



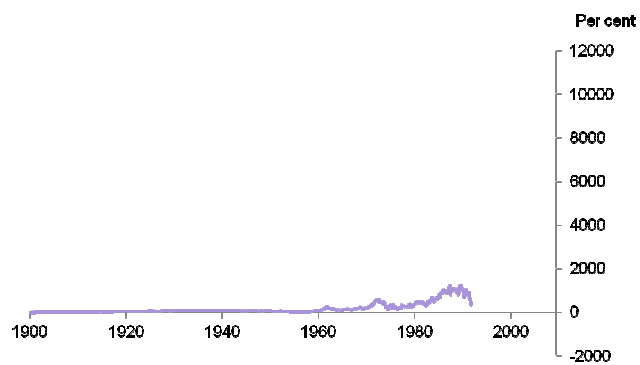
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What Can Finance Learn?

Andrew G Haldane
Bank of England

April 2012

Betting on Banking

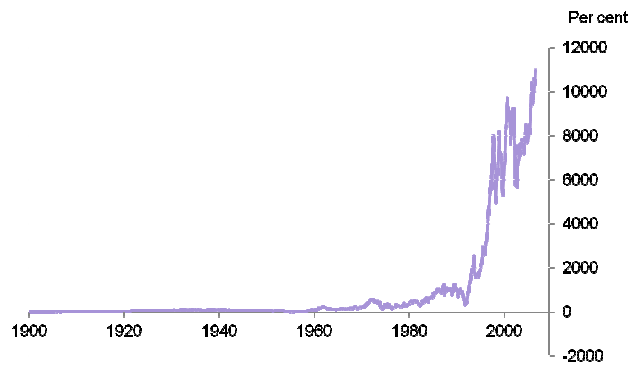


- You place a hedged bet of £100 in 1900...



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Betting on Banking



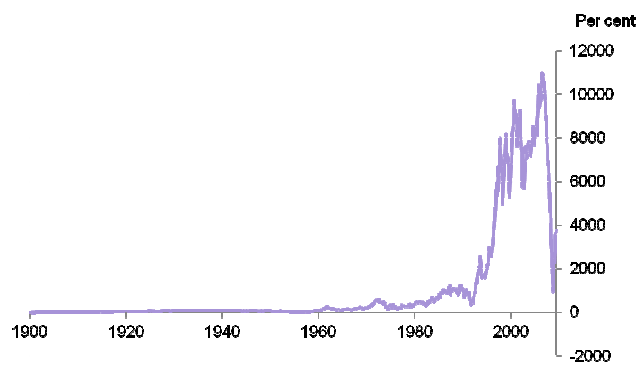
- ... you hit gold...



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3

Betting on Banking



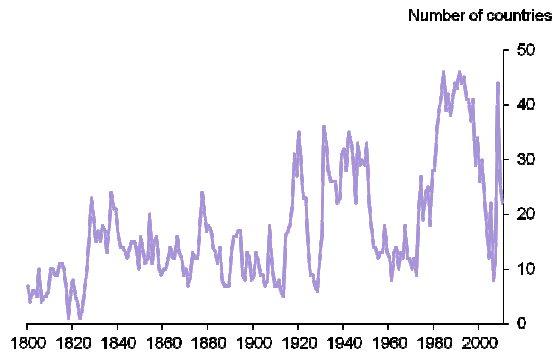
- ... fool's gold.



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4

Crisis probabilities



Source: Reinhart and Rogoff (2011), 1880-2010.

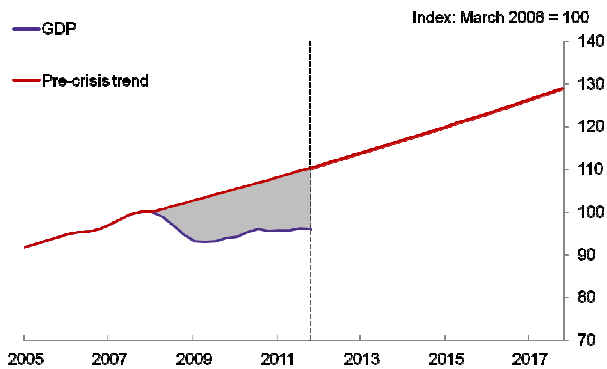
Notes: Denotes number of countries classified as "in crisis" in each year (currency, inflation, domestic sovereign, external sovereign, banking). Sample size: 70.



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5

Crisis Cost



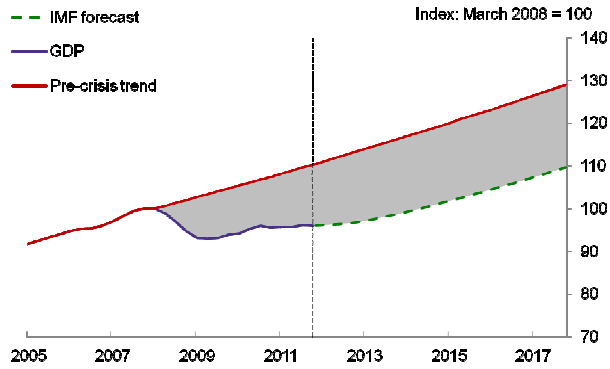
- Cumulative output loss = £540bn (37% of pre-crisis GDP).



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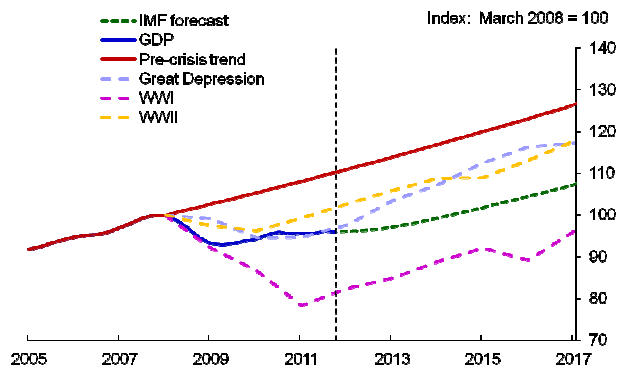
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Crisis Cost



- Cumulative output loss = £2 trillion (139% of pre-crisis GDP).

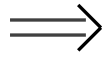
Crisis Cost



- Only WWI was more costly.

Intellectual Phase Shift...

- | | | |
|------------------------|---|----------------------|
| • Gauss | v | Pareto |
| • Random walk | v | Levy flight |
| • Fat cats | v | Fat tails |
| • Representative agent | v | Heterogeneous agents |
| • Idiosyncratic risk | v | Systemic risk |
| • Risk | v | Uncertainty |
| • Diversification | v | Diversity |
| • Equilibrium | v | Equilibria |



Treating the system as a system
(the perils of micro-founding macro)



The Perils of Probability

- Quants push the technological frontier of risk management.



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- “We are seeing things that are 25-standard deviation moves...”

David Viniar, CFO Goldman Sachs, August 2007



The Perils of Probability

- Quants push the technological frontier of risk management.
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- 25-sigma = 6×10^{124} lives of the universe



The Perils of Probability

- Quants push the technological frontier of risk management.
- “We are seeing things that are 25-standard deviation moves, several days in a row”

David Viniar, CFO Goldman Sachs, August 2007

- 25-sigma = 6×10^{124} lives of the universe
- Regulatory capital standards calibrated to 99.9% confidence interval...
- ... 1 unit of equity for every 99 of debt
- ... Now 5 units of equity for every 99 of debt

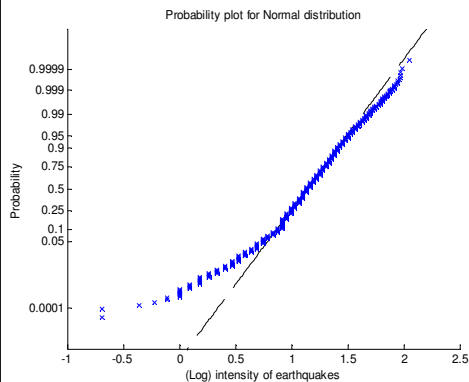


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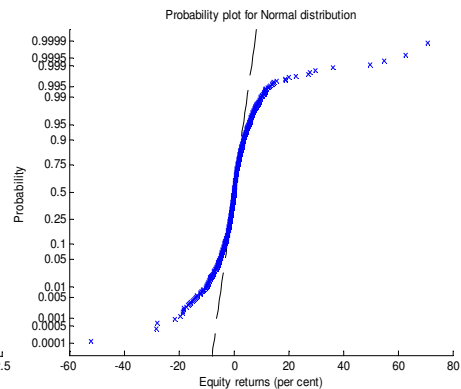
13

Probabilities of extreme events

Intensity of earthquakes in California (1910-1992)



Annual change in UK equities from 1694



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14

Ignoring connectivity

- “There is growing recognition that the dispersion of credit risk by banks to a broader and more diverse group of investors has helped make the banking and overall financial system more resilient.”

IMF Global Financial Stability Report, April 2006

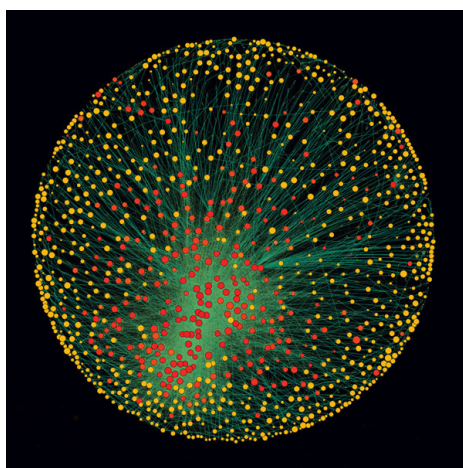
- Big banks benefit from a diversification discount
- ... but the impact of failure is greater = “super-spreaders”
- ... Now, extra buffers for the “super-spreaders”



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15

Connectivity



Notes: Superconnected companies are red, very connected companies are yellow. The size of the dot represents revenue.
Source: Vitali, S, Glattfelder, J and Battiston, S. (2011) “The network of global corporate control”.



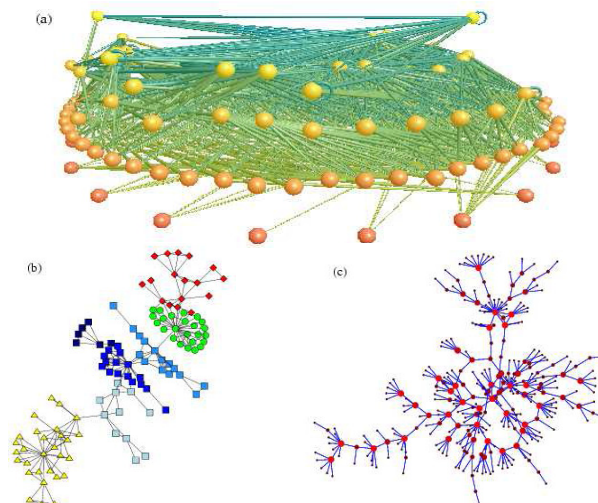
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16

The (Financial) World is a Web

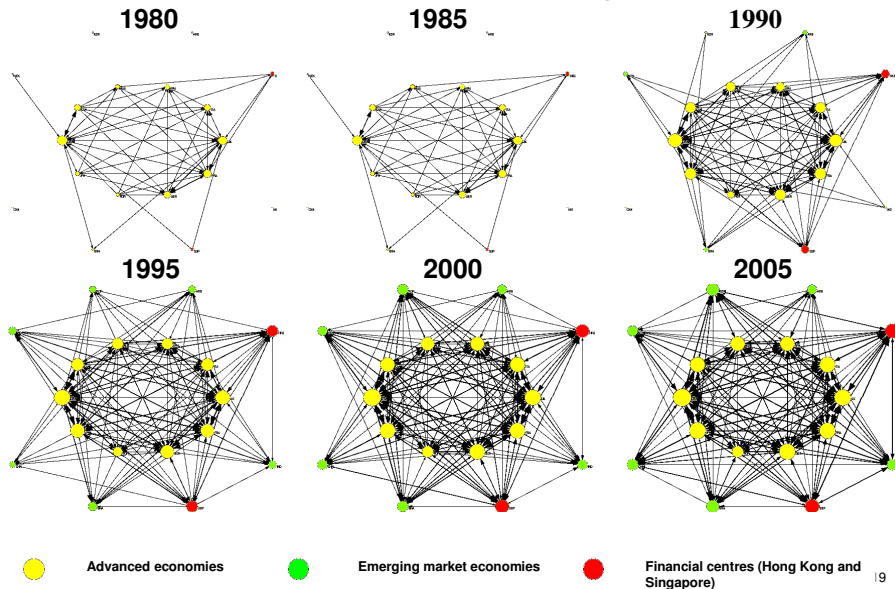
- Finance has not thought of itself as a network
- Mapping the web – “common language”, like HTML
- Managing the web – financial “weather maps”
- Rewiring the web – “central counterparties”
– “Vickers / Volcker”

Mapping the financial web



(a) A food web of predator-prey interactions between species in a freshwater lake
(b) The network of collaborations between scientists at a private research institution
(c) A network of sexual contact between individuals in the study

International Financial Systems

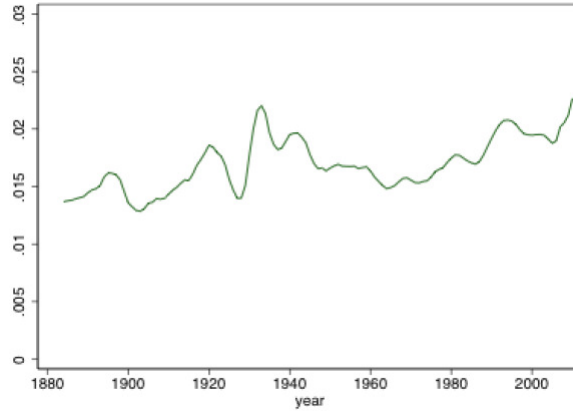


Technology and Finance

“The only useful piece of technological innovation in banking over the past 30 years has been the ATM”

Paul Volcker

Unit Cost of Financial Intermediation



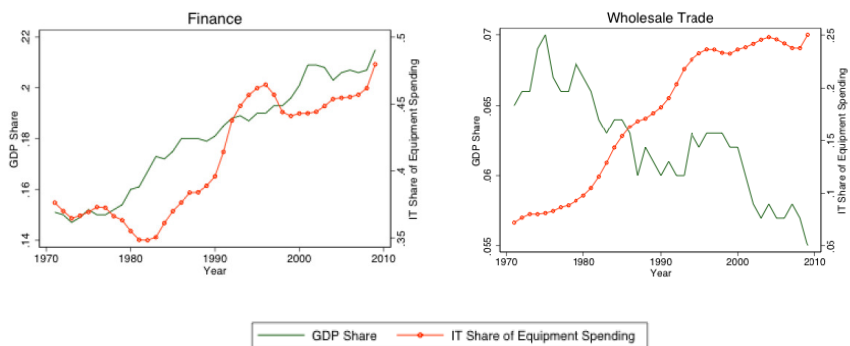
Source: Philippon (2012).
Notes: Ratio of gross value added over output.



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IT and GDP share in finance and wholesale trade



Source: Philippon (2012).



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22

Opening up Finance

- IT = Information technology
- Finance = Information industry
- What has gone wrong?
- Common standards and open access to data
 - Deposit account portability
 - Lending market contestability
- E.g. Peer-to-peer lending, Paypal, etc
- Lessons from music, publishing, job search,



dating
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