June 2011).

Figure 3: OECD (2012)

3.7. Key points from Basel and capital requirements.

- It was known that banks were shifting away from traditional lending towards more risky activities.
- Some argued that this was as a result of the use of risk weighted capital requirements.
- Not clear however that the specific **systemic risks that emerged in 2007/8** had been spotted in 2006.
- Systemic risks were recognised in BoE and IMF publications in 2006, but the **housing/MBS/CDS/liquidity story** seems not to have been.

4. Economic commentary in 2006.

4.1. From the Bank of England's Financial Stability Report (2006).

4.1.1. Reasons to be cheerful.

- Short term interest rate prospects looked stable:

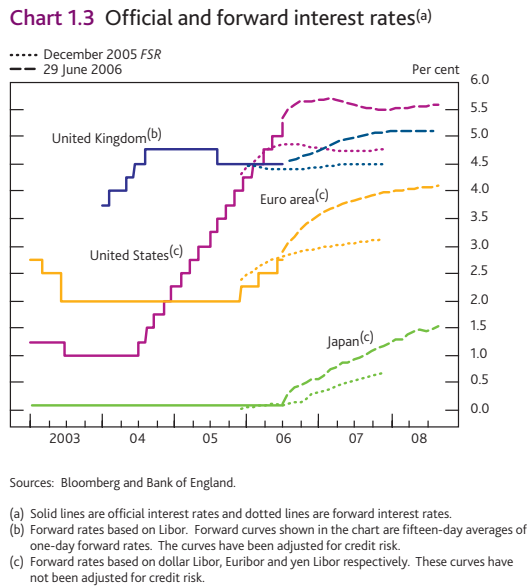
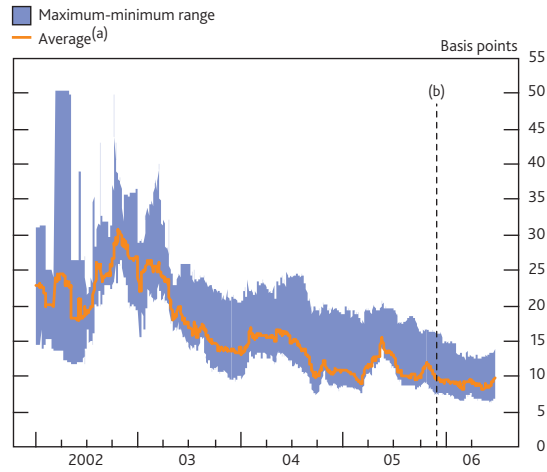


Figure 4: SP500

- Banks seemed resilient to individual risks.

Chart 8 Major UK banks' default premia remain low



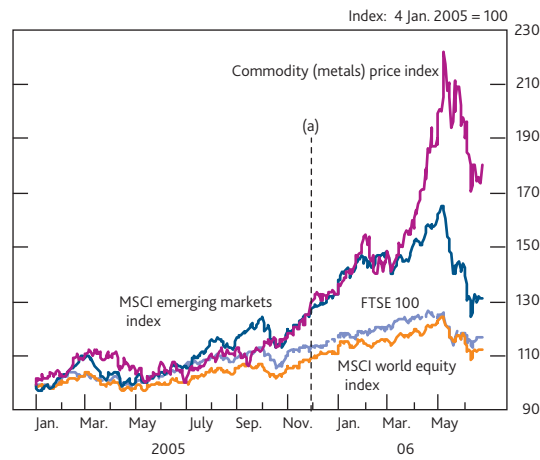
Sources: Bloomberg, Markit and Bank calculations.

(a) Average CDS premia weighted by total assets.
(b) December 2005 FSR.

Figure 5: FSR (2006): CDS premia.

- Markets seem resilient to individual risks.

Chart 6 Asset prices adjust



Sources: Bloomberg, Thomson Financial Datastream and Bank calculations.

(a) December 2005 FSR.

Figure 6: SP500

- Several recent (i.e. up to 2006) asset price falls,
 - were followed by quick recoveries.
 - This increased the belief that the system was stable.
- There was plenty of liquidity.

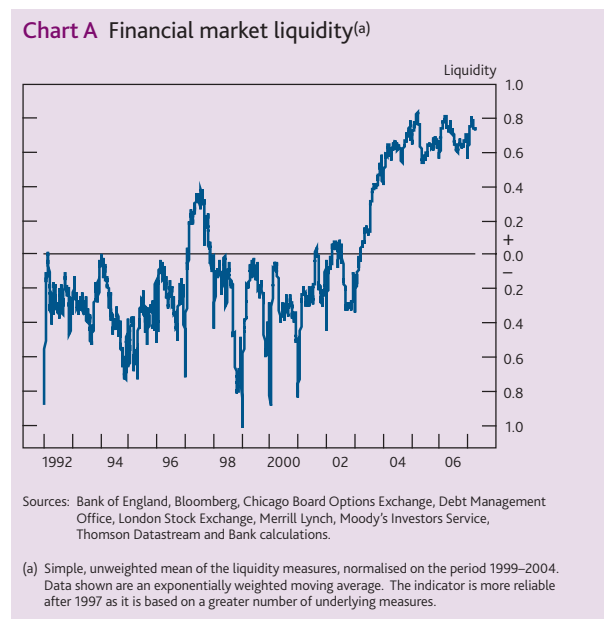


Figure 7: SP500

4.1.2. Reasons to be circumspect.

- There were two causes for concern, giving rise to six financial stability vulnerabilities.
- The two concerns were:
 1. Macro **economic stability** was causing greater risk taking.
 2. The use of **risk transfer markets** was affecting the quality of risk assessment.
- And the six vulnerabilities:

- From international financial markets:
 1. Unusually low risk premia.
 - Risk of an increase and, therefore, of asset price falls.
 2. Large financial imbalances.
 - Risk of a disorderly unwind.
- From extended non-financial sector balance sheets:
 3. Rapid releveraging of the (global) corporate sector.
 4. A significant minority of UK households had a high debt-income ratio.
- From structural financial sector dependencies:
 5. The systemic importance of LCFIs was increasing.
 - Their balance sheets and risk-taking were expanding.
 6. UK financial institutions' dependence on market clearing and settlement systems looked risky.
 - The risks of disruption were believed to be inadequately understood and tested by some users.

4.1.3. Reasons to be glum: Two 'extreme but plausible scenarios'.

1. A sharp turn in the credit cycle.
 - Reassessment of credit worthiness due to e.g. commodity price increases.
 - Would strike at:
 - Household balance sheets.
 - Corporate balance sheets.
2. Further sharp fall in asset prices.

- 2006 fall seen as rather limited more to come?
- Would strike at:
 - Low risk premia.
 - Global imbalance.
 - Household balance sheets.
 - Corporate balance sheets.
- These scenarios could trigger financial **amplification channels**:
 - Recent structural features of UK and Global financial markets...
 - ...could amplify market and credit risks.
 - Asset side:
 - * **Exposures to potentially illiquid assets** have increased.
 - * Rapid unwind could hit prices.
 - * Particularly if many institutions acted simultaneously.
 - Liability side:
 - * UK banks **reliance on wholesale funding** has increased.
 - * Leading to greater sensitivity to liquidity developments.
 - * Increased linkages between banks and LCFIs amplify systemic risks.
 - * These would increase **asset correlations** in a stress...
 - * ...reducing previously expected diversification benefits.

4.1.4. Summary of FS risks.

Table B Some key vulnerabilities edge up

Vulnerability	Assessed change in risk	
	Probability ^(a)	Impact ^(b)
Low risk premia	Broadly unchanged	A slight increase in risk
Global imbalances	A slight decrease in risk	A slight increase in risk
Global corporate debt	A slight increase in risk	A slight increase in risk
UK household debt	A slight increase in risk	Broadly unchanged
LCFI stress	Broadly unchanged	A slight increase in risk
Infrastructure disruption	Broadly unchanged	Broadly unchanged

Source: Bank calculations.

- (a) Assessed change in the probability of a vulnerability being triggered over the next three years.
 (b) Assessed change in the expected impact on major UK banks' balance sheets if a vulnerability is triggered.

Table A Change in assessment since the July 2006 Report

Vulnerability	Assessed change in risk	
	Probability ^(a)	Impact ^(b)
Low risk premia	A slight increase in risk	A slight increase in risk
Global corporate debt	Broadly unchanged	A slight increase in risk
LCFI distress	Broadly unchanged	A slight increase in risk
Infrastructure disruption	Broadly unchanged	A slight increase in risk
Global imbalances	A slight decrease in risk	Broadly unchanged
UK household debt	A slight increase in risk	Broadly unchanged

Source: Bank calculations.

- (a) Assessed change in the probability of a vulnerability being triggered over the next three years.
 (b) Assessed change in the expected impact on the UK financial system if a vulnerability is triggered.

Figure 8: BoE: Key Vulnerabilities

4.1.5. Recommended actions.

- Improve **risk measurement and management** with respect to, in particular:
 - Simultaneous market, credit and liquidity tail risks.
 - Extreme but plausible consequences of macroeconomic stress.
 - Liquidity risks arising from new and complex instruments.
- Improve **system-wide stress testing**.
 - Firm-level stress tests ignore interconnections from:
 - * Direct exposures.
 - * Indirect market linkages.
 - * Recommended actions.
- Improve **crisis management capability**.

- Current UK work focuses on business continuity.
- More is needed, to deal with stress in major market infrastructure of LCFI.

4.2. From the IMF's GFSR (2006).

4.2.1. But first, from the Turner Review (2009).

“The IMF's *Global Financial Stability Report* of April, 2006 stated that...

‘...the **dispersion of credit risk** by banks to a broader and more diverse set of investors, rather than warehousing such risk on their balance sheets, has helped make the banking and overall financial sector more resilient.’

It noted that this dispersion would help to...

‘...mitigate and absorb shocks to the financial system.’

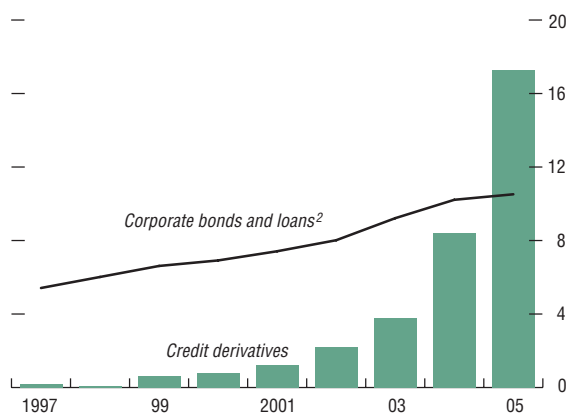
With the result that...

‘...improved resilience may be seen in fewer bank failures and **more-consistent credit provision.**’ ”

4.2.2. The GSFR's eyes were open in April 2006.

- Dispersion of credit risks:
 - “At the same time, the transition from a bank-dominated to more market-based financial systems presents new challenges and **vulnerabilities.**”
 - “...detailed data on structured credit products are not readily available, and relatively **few studies** have been done so far on the broader financial stability implications of these credit risk transfer markets.”

Figure 2.1. Global Credit Derivatives Outstanding¹
(In trillions of U.S. dollars)

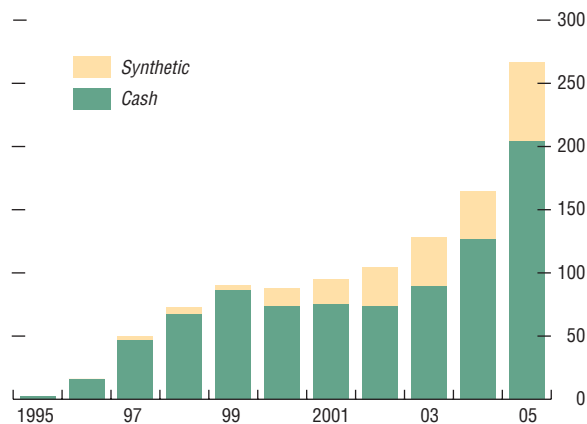


Sources: Bank for International Settlements; International Swaps and Derivatives Association; British Bankers' Association; and *Risk* magazine.

¹Credit derivatives, as reported here, comprise credit default swaps, credit-linked notes, and portfolio swaps.

²Data for 2005 are only available through the third quarter.

Figure 2.2. Global Issuance of Collateralized Debt Obligations: Cash Versus Synthetic
(In billions of U.S. dollars)



Source: Lehman Brothers.

Figure 9: GFSR(2006)

- Regulatory arbitrage:
 - “Much of the early activity in these markets was motivated by **regulatory arbitrage** related to the one-size-fits-all regulatory capital requirement structure of the 1988 Basel Capital Accord (Basel I).”
 - “Compared with banks own (economic) capital assessments, Basel I tended to prescribe relatively **higher capital requirements on lower risk assets**, and vice versa. As such, risk transfer activity often targeted a more appropriate allocation of regulatory capital, but arguably produced a **riskier credit portfolio**.”
- Market liquidity:
 - “the resilience of the financial system, and therefore financial stability, depends critically on the ability of markets to meet sudden

or temporary **increases in demand for liquidity** without major disruptions.”.

- Primary markets are very liquid: secondary market liquidity is lacking in many cases.
- “Evaluating, managing, and ultimately **reducing liquidity risk is a key challenge** for investors, as well as for supervisors and other public officials concerned with financial stability.”

- Investor understanding:

- “Despite the key role rating agencies play in promoting the acceptance of structured credit products, some questions remain as to **whether all investors fully understand** the risk profile of these instruments, and how it differs from that of similarly rated corporate bonds.”
- “Many investors (and their senior management) may therefore be **negatively surprised** during the next rating downgrade cycle.”

- Market structure:

- “...the limited number of market makers raised concerns about whether liquid markets could be maintained in the event a dealer stopped trading for any reason. The rapid development of the credit derivative markets in recent years has reduced these concerns.”
- “...the **withdrawal of a major dealer**, while unlikely in view of the infrastructure commitment, revenue contribution, and their solid credit standing, could have a disruptive impact on the market, at least in the short term.”
- “...**lack of diversity among market participants**, and the related high degree of market segmentation, remain key structural influences and hindrances to secondary market liquidity.”

- Credit cycles:
 - “Credit derivative markets increasingly influence loan pricing and enable banks to delink loan origination decisions from traditional risk management considerations.”
 - “...both bank and bond markets reduce credit origination in response to market signals of deteriorating creditworthiness (e.g., spread widening).”
 - “...the **increasing influence of market prices on bank behaviour** may also cause banks to become more forward looking, and less procyclical.” *No mention though of their contributing to a credit crunch.*

4.2.3. GFSR, September 2006.

- Rise in financial market volatility reflects investor uncertainty about economic outlook and likely policy response.
- “...the most likely outcome will be a continuation of solid growth...” (WEO, September 2006).
- Risks to this outlook ... “include a more **pronounced economic slowdown in the US (perhaps accompanied by a rapid weakening of the US housing market)** which could slow global growth.”
- “it is reasonable to wonder whether financial markets might react to less favourable developments in a way that would **amplify – rather than dampen – the emerging risks.**”
- Concerns have been raised “...for **illiquidity to emerge** in response to unexpected stress in markets for new and complex financial instruments, such as structured credit products.”
- The IMF’s Credit Risk Indicators, show an uptick in the middle of 2006, explained as “...rising interest rates and the perception

(based on numerous qualitative factors) that the **credit cycle may have peaked.**”

Figure 1.39. Probability of Multiple Defaults in Select Portfolios
(In percent)

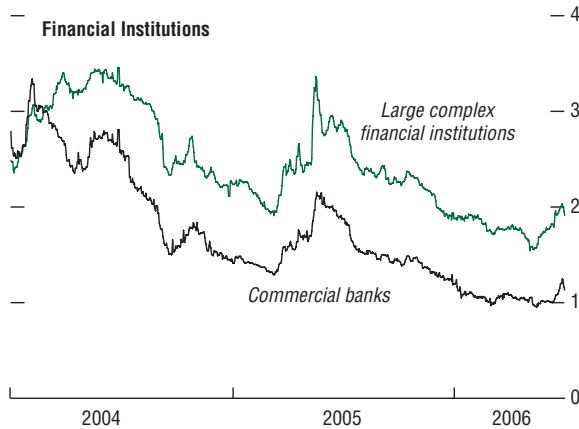


Figure 1.4. Probability of Multiple Defaults in Select Portfolios
(In percent)

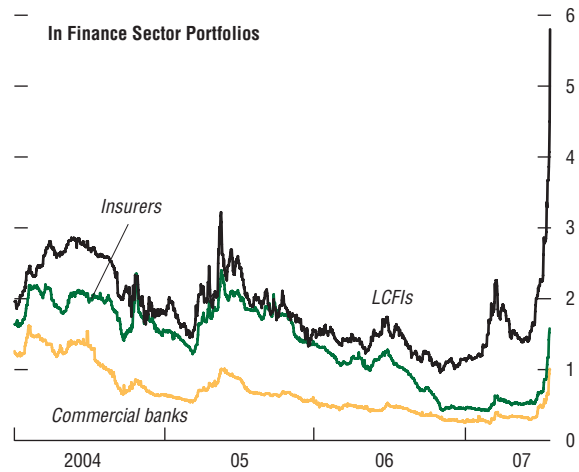


Figure 10: GFSR (September 2006)

5. An academic’s view in the IMF: Raghuram Rajan (2005).

“...absence of volatility does not imply the absence of risk, especially when it is tail risk, which may take a long time to show up” *Rajan (2005)*.

5.1. Recent changes in the financial system.

- Shadow banks:
 - * Call it **reintermediation**, not disintermediation.
- Traditional banks:
 - * As plain-vanilla loans become easier to sell in (shadow bank) markets, **banks are holding more-illiquid assets** on their balance

sheets i.e. those for which they have a comparative advantage e.g. where explicit contracts are hard to specify.

- * I.e. banks are **concentrating on more-complicated risks**, and selling off the simpler ones.
- * Banks can write lend using **incomplete contracts**; markets cannot.
- * Their price-earnings ratios have declined, suggesting that they are **attracting higher discount rates** i.e. risk premia. (Or they have lower earnings growth projections, but this seems unlikely.) [But note that CDS spreads were falling up to 2005.]

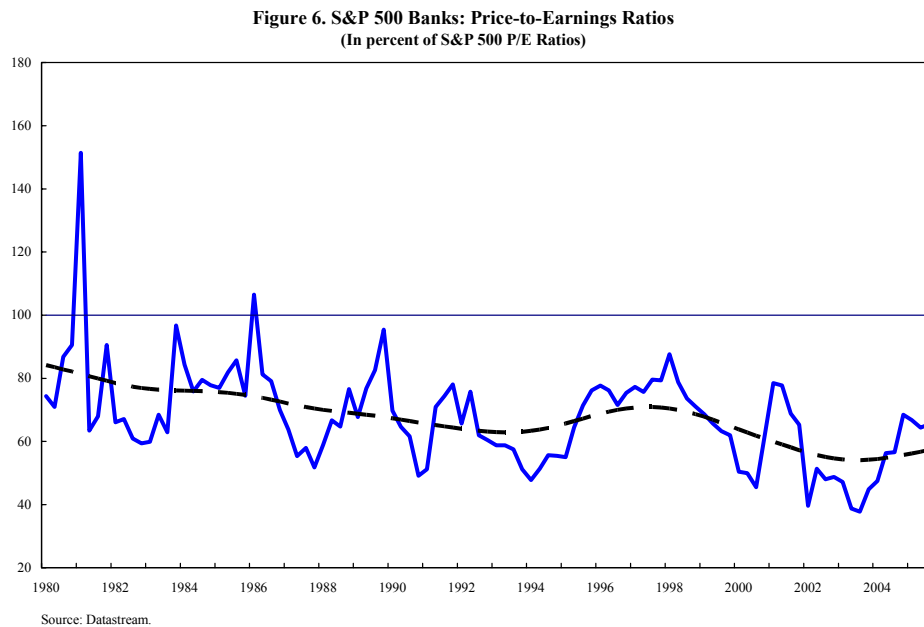


Figure 11: Rajan (2006) - Banks' relative P/E ratios.

- Problems with incentives in the reintermediated markets:
 - * Back in the day...banks did the lion's share of intermediation.
 - **Banks' lending managers took risks in line with depositors' wishes** (so risk taking was rather limited)

- Failure to do this would result in a bank run.
- Salaries were largely fixed and unrelated to loan returns.
- Uncompetitive market allowed reasonable returns to ‘simple’ banking.
- * In 2006...it is shared with market-based firms.
 - The system is much more competitive.
 - Investment managers have to be paid by results.
 - Their compensation is asymmetrically in favour of the upside.
 - Their relative compensation (relative to competitors) is highly important.
- * And this is bad?
 - No, but it creates two perverse incentives:
 1. To **take risks that are concealed from investors** - the easiest are tail risks.
 2. To **follow the herd**.
 - And these two can work together to support an asset price boom.
- * Banks can’t provide the liquidity that they used to in a stress.
 - **Liquidity is a public good** that can experience market failure. (Shin (2006)).
 - It’s supply can dry up if individual firms cease to provide it (hence the public sector locus).
- * **Banks used to provide liquidity** i.e. they would buy assets from troubled firms needing cash.
- * **Today they need it themselves** i.e. they have assets that they might have to sell in a hurry.
- * They hedge their risky positions dynamically, which requires frequent trading.

- So we have a lot **more correlation** in the financial system:
 - * Investment managers' behaviour is quite similar due to their incentives.
 - * Banks and shadow banks are both liquidity consumers in a stress.
- And all this matters for monetary policy too:
 - * Should be aware that monetary policy (e.g. low interest rates) can interact with investment managers' incentives.
 - * Traditional aggregates, e.g. bank credit, may be less reliable as indicators of financial pressure on the real sector.
- Financial transactions have changed:
 - * Long-term financial relationships have been replaced by...
 - * **...arms-length transactions**, often after securitisation.
 - * Securitisation is a specialist activity that gets separated from loan origination and portfolio management.
- Mutual funds, including hedge funds, now intermediate more between investors and corporates.

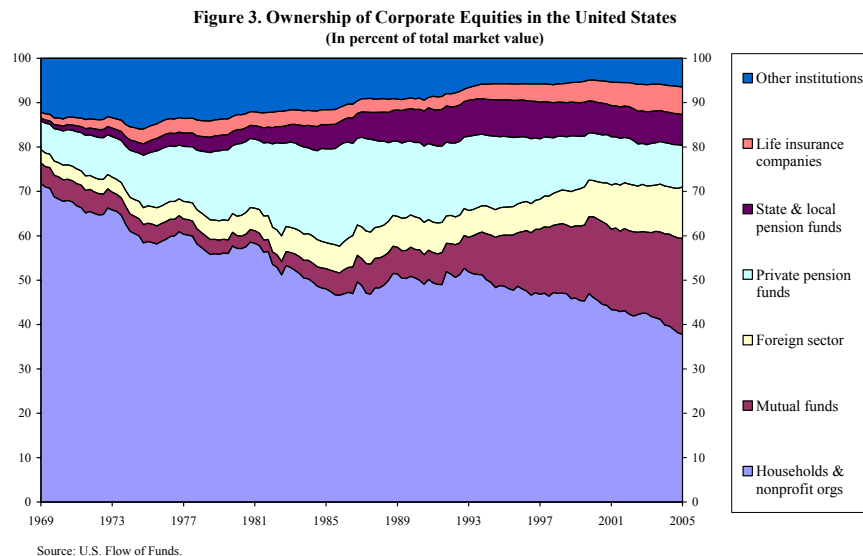


Figure 12: Rajan (2006) - Ownership of corporate equities in US.

- Market participants rely on markets working when they get stressy:
 - In particular, they need liquidity when firms need to sell for a quick exit from a position.
 - But **market quality may deteriorate in good times**:
 - * **Unsophisticated investors** get involved, and then ‘take fright’ leading to large sales.
 - * **Investors herd** and pay less attention to acquiring quality information about investments.
 - * The **skills** required to deal with a market under stress deteriorate.

5.2. What should be done?

- Who should be **supervised**?
 - **Large institutions** at the core of the system.
 - Maybe hedge funds, because they are large enough, and herdy enough, to move markets. They also place large demands on market liquidity.
 - Small banks holding loans to maturity can be easily monitored but...
 - ...for large, fast-moving, institutions supervisors may require:
 - * **Knowledge of the firms risk structure**;
 - * The **risk models** it uses;
 - * The firm to undertake **stress tests** in response to macroeconomic and asset price shocks.
- What should the regulatory instruments be?
 - Capital requirements that are **pro-cyclical**.

- Capital requirements could be **sectoral**.
- But, since firms may be able to sell their loans to those who are **outside the perimeter**, the effect on aggregate lending may be limited.
- Capital requirements tend to deal badly with **tail risks** (WHY?); they may therefore lead to more tail risk being taken on.
- Incentives:
 - We seek to ensure that investment managers have the right incentives, are not myopic, and internalize the risks that they take.
 - Require them to have some of their **own wealth/income invested** in their clients' exposures...
 - ...and let these be **retained for several years** to discourage short-term speculation.

5.3. Larry Summers' response.

- **'Slightly luddite'** - most commentators' quotations leave out the 'slightly'.
- '...the tendency towards restriction that runs through the tone of the presentation [by Rajan] seems to me to be quite problematic. It seems to me to support a **wide variety of misguided impulses** in many countries.'
- '... That also argues for the **benefits of more open and free financial markets**, rather than for the concerns they bring.'

6. References.

References

- [1] "Systemically Important Banks and Capital Regulation Challenges.", OECD, 2011.

- [2] “International Convergence of Capital Measurement and Capital Standards.”, BCBS, 2006.