

Financial Bubbles, Real-Estate Bubble, Derivative Bubbles and the Financial and Economic Crisis

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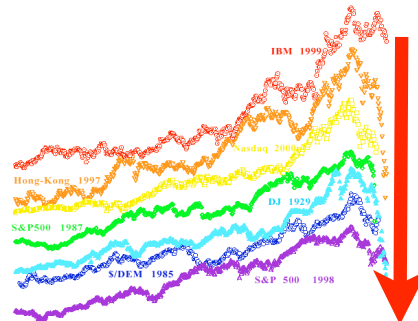


Research strategy: target the biggest fish in the pond

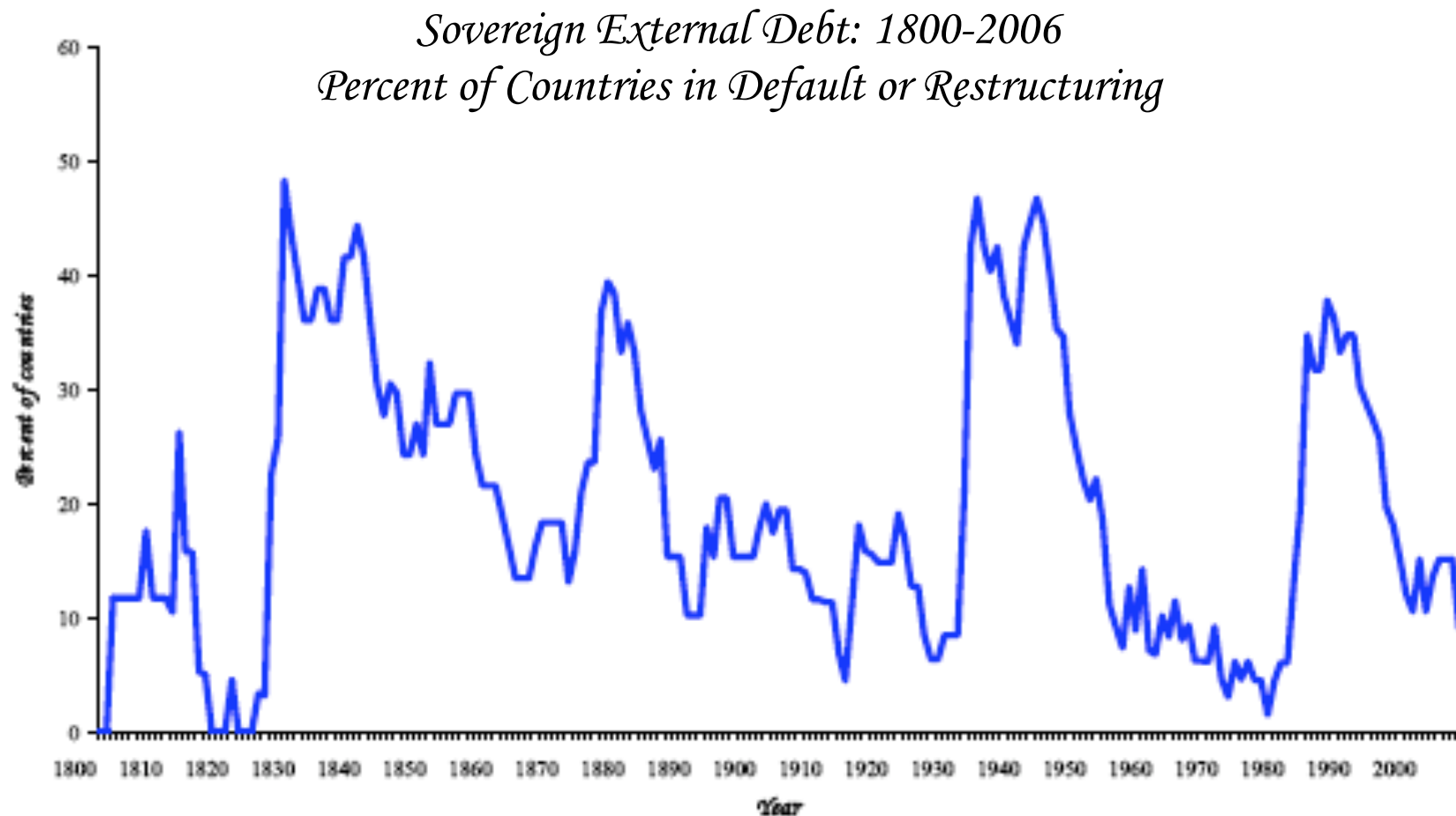
The largest anomalies may reveal the most important factors

The most important impacts given the uncertainties

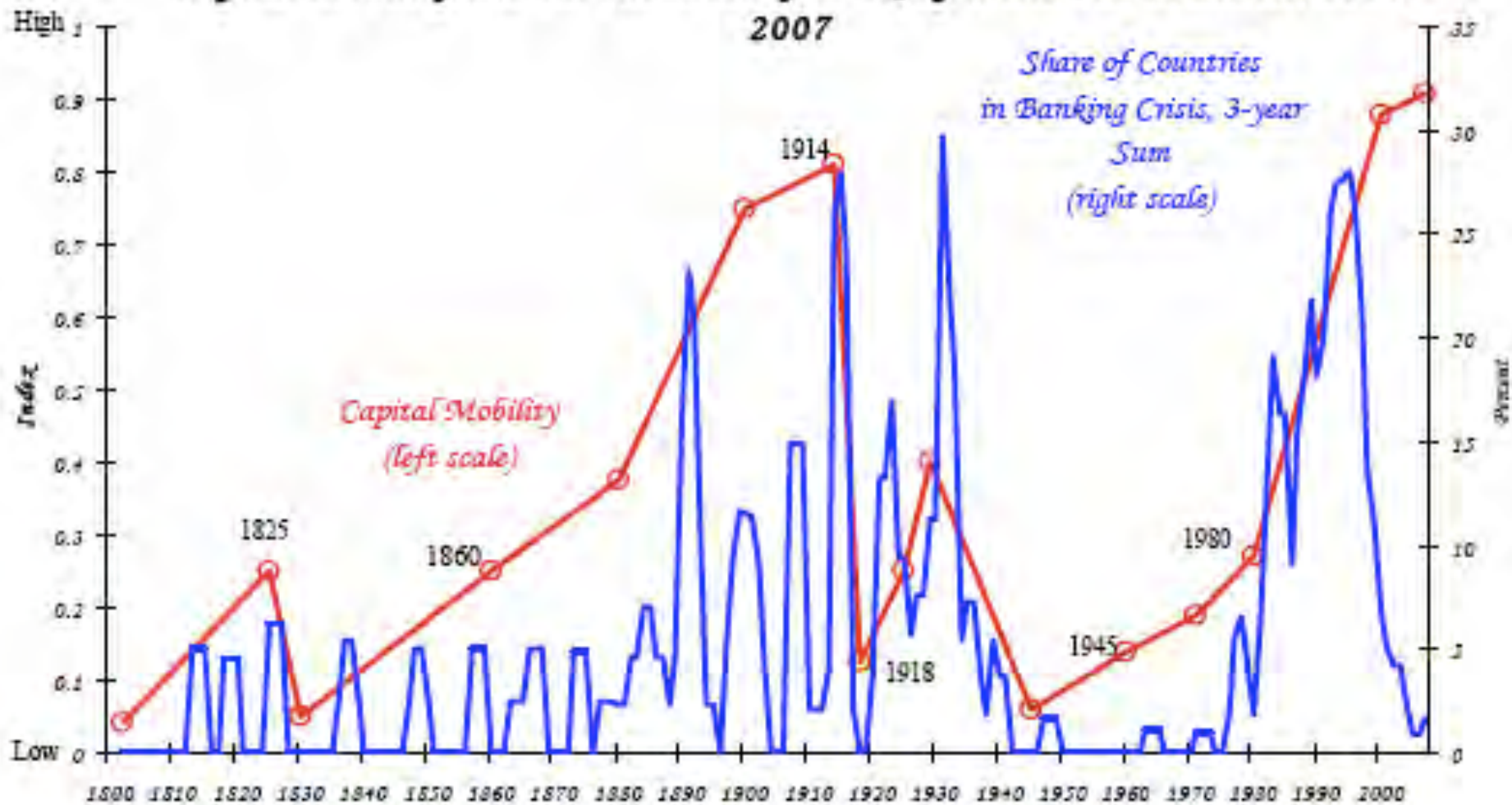
The biggest challenge(s)



Crises frequently emanate from the financial centers with transmission through interest rate shocks and commodity price collapses. Thus, the recent US sub-prime financial crisis is hardly unique.



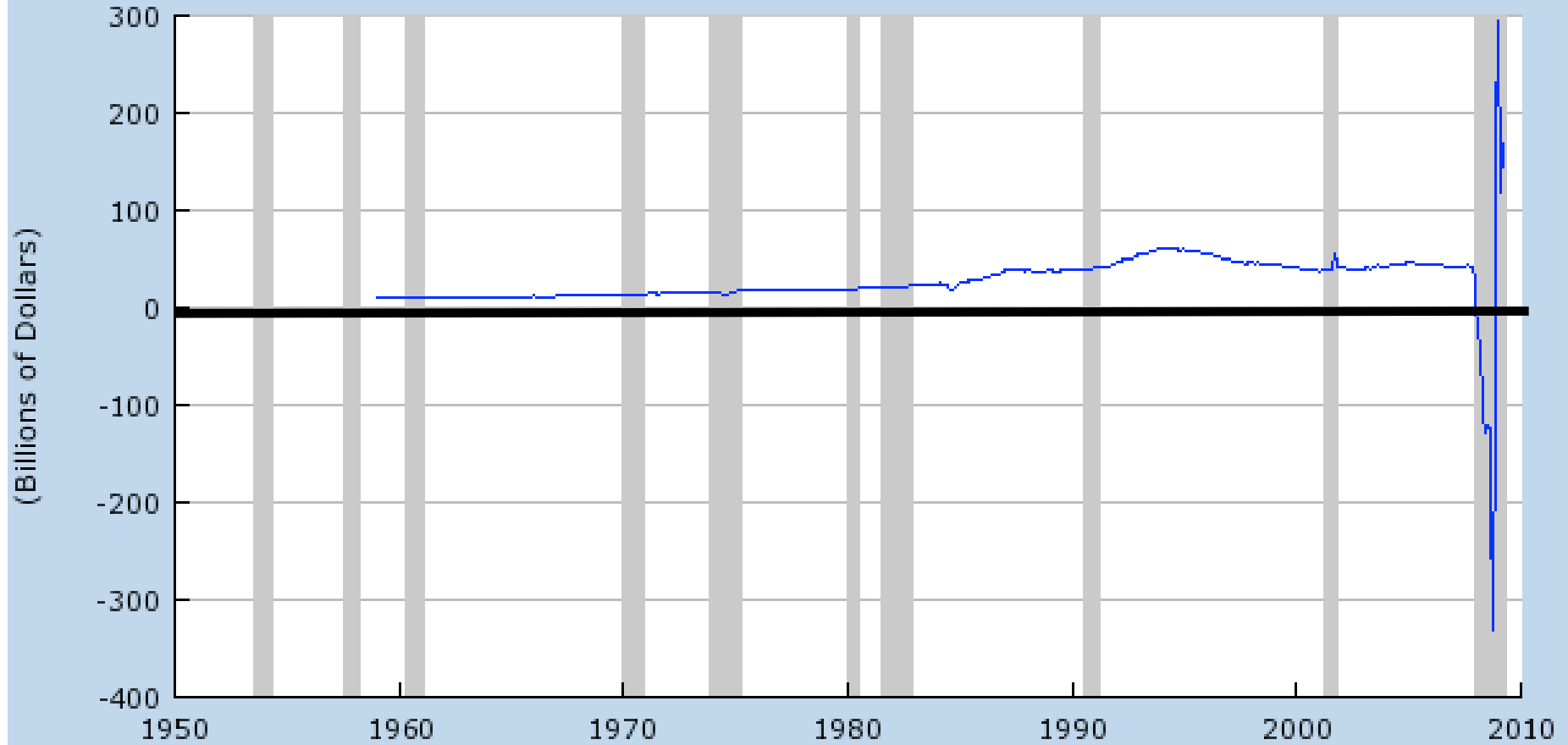
Capital Mobility and the Incidence of Banking Crisis: All Countries, 1800-2007



Sources: Bordo et al. (2001), Caprio et al. (2005), Kaminsky and Reinhart (1999), Obstfeld and Taylor (2004), and Carmen M. Reinhart and Kenneth S. Rogoff,

The CRISIS vs EXTREMES

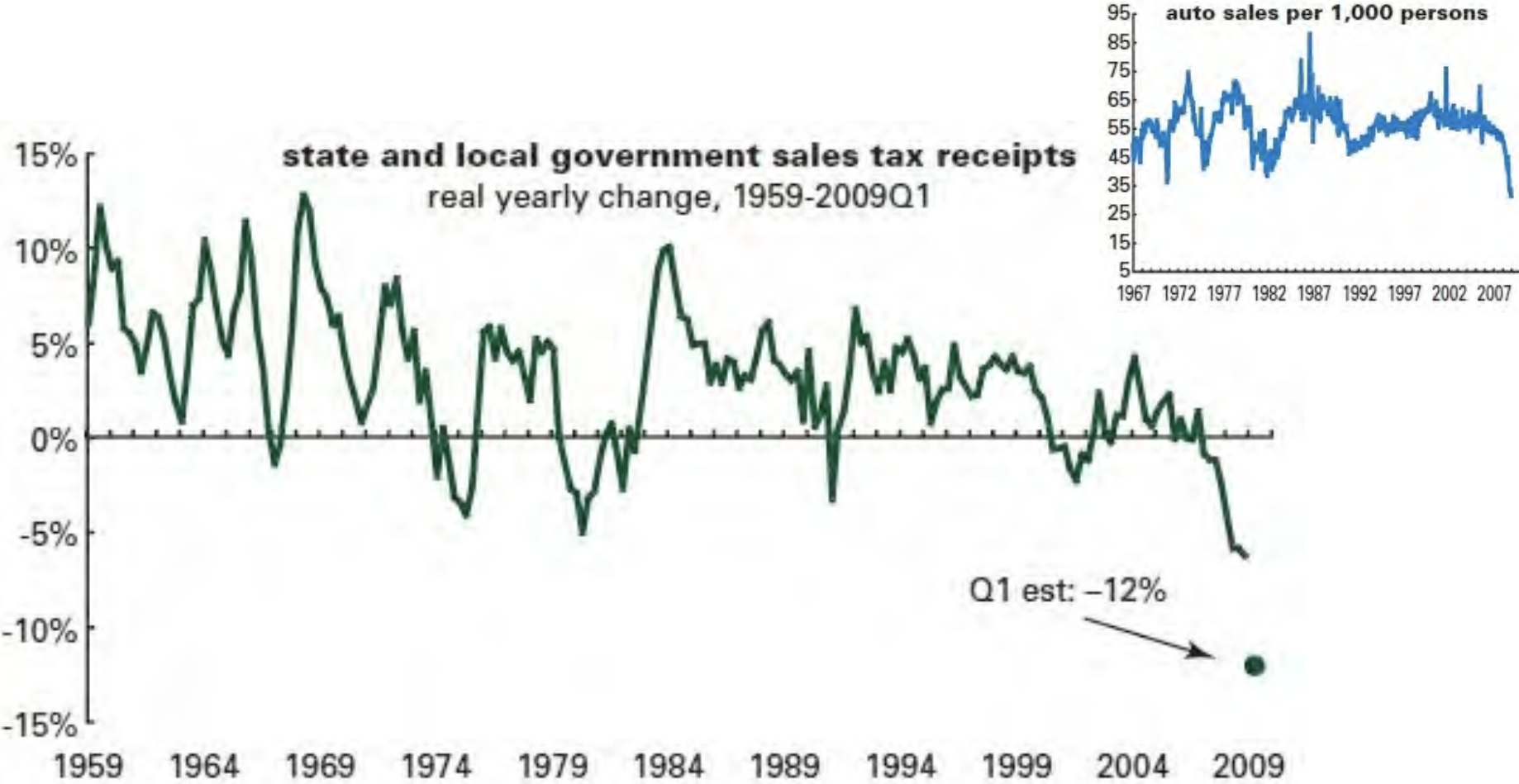
Non-Borrowed Reserves of Depository Institutions (BOGNONBR)
Source: Board of Governors of the Federal Reserve System



Shaded areas indicate US recessions.
2009 research.stlouisfed.org

March 2009

Consumption: From Excess to Freefall



Yearly change in state and local government sales tax receipts, deflated by the price index for state and local government purchases, from the national income accounts. Data for 2009Q1 is a TLR estimate, based on the states in our tax survey.

IMF estimate of the cost of the Banking crisis

Country	2008 GDP (\$ billion)	IMF Estimate Δ Deficit (% of GDP)	Projected Bond Issuance (\$ billion)
Australia	\$1,069	26%	\$278
Canada	\$1,564	14%	\$219
France	\$2,978	21%	\$625
Germany	\$3,818	14%	\$535
Italy	\$2,399	28%	\$672
Japan	\$4,844	28%	\$1,356
South Korea	\$858	14%	\$120
Mexico	\$1,143	6%	\$69
Spain	\$1,683	35%	\$589
Turkey	\$799	12%	\$96
UK	\$2,787	29%	\$808
US	\$14,330	34%	\$4,872
Total, G12	\$38,272	27%	\$10,239

	Δ Deficit (% of GDP)	Projected Bond Issuance (\$ billion)
IMF Estimate	27%	\$10,239
Rogoff, Best Case	40%	\$15,309
Rogoff, Average	86%	\$33,029

Source: CIA World Fact Book, IMF, Rogoff & Reinhart

total private wealth across the world today is about \$37 trillion *less* the losses incurred in 2007-09, so the real number is probably closer to \$30 trillion now.

Total global savings (loosely adjusted for the big losses in 2008) are probably somewhere in the region of \$100 trillion.

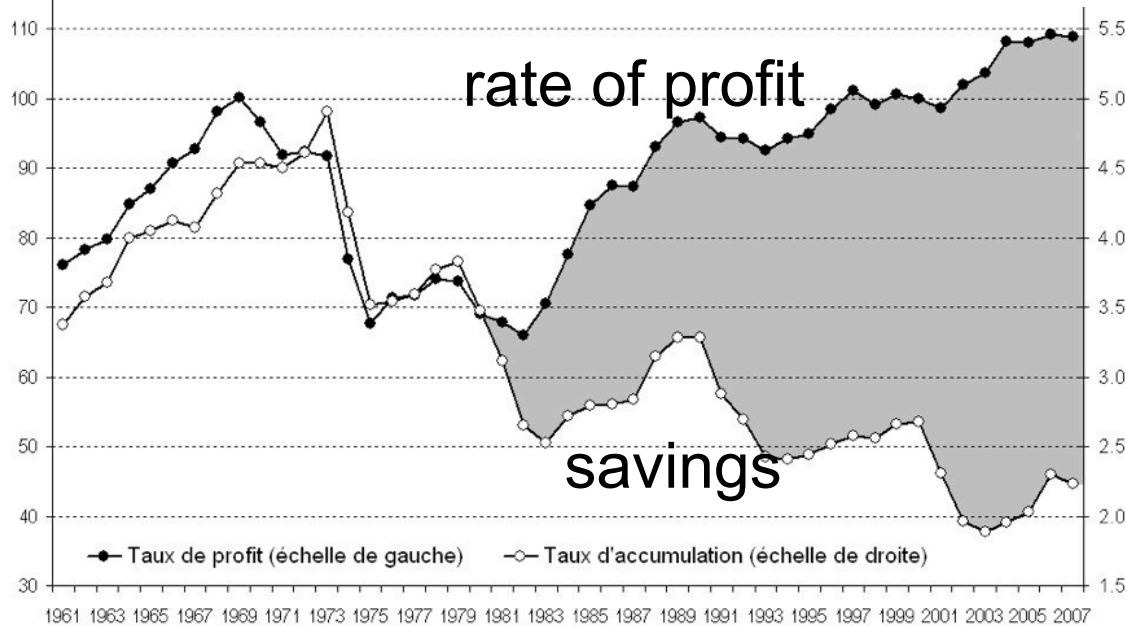
In other words, financing this crisis could absorb one-third of total global savings.

Fund Type	As of End	\$ Billion
Private Wealth	2006	\$37,200
Pension Funds	2007	\$28,228
Mutual Funds	2007	\$26,200
Insurance Companies	2007	\$18,836
FX Reserves	2007	\$7,341
Sovereign Wealth Funds	2007	\$3,300

Causes of the 2007-XXXX crisis?

- Real-estate loans and MBS as fraction of bank assets
- Managers greed and poor corporate governance problem
- Deregulation and lack of oversight
- Bad quantitative risk models in banks (Basel II)
- Lowering of lending standards
- Securitization of finance
- Leverage
- Rating agency failures
- Under-estimating aggregate risks
- Growth of over-capacity

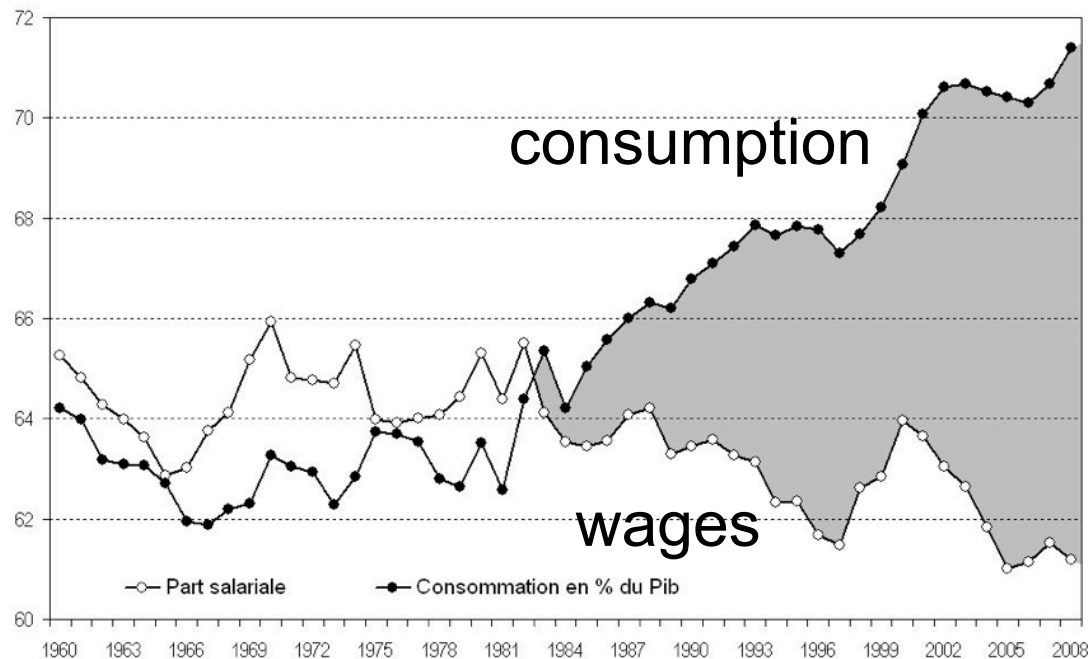
The illusionary "PERPETUAL MONEY MACHINE"



Rate of profit and rate of accumulation: The United States + European Union + Japan

* Rate of accumulation = rate of growth rate of the net volume of capital * Rate of profit = profit/capital (base: 100 in 2000)

Sources and data of the graphs: <http://hussonet.free.fr/toxicap.xls>



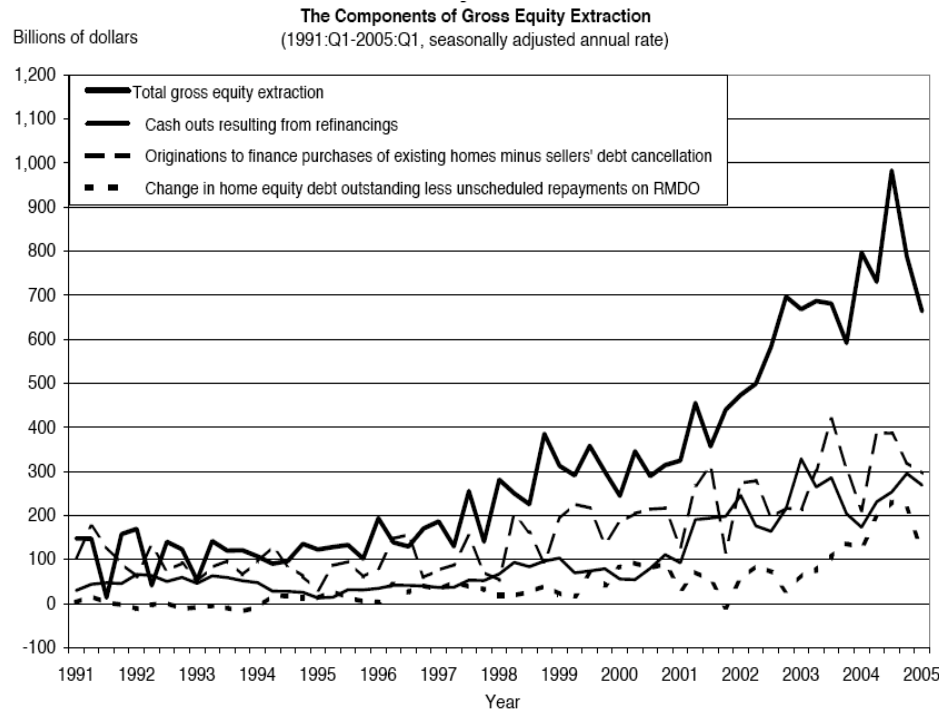
The gap widens between the share of wages and the share of consumption (gray zones), so as to compensate for the difference between profit and accumulation. FINANCE allows increasing debt and virtual wealth growth... which can only be transitory (even if very long).

United States Share of wages and of private consumption in Gross Domestic Product (GDP)

Source of data and graphics: <http://hussonet.free.fr/toxicap.xls>

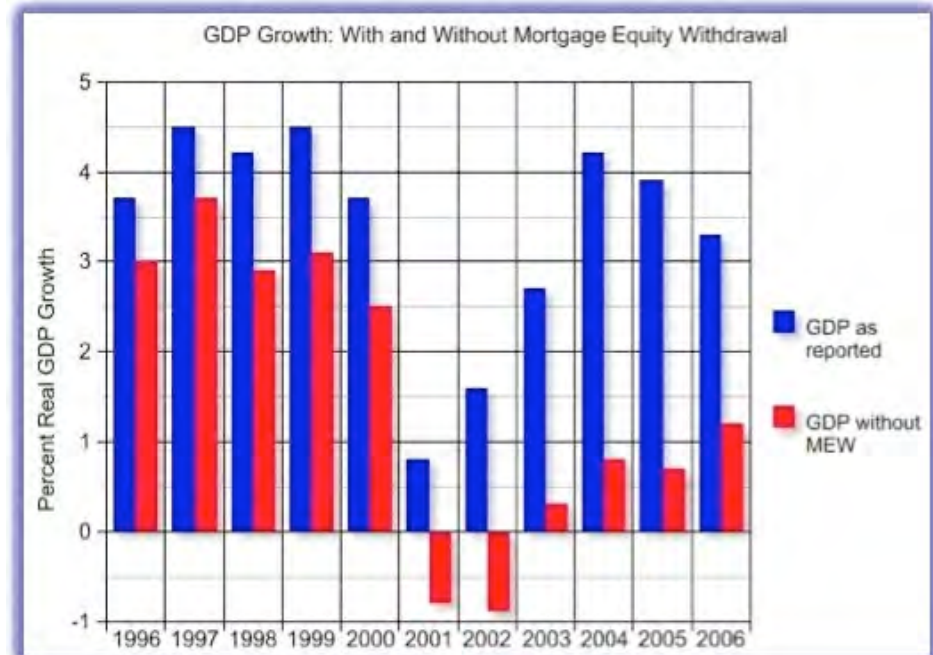
Wealth Extraction

Over the past decade and a half, (B - F) has been closely correlated with realized capital gains on the sale of homes. $B - F = \text{change in home equity debt outstanding less unscheduled repayment on RMDO}$



Alan Greenspan and James Kennedy (Nov. 2005)

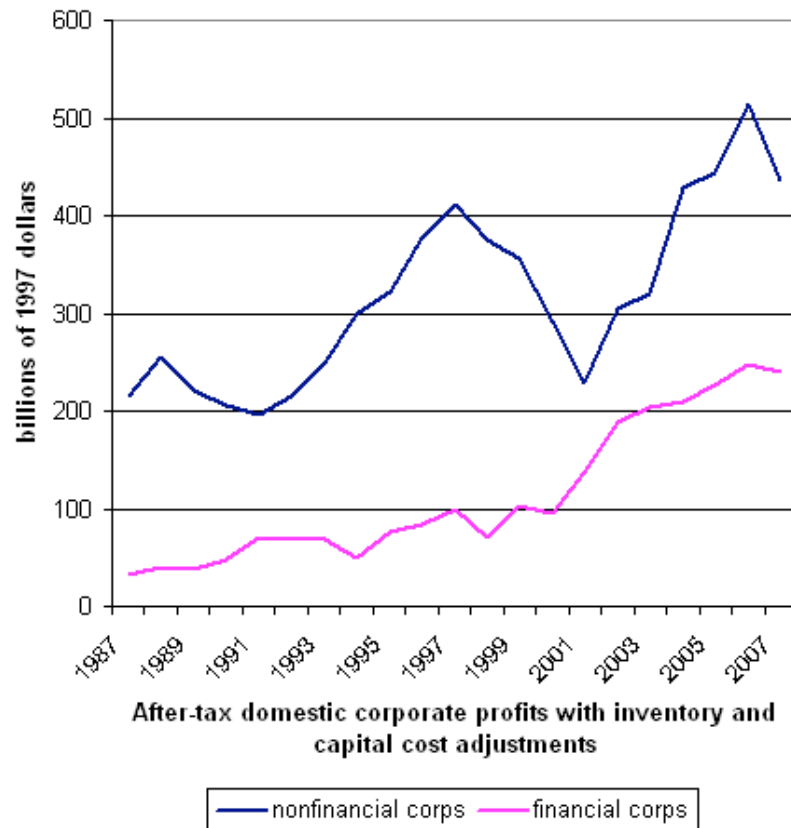
Mortgage Equity Withdrawal impact on GDP



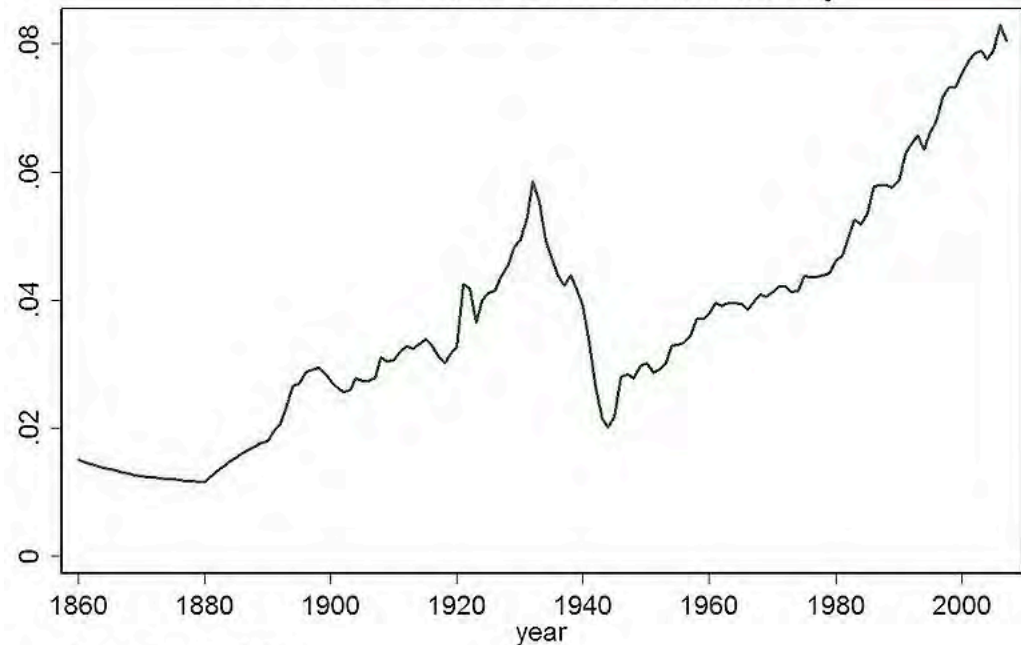
source: John Mauldin (April 09)

Financial investments accounted for >1/3 of corporate profits

Real Corporate Profits



GDP share of US Financial Industry

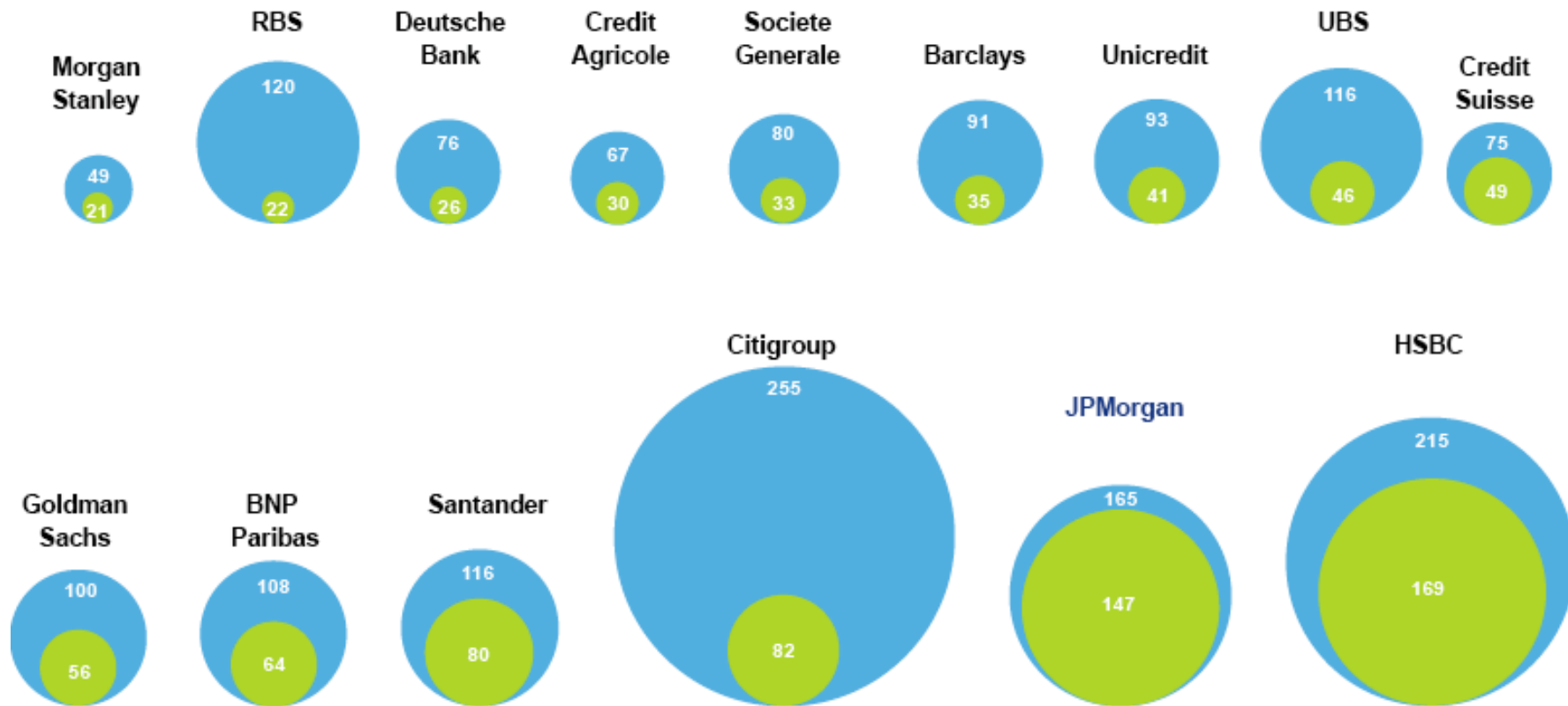


Source: Philippon, 2008

Michael Mandel

http://www.businessweek.com/the_thread/economicsunbound/archives/2009/03/a_bad_decade_fo.html

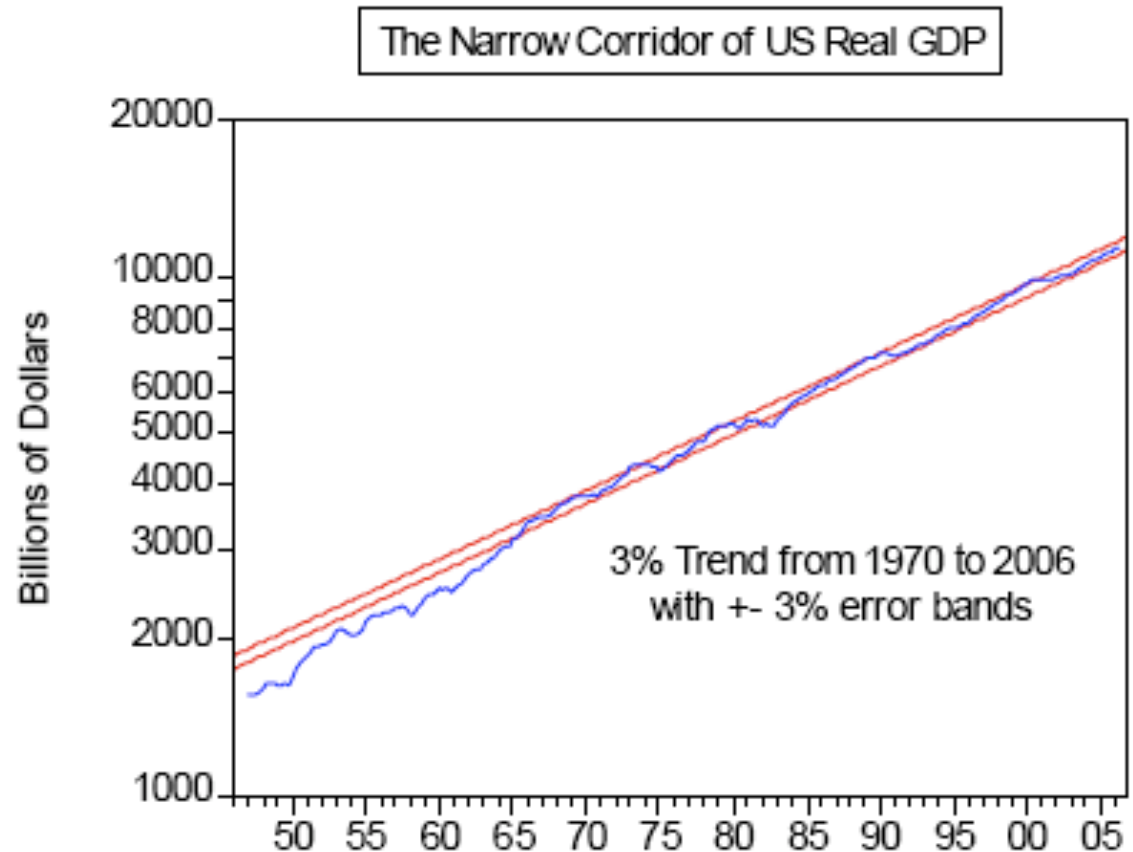
The illusionary “PERPETUAL MONEY MACHINE”



● Market value as of October 20th 2008, \$bn
● Market value as of Q2 2007, \$bn

The illusory “PERPETUAL MONEY MACHINE”

- An economy which grows at 2 or 3 per cent cannot provide a universal profit of 15 per cent, as some managers of equities claim and many investors dream of.
- Financial assets represent the right to a share of the surplus value that is produced. As long as this right is not exercised, it remains **virtual**. But as soon as anyone exercises it, they discover that it is subject to **the law of value**, which means, quite simply, that you cannot distribute more real wealth than is produced.

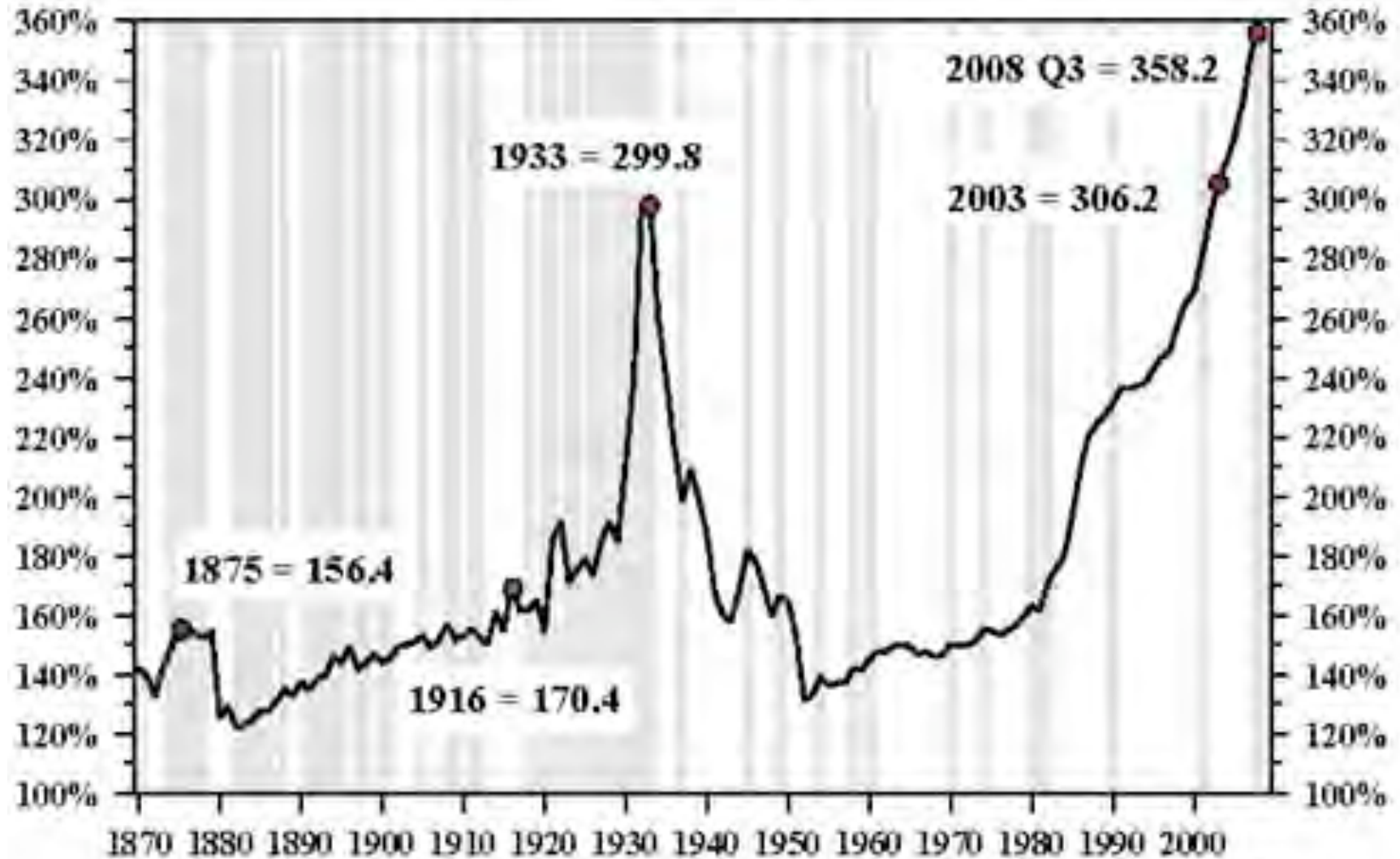


From 1982 until 2007, the U.S. only experienced two shallow recessions that each lasted just 8 months. This stretch of 25 years may be the best 25 years in the US economic history. But much of this prosperity was bought with debt, as the ratio of debt to GDP rose from \$1.60 to \$3.50 for each \$1.00 of GDP.

Total U.S. Debt as a % of GDP

annual

\$ 50 trillions



Sources: Bureau of Economic Analysis, Federal Reserve, Census Bureau: Historical Statistics of the United States
Colonial Times to 1970. Through Q3 2008.

A 15y History of the 2008- crisis

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Consequences (deep loss of trust, systemic instability)
- Solution?

What is a bubble?

Academic Literature: No consensus on what is a bubble...

Ex: Refet S. Gürkaynak, [Econometric Tests of Asset Price Bubbles: Taking Stock](#).

Can asset price bubbles be detected? This survey of econometric tests of asset price bubbles shows that, despite recent advances, econometric detection of asset price bubbles cannot be achieved with a satisfactory degree of certainty. **For each paper that finds evidence of bubbles, there is another one that fits the data equally well without allowing for a bubble.** We are still unable to distinguish bubbles from time-varying or regime-switching fundamentals, while many small sample econometrics problems of bubble tests remain unresolved.

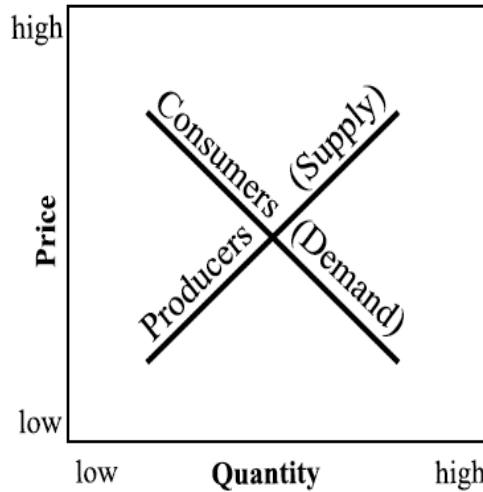
Professional Literature: we do not know... only after the crash

The Fed: A. Greenspan (Aug., 30, 2002):

“We, at the Federal Reserve...recognized that, despite our suspicions, it was very difficult to definitively identify a bubble **until after the fact, that is, when its bursting confirmed its existence**... Moreover, it was far from obvious that bubbles, even if identified early, could be preempted short of the Central Bank inducing a substantial contraction in economic activity, the very outcome we would be seeking to avoid.”

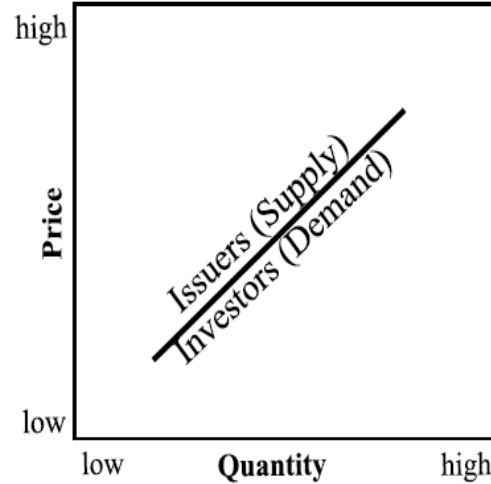
What is a bubble?

The Law of Supply & Demand in Utilitarian Economics



© 2003 Robert R. Prechter, The Socionomics Institute

Herding Impulse in Finance

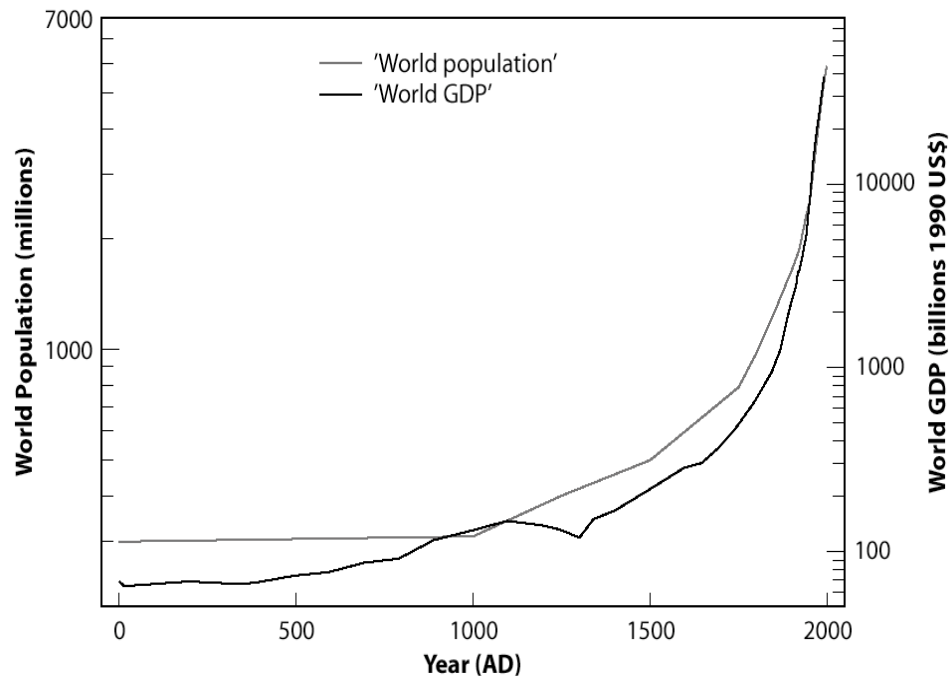


Positive feedbacks

$$\frac{dp}{dt} = cp^d$$

$$p(t) = \left(\frac{c}{m}\right)^{-m} (t_c - t)^{-m}$$

$$m = 1/(d - 1) > 0 \text{ and } t_c = t_0 + mp_0^{1-d}/c.$$



Our proposition:
Faster than exponential
 transient unsustainable
 growth of price

Mechanisms for positive feedbacks in the stock market

- **Technical and rational mechanisms**
 1. Option hedging
 2. Insurance portfolio strategies
 3. Trend following investment strategies
 4. Asymmetric information on hedging strategies
- **Behavioral mechanisms:**
 1. Breakdown of “psychological Galilean invariance”
 2. Imitation(many persons)
 - a) It is rational to imitate
 - b) It is the highest cognitive task to imitate
 - c) We mostly learn by imitation
 - d) The concept of “CONVENTION” (Orléan)

Imitation



-Imitation is considered an efficient mechanism of social learning.

- Experiments in developmental psychology suggest that infants use imitation to get to know persons, possibly applying a ‘like-me’ test (‘persons which I can imitate and which imitate me’).

- Imitation is among the most complex forms of learning. It is found in highly socially living species which show, from a human observer point of view, ‘intelligent’ behavior and signs for the evolution of traditions and culture (humans and chimpanzees, whales and dolphins, parrots).

- In non-natural agents as robots, tool for easing the programming of complex tasks or endowing groups of robots with the ability to share skills without the intervention of a programmer. Imitation plays an important role in the more general context of interaction and collaboration between software agents and human users.

Thy Neighbor's Portfolio: Word-of-Mouth Effects in the Holdings and Trades of Money Managers

THE JOURNAL OF FINANCE • VOL. LX, NO. 6 • DECEMBER 2005

HARRISON HONG, JEFFREY D. KUBIK, and JEREMY C. STEIN*

A mutual fund manager is more likely to buy (or sell) a particular stock in any quarter if other managers in the same city are buying (or selling) that same stock. This pattern shows up even when the fund manager and the stock in question are located far apart, so it is distinct from anything having to do with local preference. The evidence can be interpreted in terms of an epidemic model in which investors spread information about stocks to one another by word of mouth.

A fundamental observation about human society is that people who communicate regularly with one another think similarly. There is at any place and in any time a Zeitgeist, a spirit of the times. . . . Word-of-mouth transmission of ideas appears to be an important contributor to day-to-day or hour-to-hour stock market fluctuations. (pp. 148, 155) Shiller (2000)

Humans Appear Hardwired To Learn By 'Over-Imitation'

ScienceDaily (Dec. 6, 2007) — Children learn by imitating adults--so much so that they will rethink how an object works if they observe an adult taking unnecessary steps when using that object, according to a new Yale study.

Universal Bubble and Crash Scenario

Displacement



Credit creation



Euphoria



Critical stage / Financial distress



Revulsion

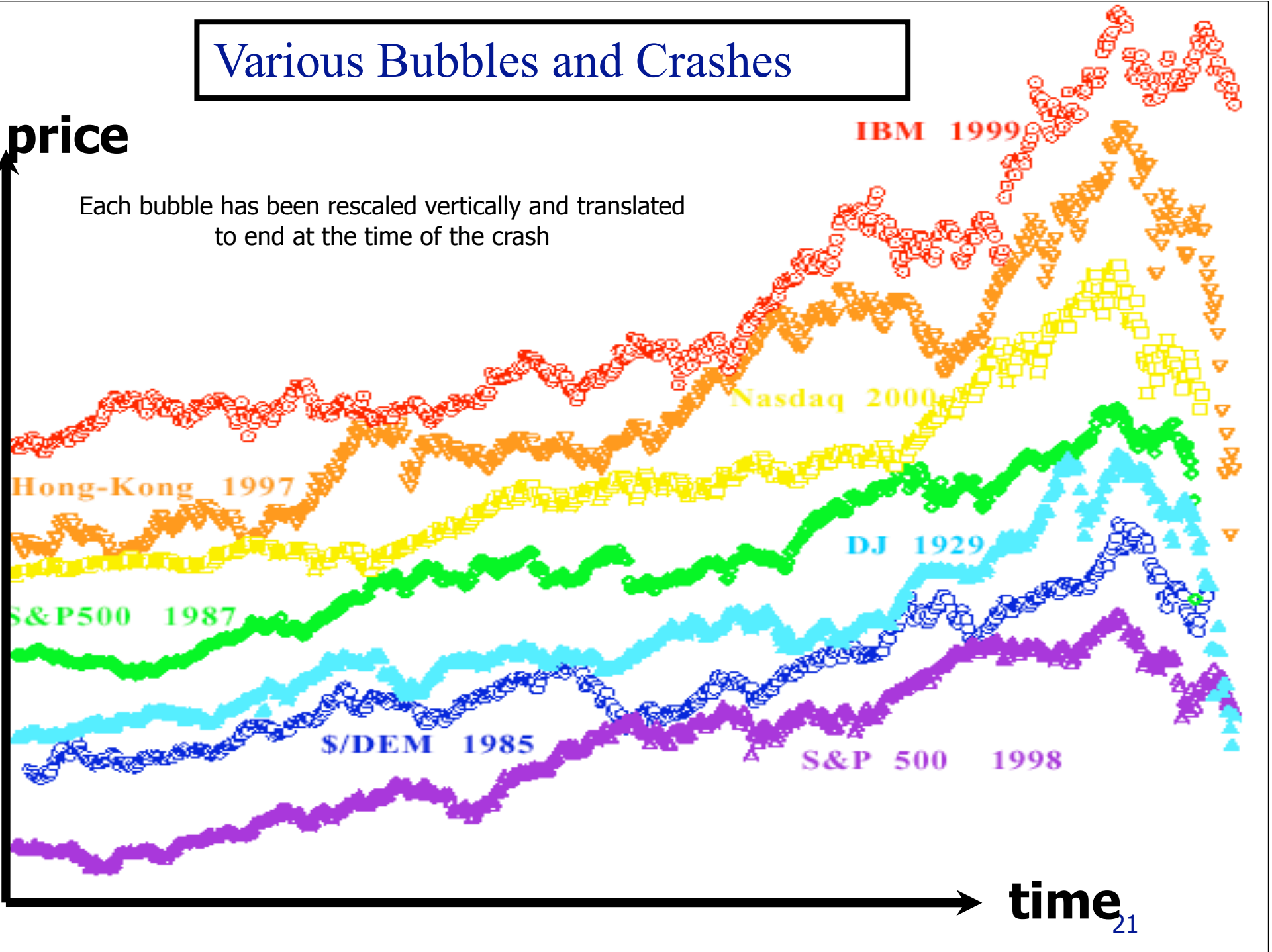
Charles Kindleberger, *Manias, Panics and Crashes* (1978)

Didier Sornette, *Why stock markets crash* (2003)

Various Bubbles and Crashes

price

Each bubble has been rescaled vertically and translated to end at the time of the crash

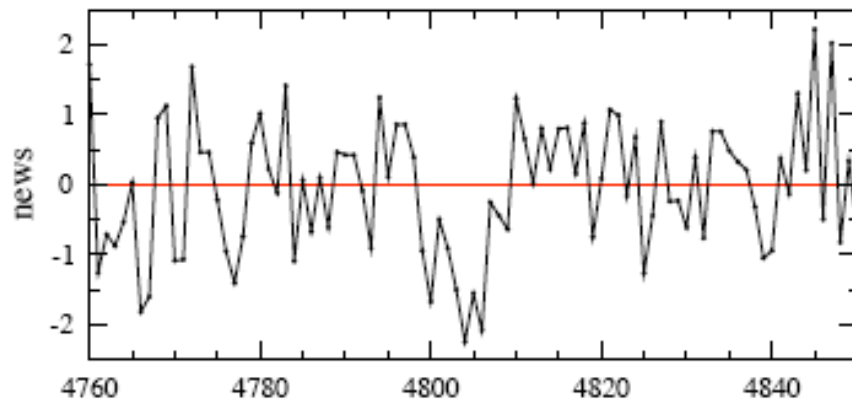


time₂₁

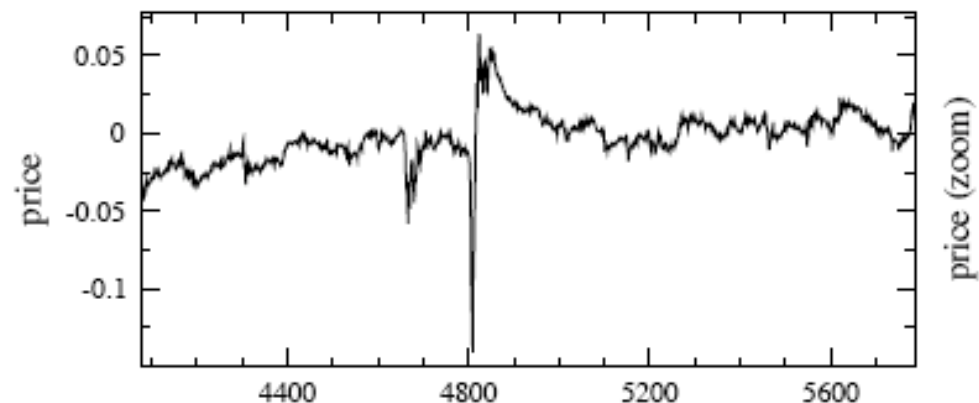
Endogenous versus exogenous origins of financial bubbles and crashes

Georges Harras & Didier Sornette

news



price



<http://arXiv.org/abs/0806.2989>

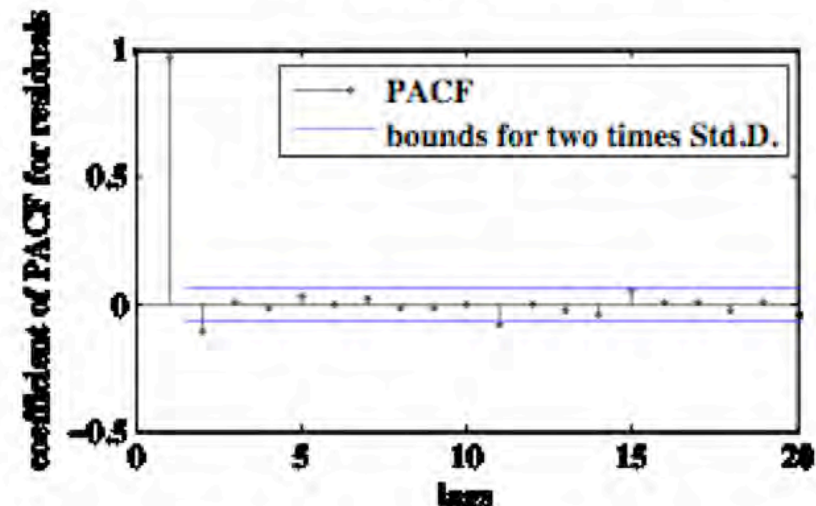
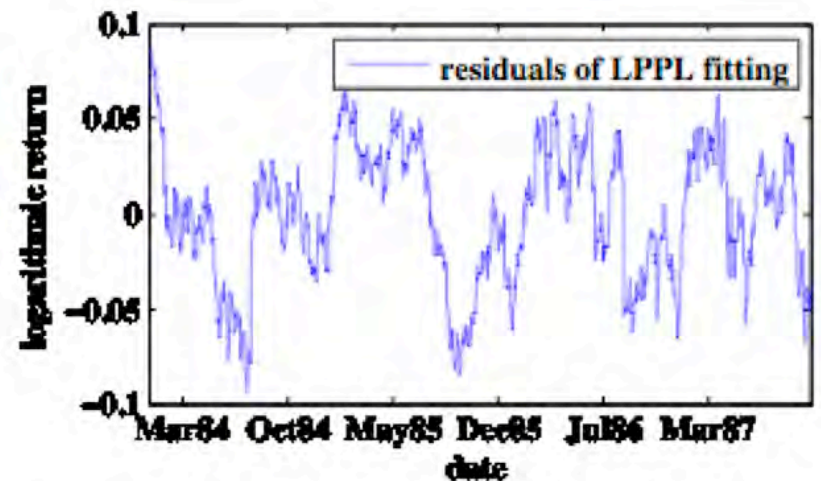
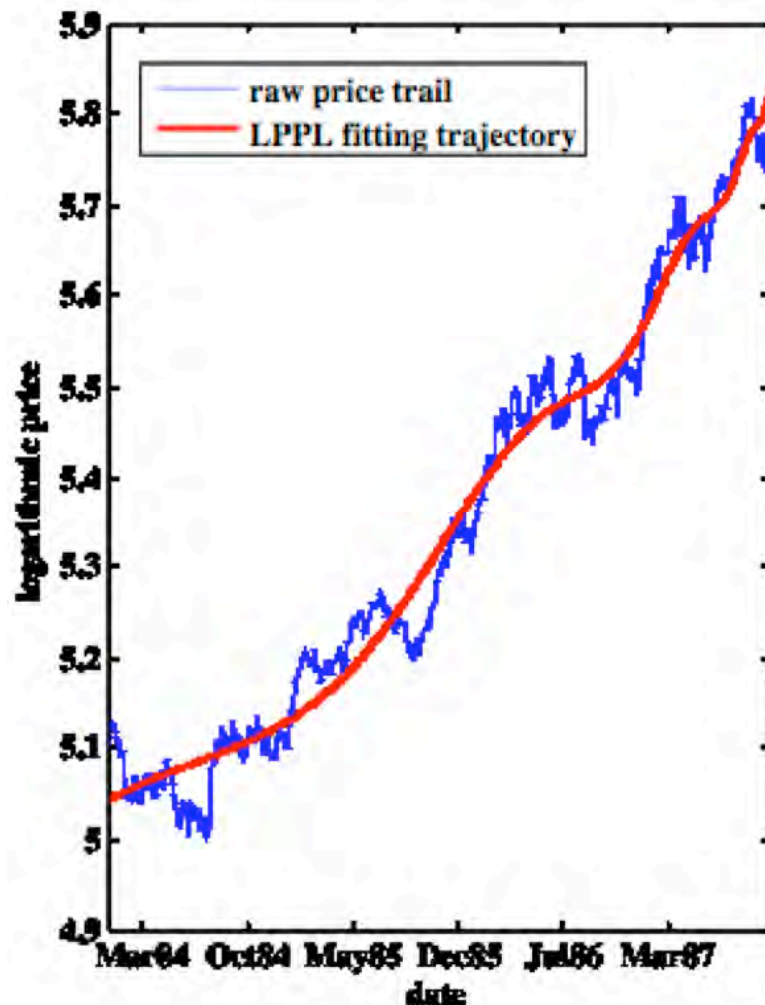
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1156348

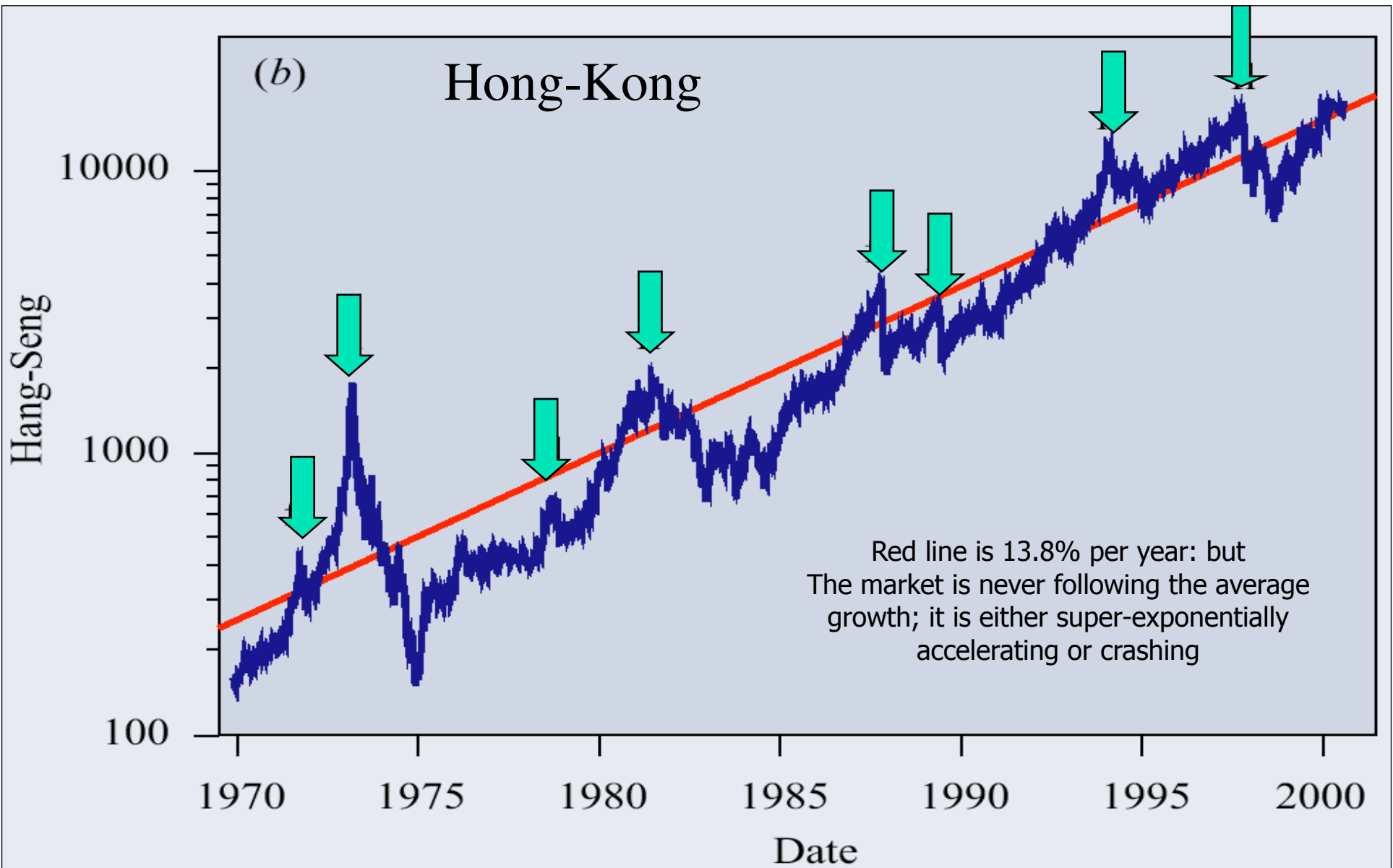
A Consistent Model of 'Explosive' Financial Bubbles With Mean-Reversing Residuals

L. Lin, R. E. Ren and D. Sornette (2009)

see **Li LIN's presentation WESNESDAY G59 15:45t**

$$\frac{dI}{I} = [r + \rho\Sigma + \kappa h(t)]dt - \alpha\rho_Y Y dt + (\sigma_Y + \sigma_W)dW$$





Patterns of price trajectory during 0.5-1 year before each peak: Log-periodic power law

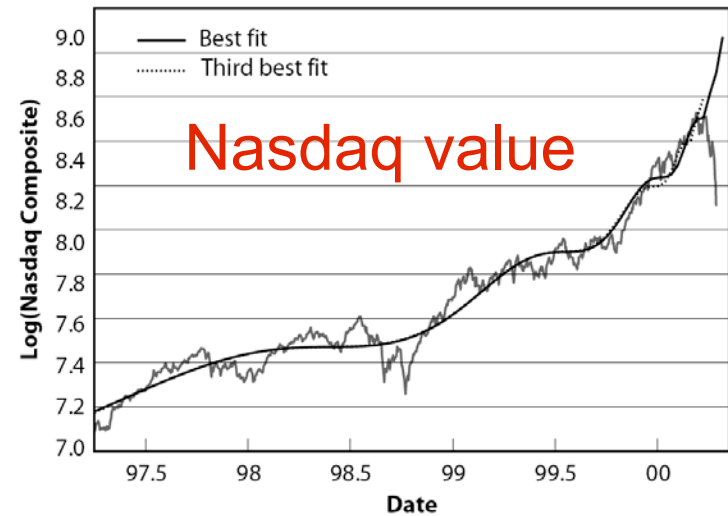
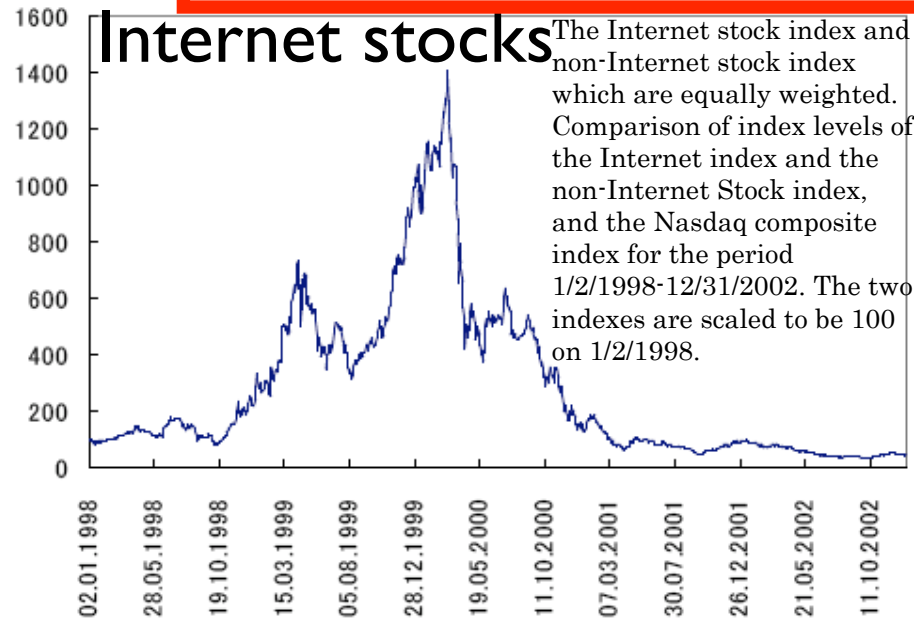


Figure 12. Hong Kong crash of 1971. The parameter values of the fit with equation (1) are: $A = 569$, $B = -549$, $C = 17$, $\beta = 0.20$, $\phi = 0.11$, $\alpha = 1973.19$, $\rho = -0.05$ and $\omega = 8.7$. Note that for this fit with equation (3) are: $A = 824$, $B = -535$, $C = -283$, $\beta = 0.40$, $\alpha = 1979.89$, $\rho = -0.17$ and $\omega = 5.9$.
 Figure 13. Hong Kong crash of 1973. The parameter values of the fit with equation (1) are: $A = 10.4$, $B = -73.6$, $C = -0.05$, $\beta = 0.11$, $\alpha = 1973.19$, $\rho = -0.05$ and $\omega = 8.7$. Note that for this fit with equation (3) are: $A = 824$, $B = -535$, $C = -283$, $\beta = 0.40$, $\alpha = 1979.89$, $\rho = -0.17$ and $\omega = 5.9$.
 Figure 14. Hong Kong crash of 1978. The parameter values of the fit with equation (1) are: $A = 2069$, $B = -1786$, $C = -55.5$, $\beta = 0.29$, $\alpha = 1989.86$, $\rho = 1.8$ and $\omega = 7.2$.
 Figure 15. Hong Kong crash of 1980. The parameter values of the fit with equation (1) are: $A = 1513$, $B = -1072$, $C = 225$, $\beta = 0.57$, $\alpha = 1989.46$, $\rho = 0.5$ and $\omega = 6.6$.
 Figure 16. Hong Kong stock market bubble ending with the crash of October 1987. On October 19, 1987, the Hang Seng index closed at 3582.8. On October 26, it closed at 2241.7, corresponding to a loss of 37.1%. See Table 1 for the parameter values of the fit with equation (1). Note that the two fits are almost indistinguishable except at the very end of the bubble. Reproduced from [214].
 Figure 17. Hong Kong crash of 1989. The parameter values of the fit with equation (1) are: $A = 1513$, $B = -1072$, $C = 225$, $\beta = 0.57$, $\alpha = 1989.46$, $\rho = 0.5$ and $\omega = 6.6$.
 Figure 18. The Hong Kong index prior to the October 1989 crash on the Hong Kong stock exchange closely follows the fit in Figure 17 and the S&P 500 stock index prior to the crash on Wall Street in August 1989. The fit to the S&P 500 index is equation (1) with: $A = 1341$, $B = -802$, $C = 197$, $\beta = 0.846$, $\rho = 0.7$, $\alpha = 1973.73$, $\rho = -0.05$ and $\omega = 8.3$. Reproduced from [215].

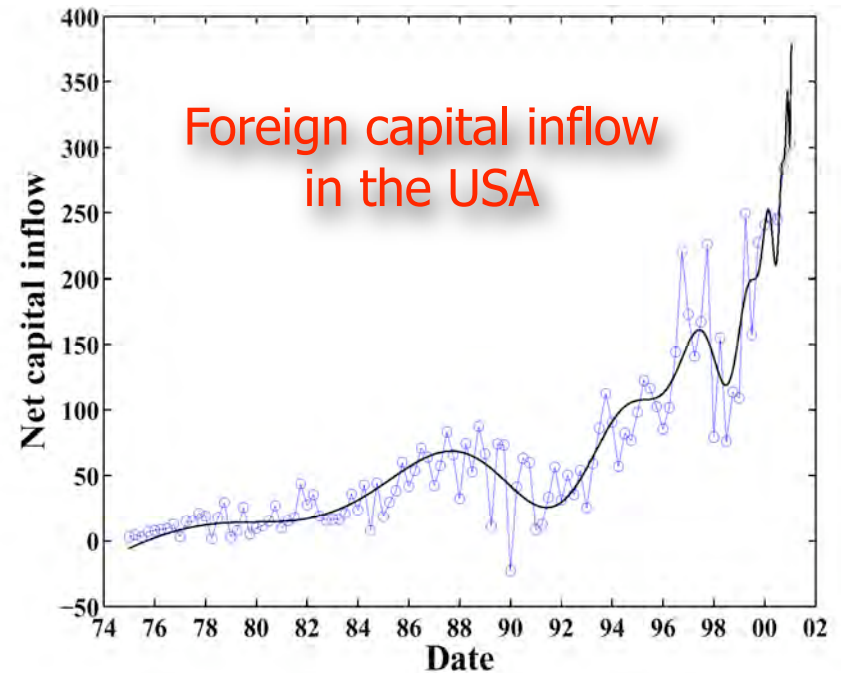
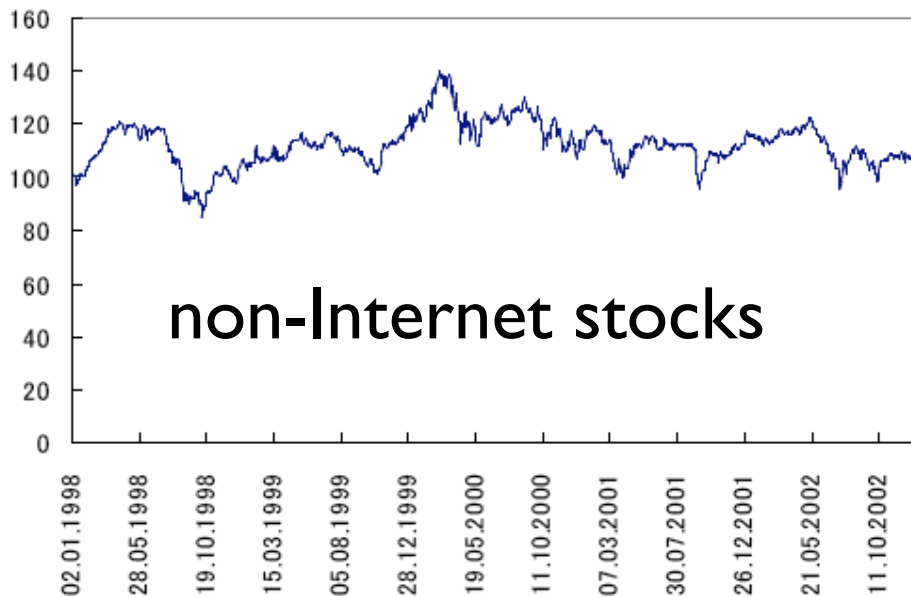
A 15y History of the 2008- crisis

- The ITC “new economy” bubble (1995-2000)
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Consequences (deep loss of trust, systemic instability)
- Solution?

THE NASDAQ CRASH OF APRIL 2000



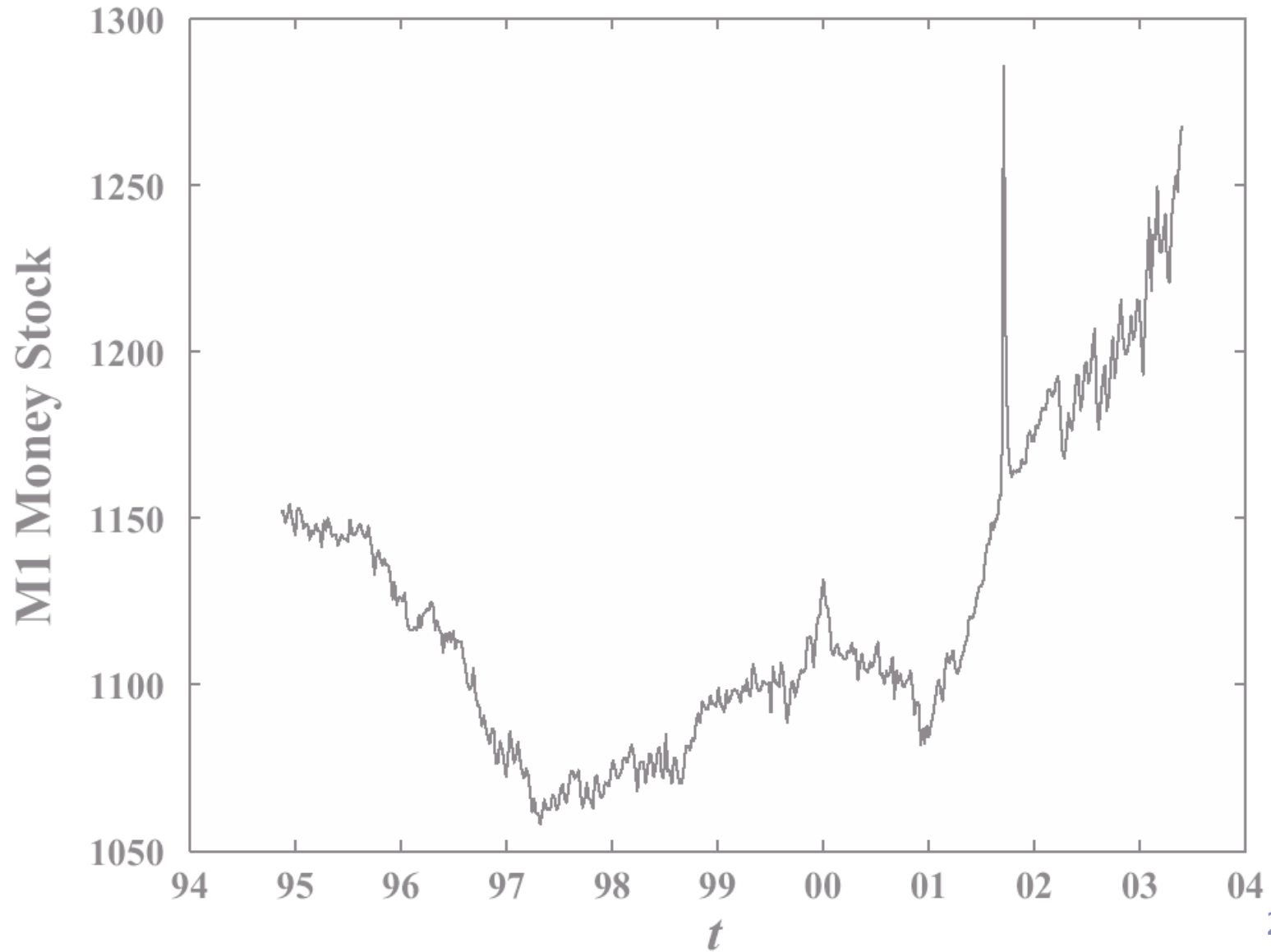
Non-Internet Stock Price Index



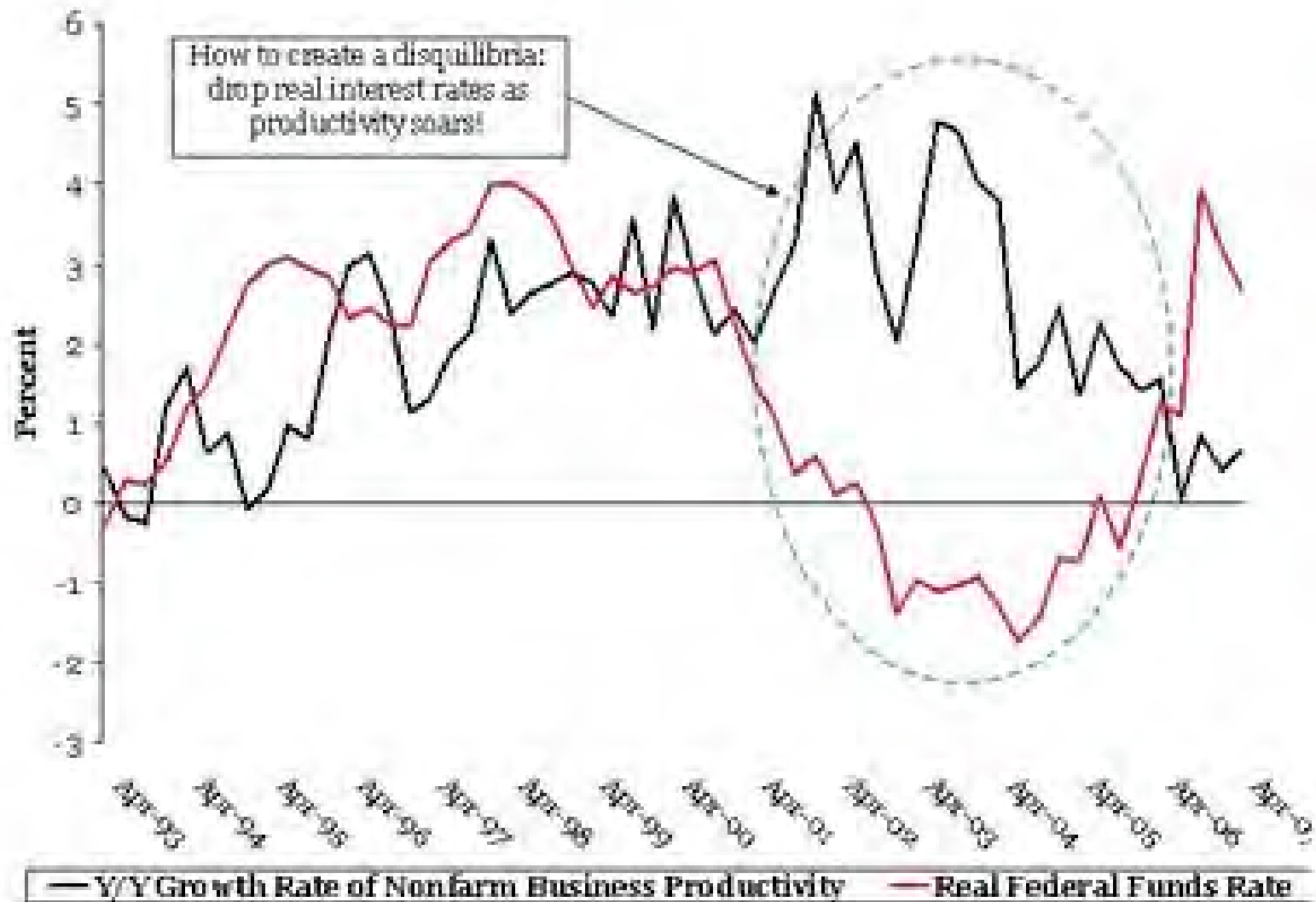
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Growth of Money supply (M1)

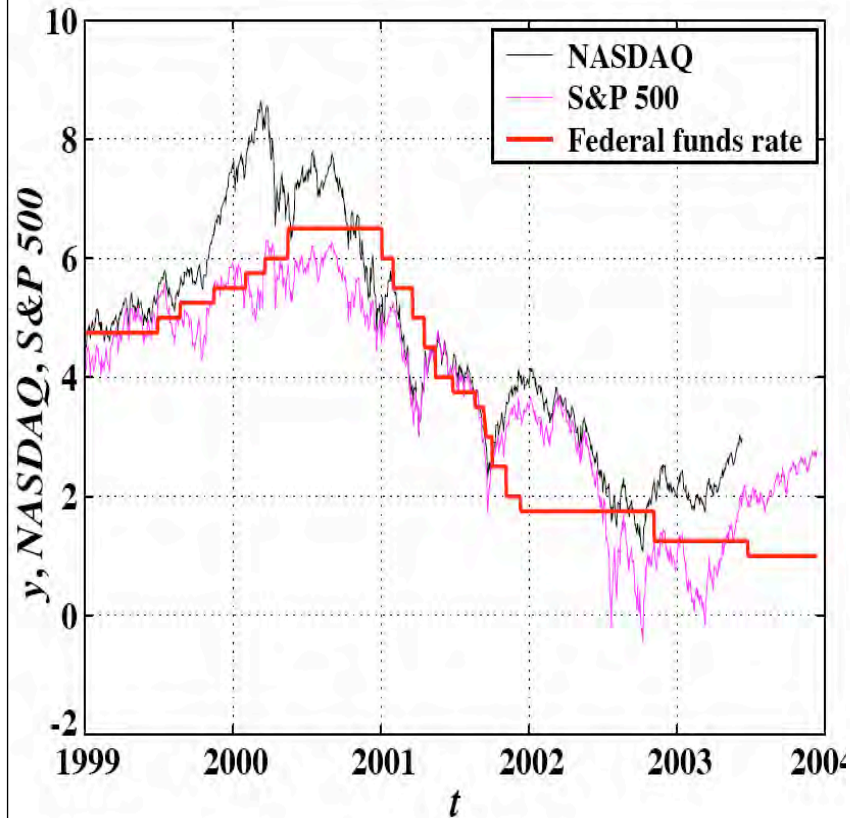


No, Greenspan Was Not Right

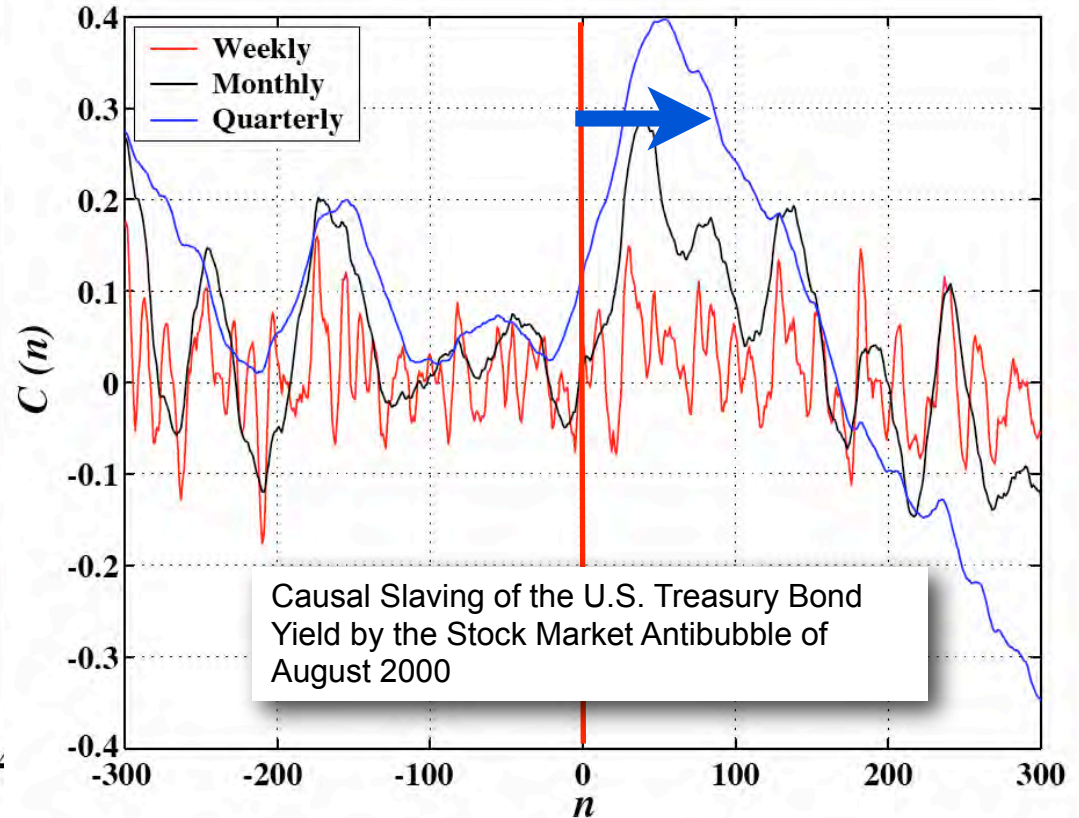


“SLAVING OF THE FED TO THE STOCK MARKET

W.-X. Zhou and D. Sornette, Physica A 337, 586-608 (2004)



Comparison of the Federal funds rate, the S&P 500 Index $x(t)$, and the NASDAQ composite $z(t)$, from 1999 to mid-2003. To allow a illustrative visual comparison, the indices have been translated and scaled as follows: $x \rightarrow 5x - 34$ and $z \rightarrow 10z - 67$.



Cross-correlation coefficient $C(n)$ between the increments of the logarithm of the S&P 500 Index and the increments of the Federal funds rate as a function of time lag n in days. The three curves corresponds to three different time steps used to calculate the increments: weekly, monthly and quarterly. A positive lag n corresponds to having the Federal funds rate posterior to the stock market.

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Real-estate bubbles



Sources: Shiller; BIS.

Real-estate in the UK

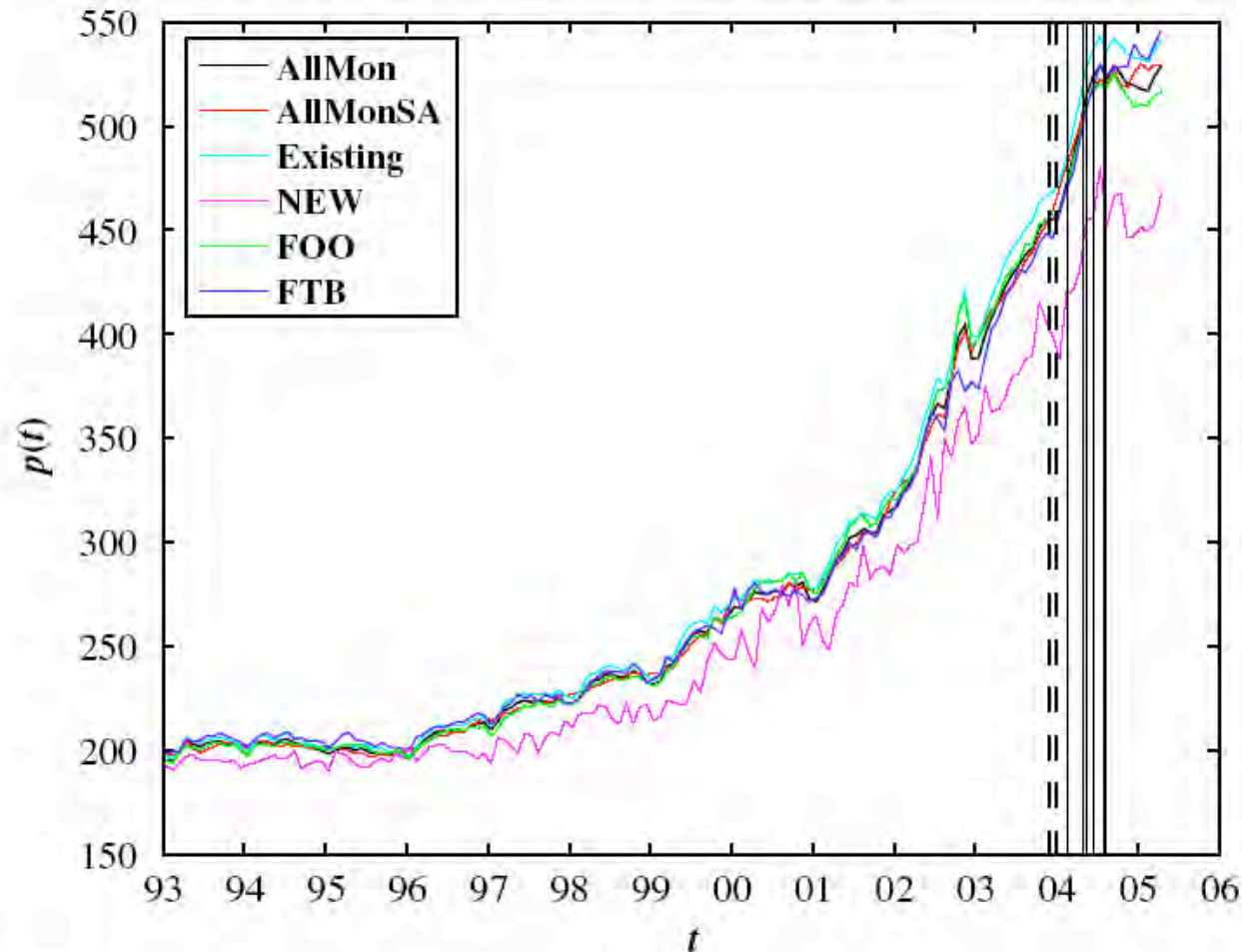


Fig. 1. (Color online) Plot of the UK Halifax house price indices from 1993 to April 2005 (the latest available quote at the time of writing). The two groups of vertical lines correspond to the two predicted turning points reported in Tables 2 and 3 of [1]: end of 2003 and mid-2004. The former (resp. later) was based on the use of formula (2) (resp. (3)). These predictions were performed in February 2003.

Real-estate in the USA

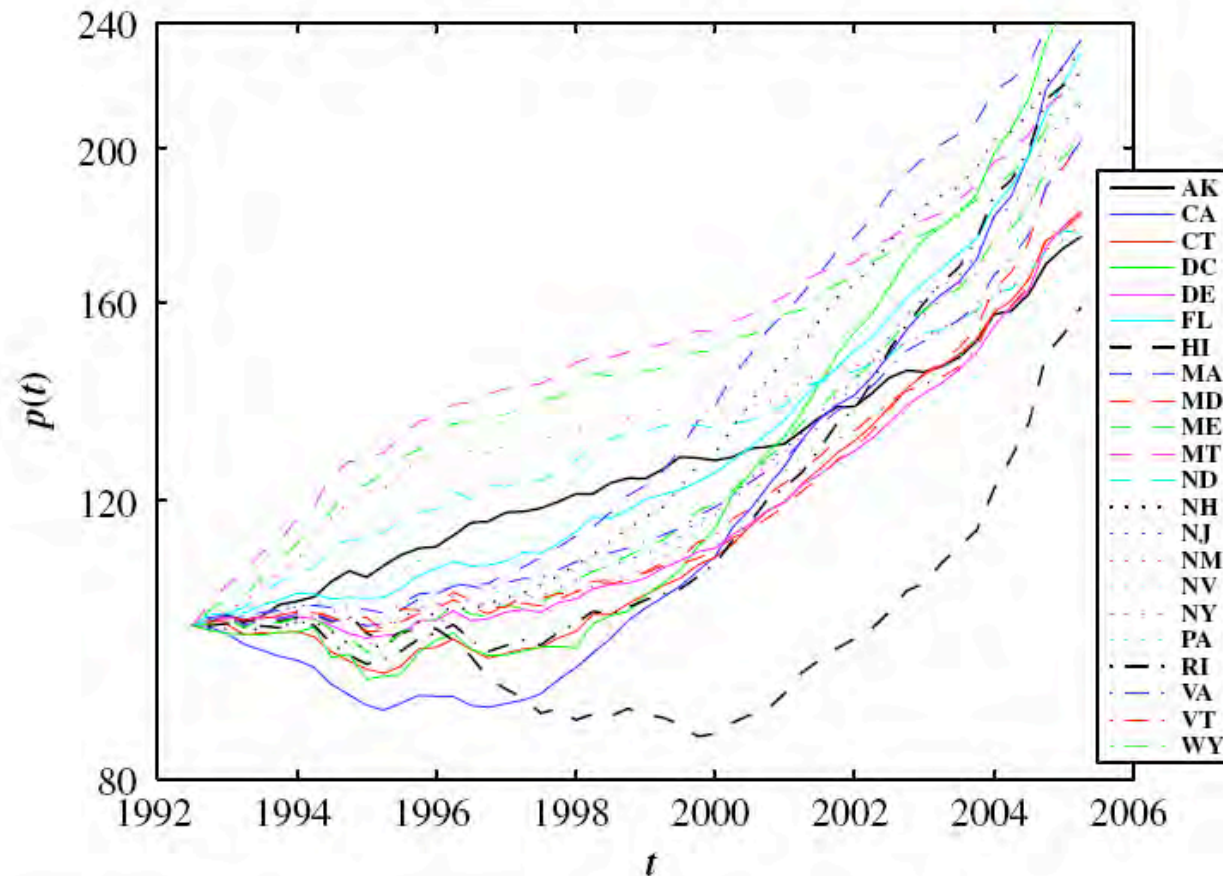
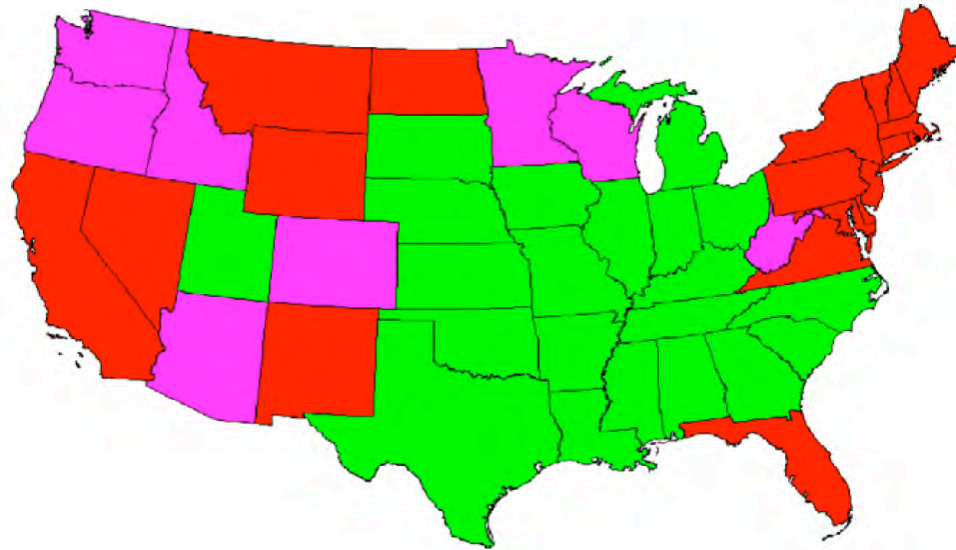
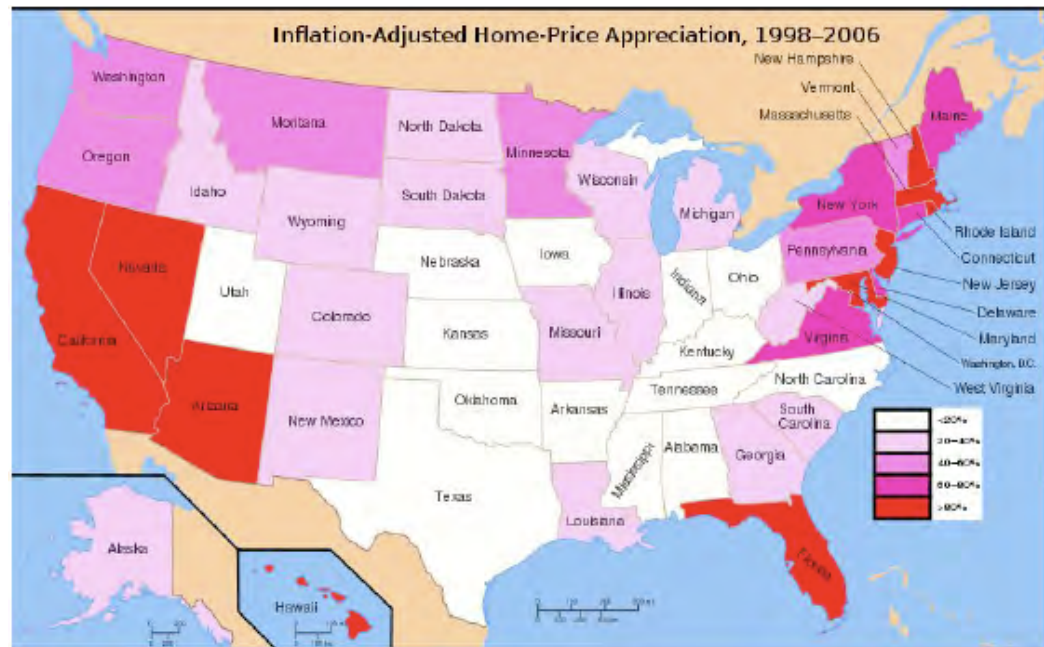


Fig. 5. (Color online) Quarterly average HPI in the 21 states and in the District of Columbia (DC) exhibiting a clear upward faster-than-exponential growth. For better representation, we have normalized the house price indices for the second quarter of 1992 to 100 in all 22 cases. The corresponding states are given in the legend.

Our study in 2005 identifies the bubble states



Local bubbles (Froths) of Housing Markets in US, 1998-2006

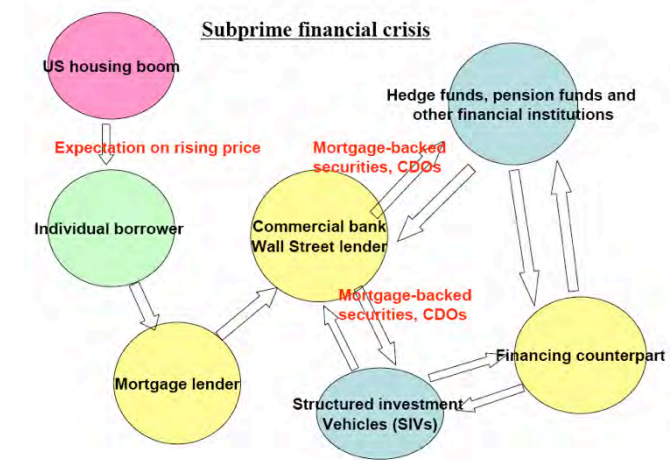
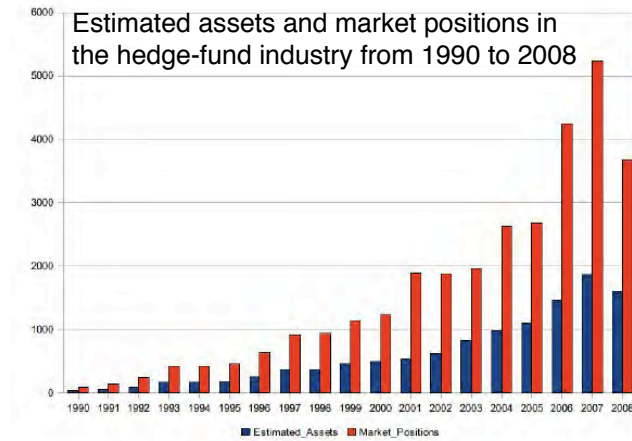


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- **MBS, CDOs bubble (2004-2007)**
- Commodities and Oil bubbles (2006-2008)
- Consequences (deep loss of trust, systemic instability)
- Solutions?

Securitization of non-financial assets (commodities, real-estate, credit)

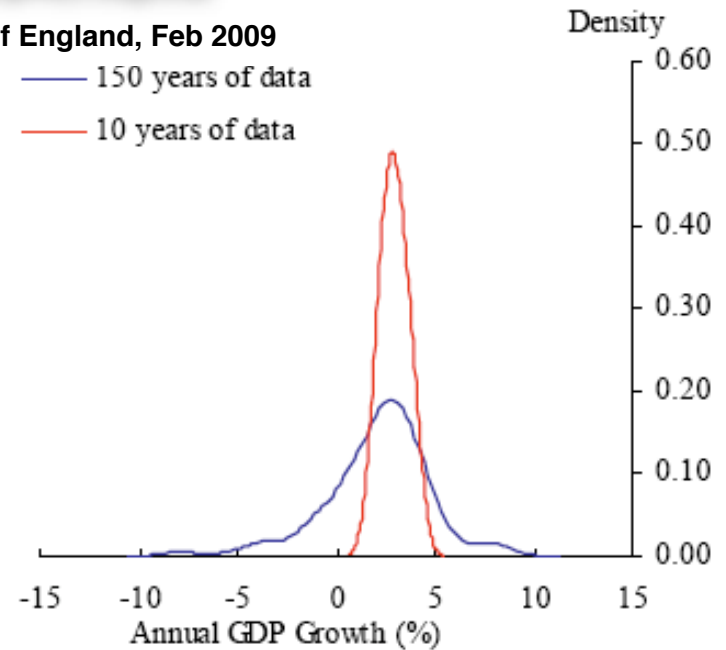
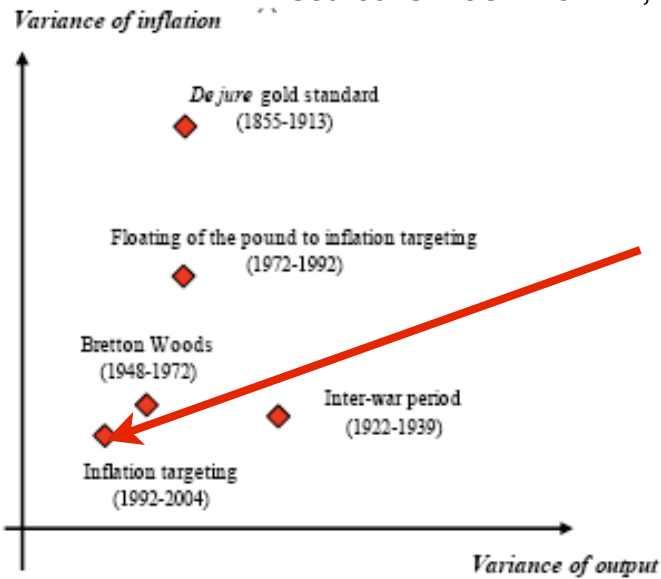
One prominent financial figure held the greatest sway in debates about the regulation and use of derivatives — exotic contracts that promised to protect investors from losses, thereby stimulating riskier practices that led to the [financial crisis](#). For more than a decade, the former [Federal Reserve Chairman Alan Greenspan](#) has fiercely objected whenever derivatives have come under scrutiny in Congress or on Wall Street. “What we have found over the years in the marketplace is that **derivatives have been an extraordinarily useful vehicle to transfer risk from those who shouldn’t be taking it to those who are willing to and are capable of doing so,**” Mr. Greenspan told the Senate Banking Committee in 2003. “We think it would be a mistake” to more deeply regulate the contracts, he added.



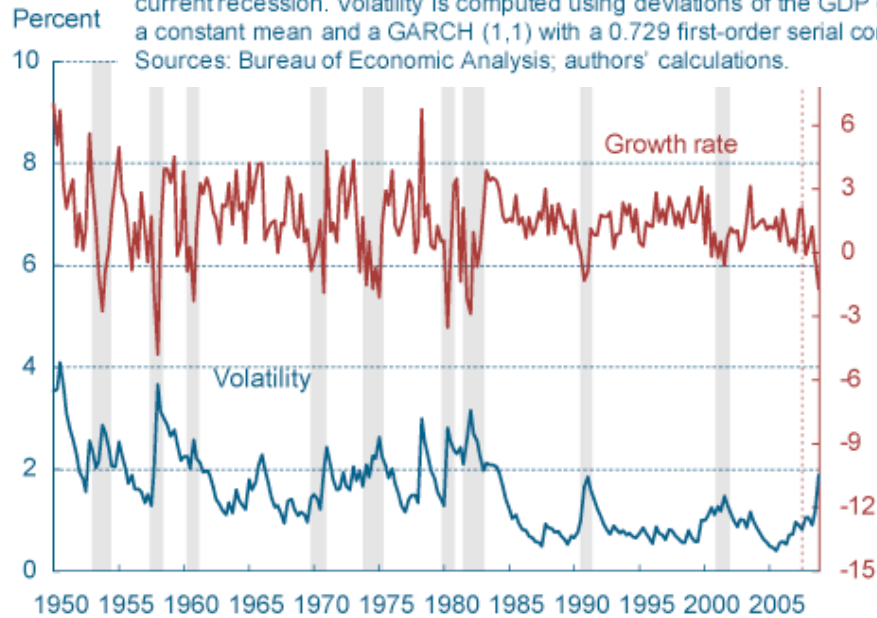
“Not only have individual financial institutions become less vulnerable to shocks from underlying risk factors, but also the financial system as a whole has become more resilient.” — [Alan Greenspan](#) in 2004

THE GREAT MODERATION

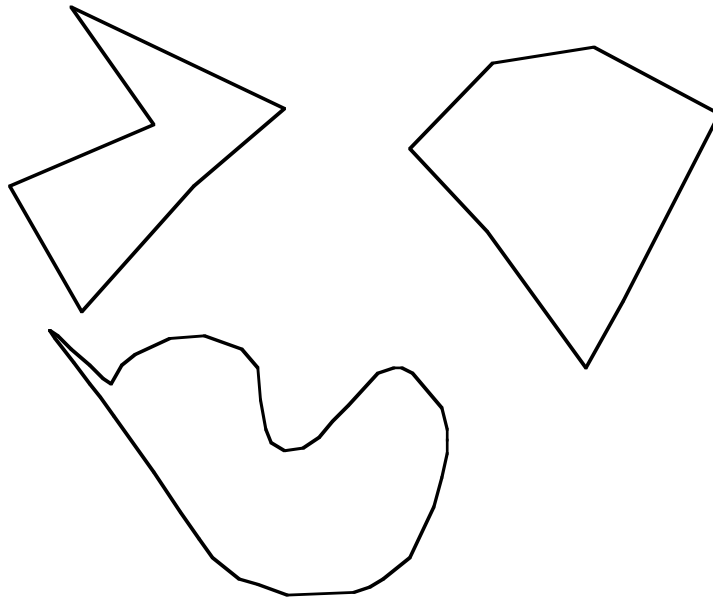
Source: SIR JOHN GIEVE, Deputy Governor, Bank of England, Feb 2009



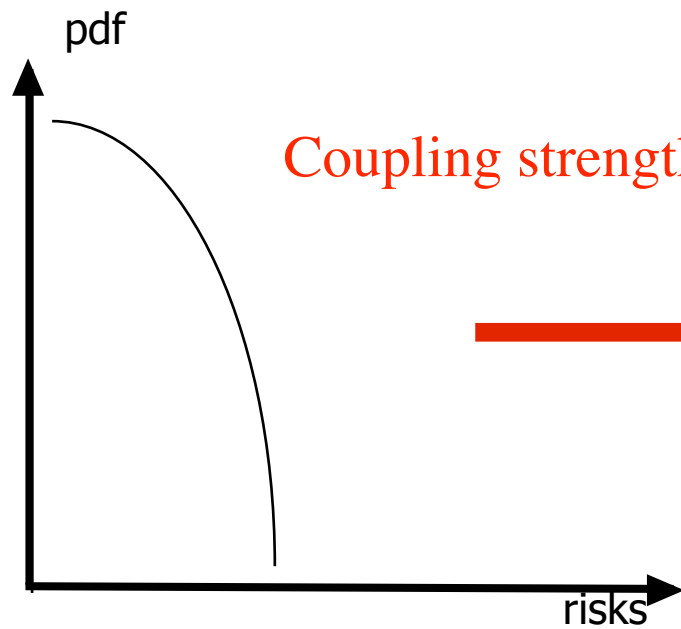
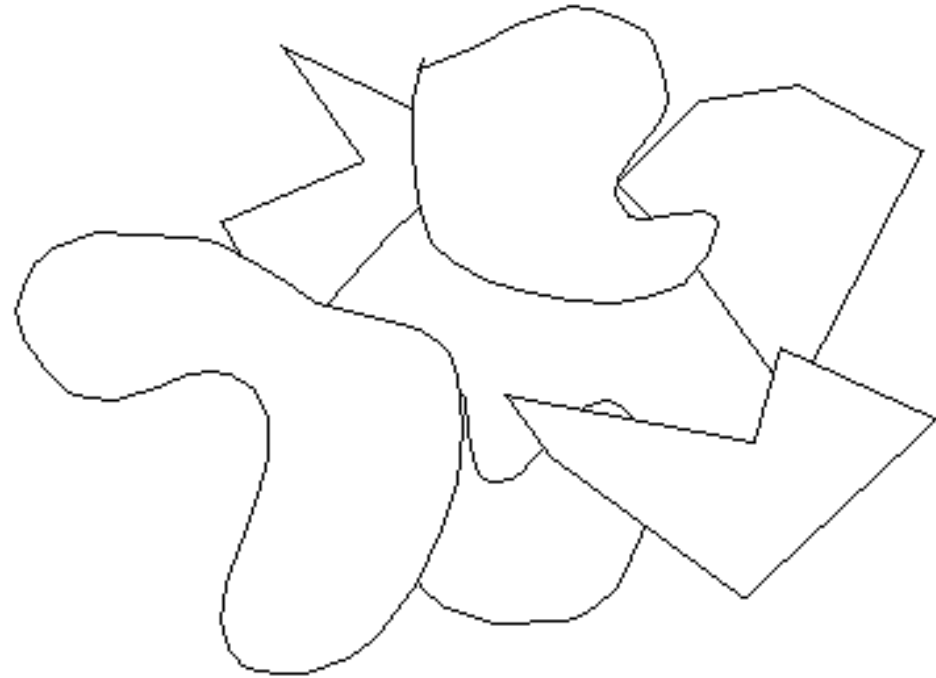
Notes: Shaded bars indicate recessions. The dashed red line indicates the onset of the current recession. Volatility is computed using deviations of the GDP growth rate from a constant mean and a GARCH (1,1) with a 0.729 first-order serial correlation. Sources: Bureau of Economic Analysis; authors' calculations.



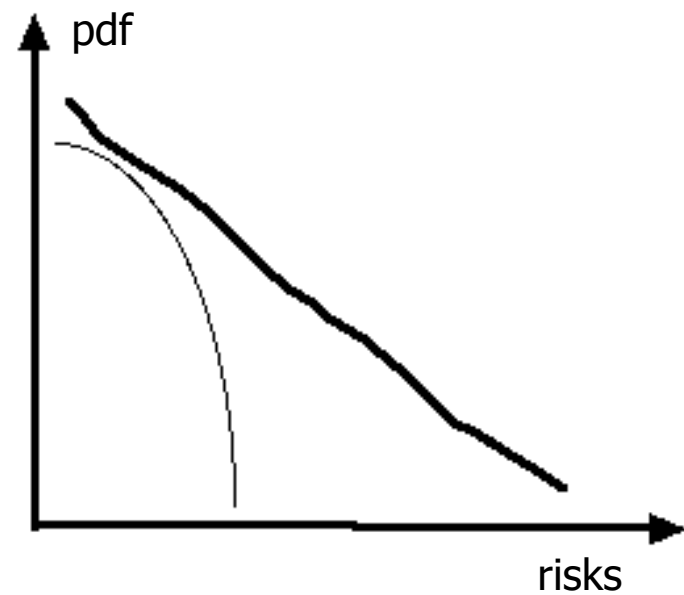
Separation of financial and credit risks



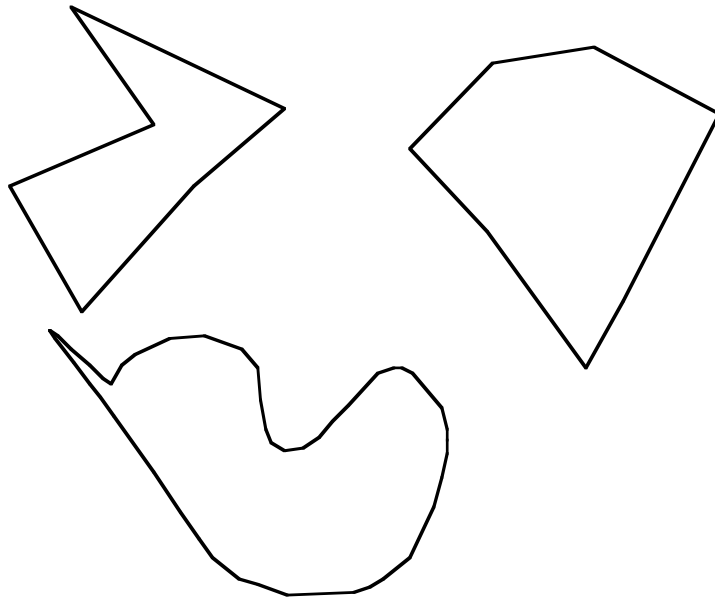
Securitization leads to larger inter-connectivity



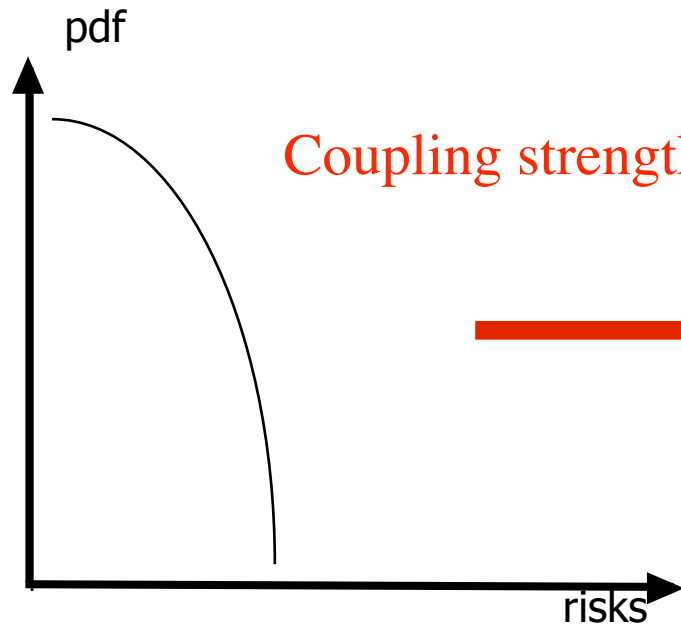
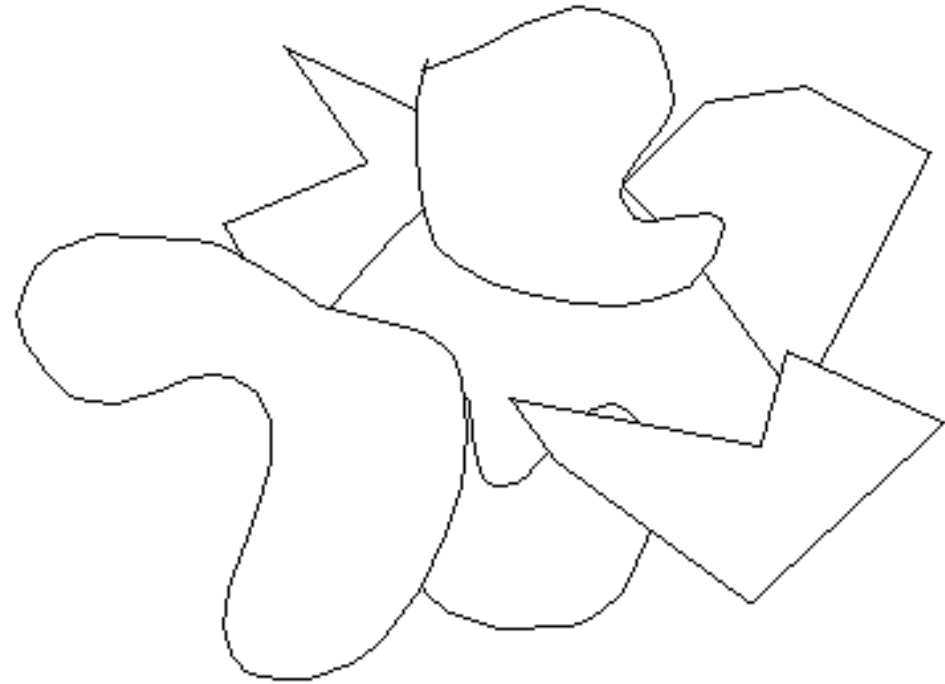
Coupling strength increases



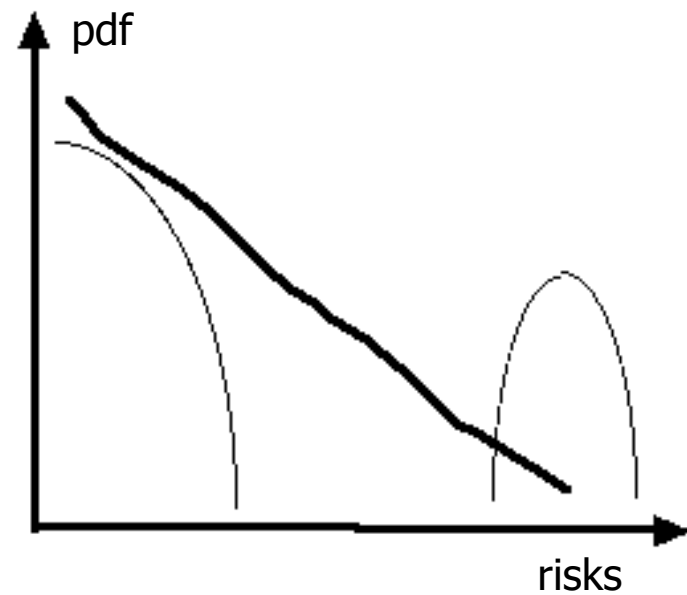
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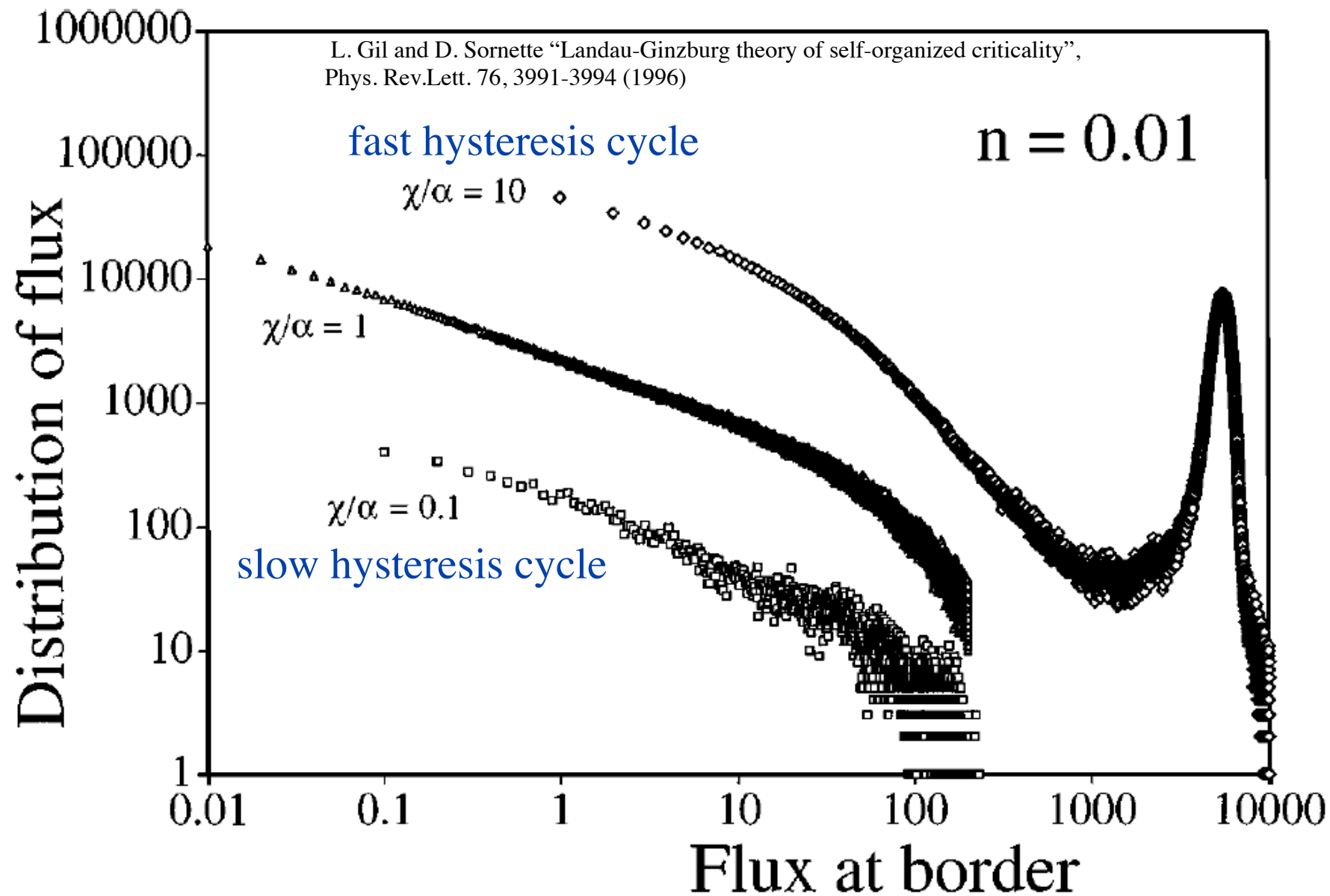


FIG. 3. Distribution $P(J)$ of flux amplitudes at the right border, in the same conditions as for Fig. 1.

Alan the Penitent (23 Oct. 2008)

“I made a mistake in presuming that the self-interests of organizations, specifically banks and others, were such as that they were best capable of protecting their own shareholders and their equity in the firms,” Mr. Greenspan said.

[And the alternative? What should protect the shareholders? The altruism of regulators? Too bad Henry Waxman never has to answer the questions.]

Referring to his free-market ideology, Mr. Greenspan added: “I have found a flaw. I don’t know how significant or permanent it is. But I have been very distressed by that fact.”

Mr. Waxman pressed the former Fed chair to clarify his words. “In other words, you found that your view of the world, your ideology, was not right, it was not working,” Mr. Waxman said.

“Absolutely, precisely,” Mr. Greenspan replied. “You know, that’s precisely the reason I was shocked, because I have been going for 40 years or more with very considerable evidence that it was working exceptionally well.”

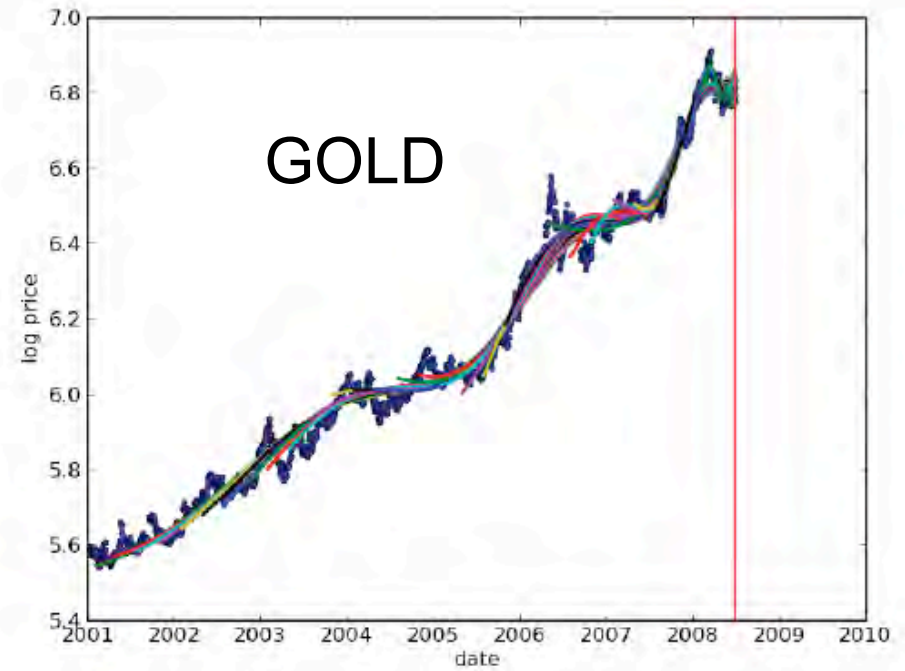
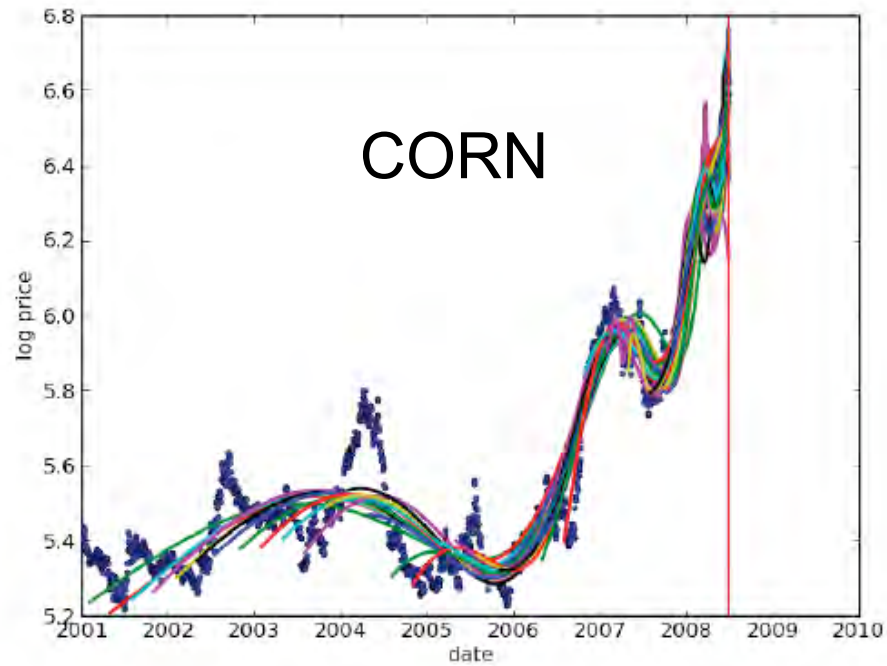
GENERIC PROBLEM IN RISK MANAGEMENT

No one see any pressing need to ask hard questions about the sources of profits when things are doing well.

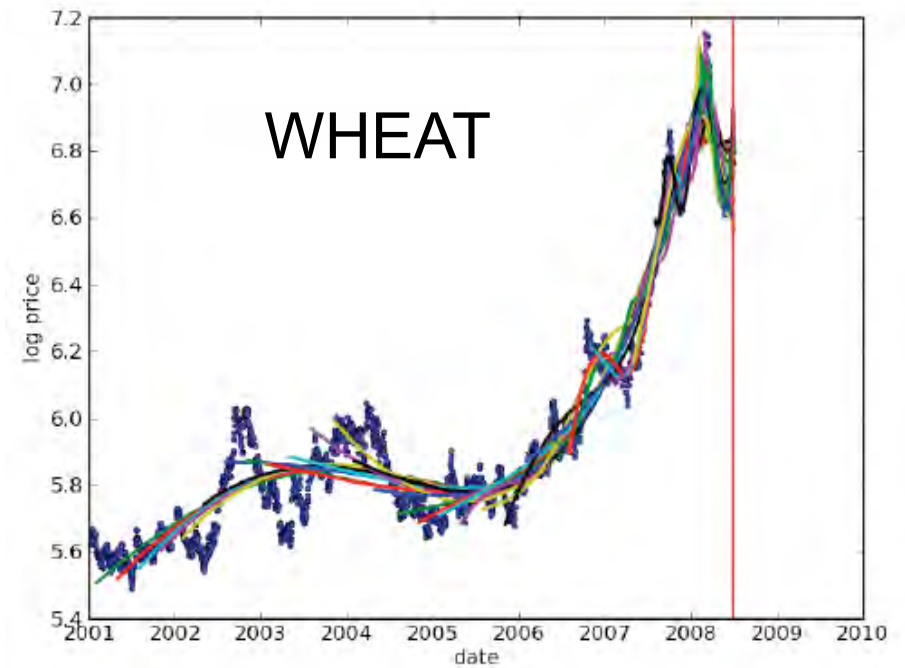
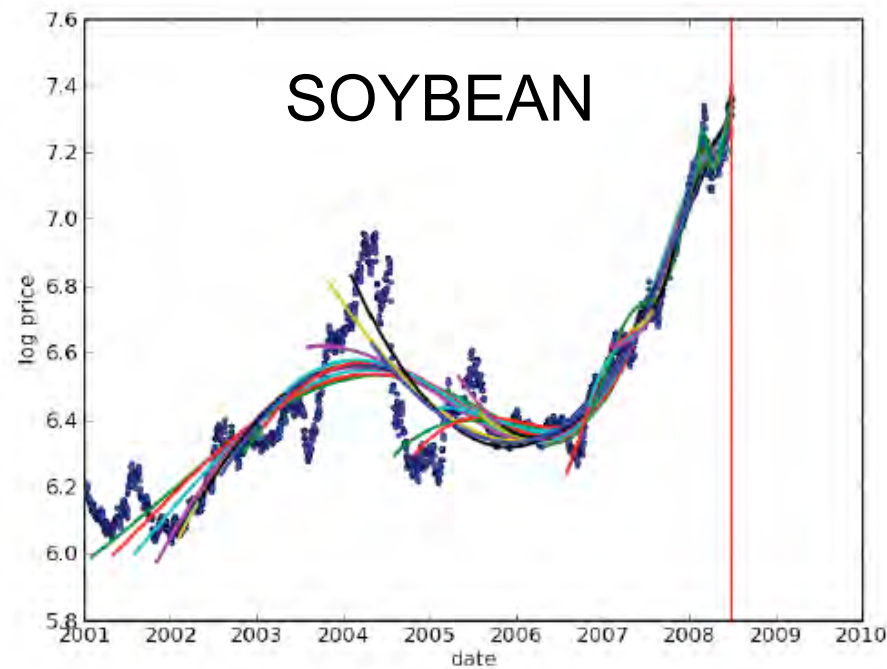
A 15y History of the 2008- crisis

- The ITC “new economy” bubble (1995-2000)
- Slaving of the Fed monetary policy to the stock market descent (2000-2003)
- Real-estate bubbles (2003-2006)
- MBS, CDOs bubble (2004-2007)
- **Commodities and Oil bubbles (2006-2008)**
- Consequences (deep loss of trust, systemic instability)
- Solutions?

source: R. Woodard

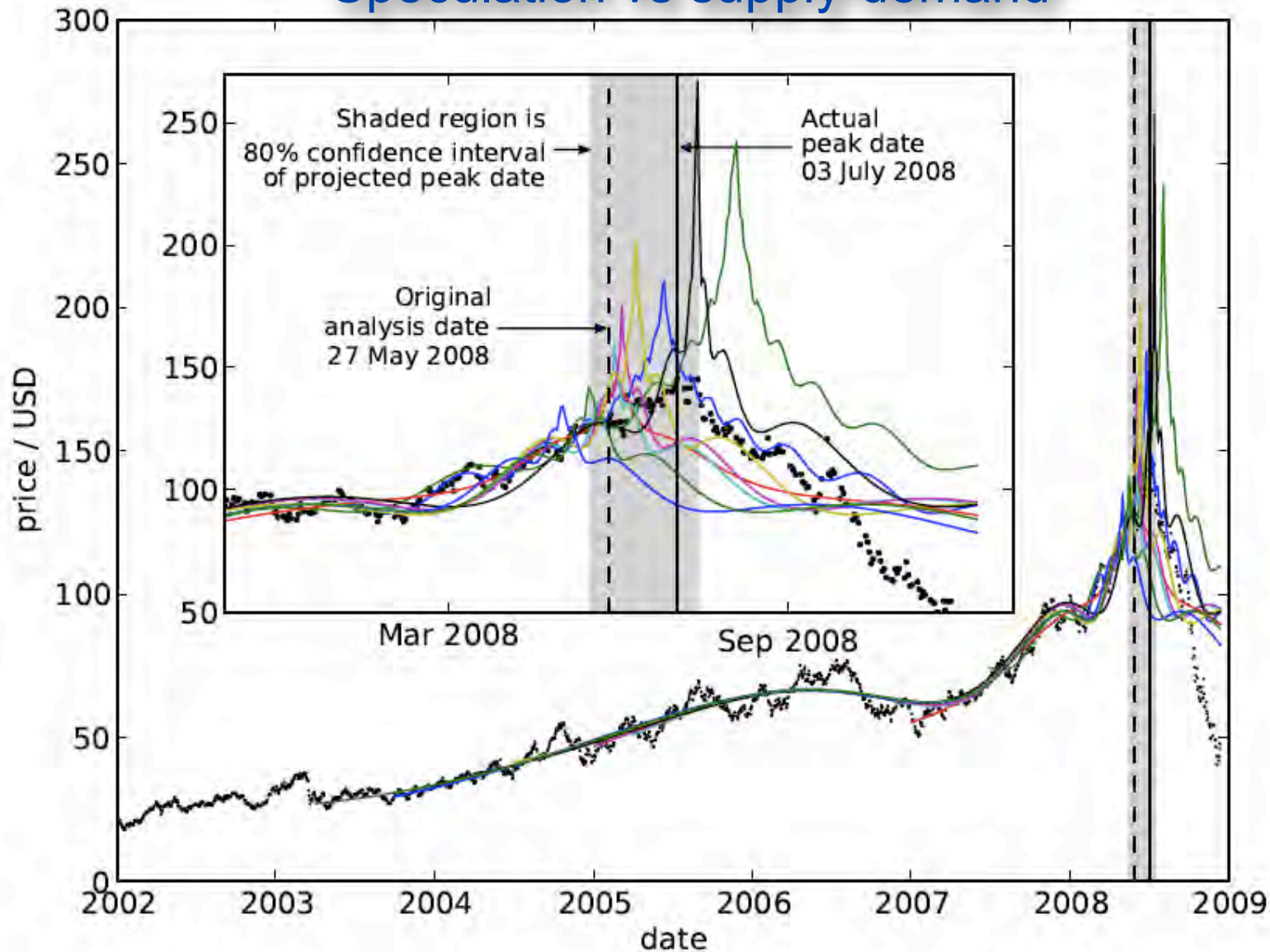


R.Woodard and D.Sornette (2008)



2006-2008 Oil bubble

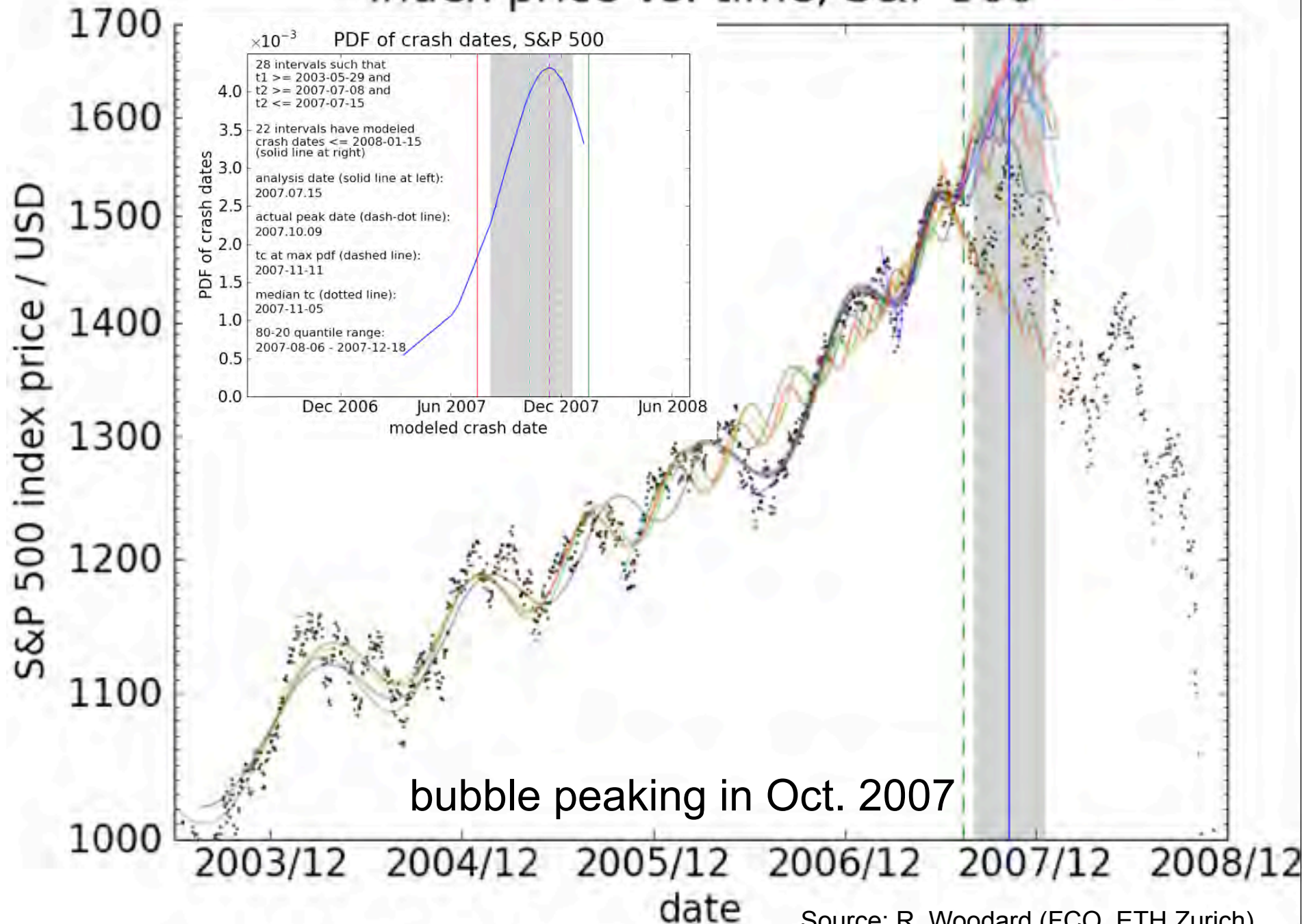
Speculation vs supply-demand



D. Sornette, R. Woodard and W.-X. Zhou, The 2006-2008 Oil Bubble and Beyond, *Physica A* 388, 1571-1576 (2009) (arXiv.org/abs/0806.1170)

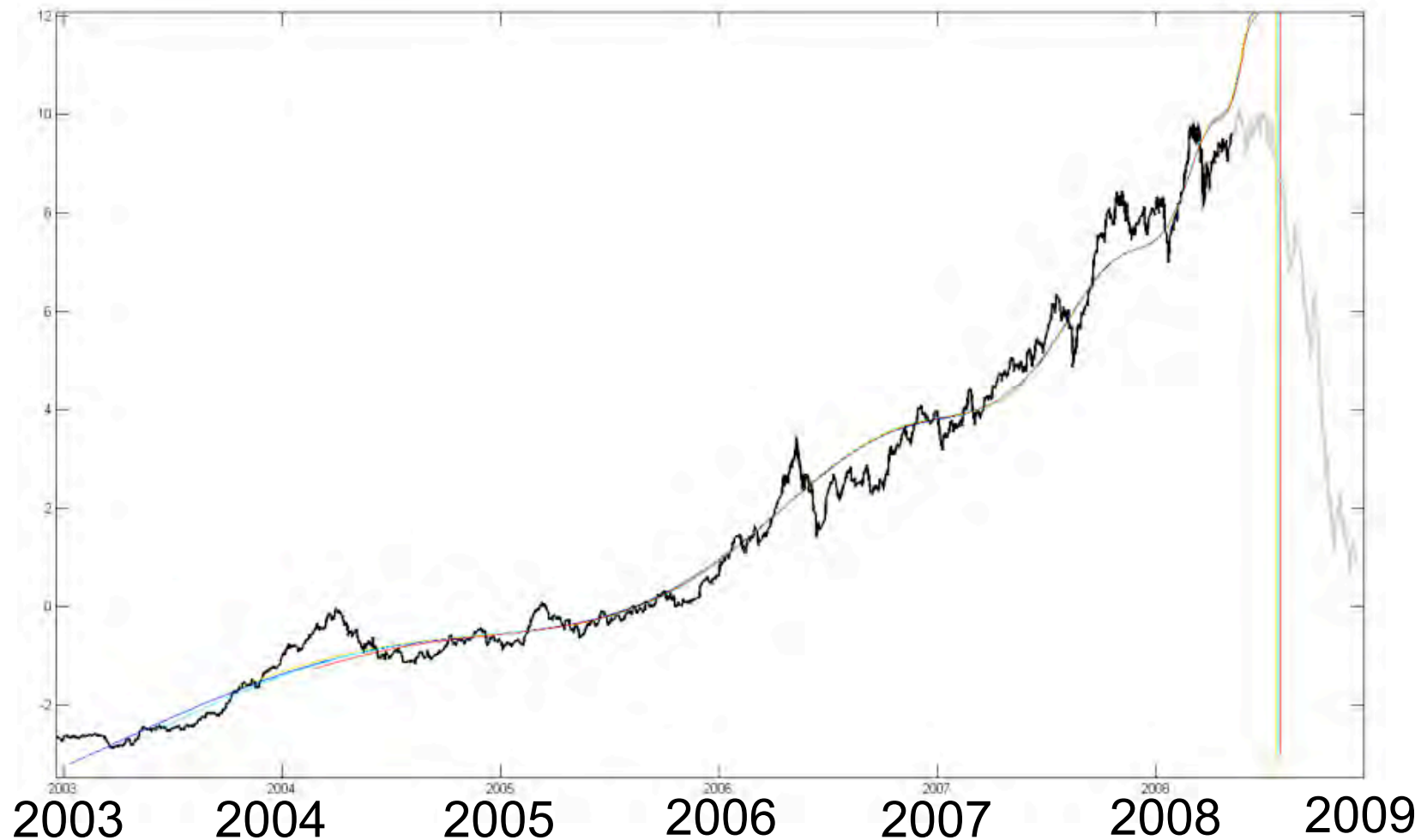
Typical result of the calibration of the simple LPL model to the oil price in US\$ in shrinking windows with starting dates t_{start} moving up towards the common last date $t_{\text{last}} = \text{May 27, 2008}$.

Index price vs. time, S&P 500



Source: R. Woodard (FCO, ETH Zurich)

The Global BUBBLE



PCA first component on a data set containing, emerging markets equity indices, freight indices, soft commodities, base and precious metals, energy, currencies...

(Peter Cauwels FORTIS BANK - Global Markets)

In summary

Each excess is partially “solved” by the subsequent excess... leading to a succession of

- unsustainable wealth growth
- instabilities

The present crisis+recession is the consolidation after this series of unsustainable excesses.

One could conclude that the extraordinary severity of this crisis is not going to be solved by the same of implicit or explicit “bubble thinking”.

"The problems that we have created cannot be solved at the level of thinking that created them." Albert Einstein

Recession-Plagued Nation Demands New Bubble To Invest In

The Onion, JULY 14, 2008 | ISSUE 44•29 (satirical american journal)



A prominent finance expert asks Congress to help Americans rebuild their fictitious dreams.

"Every American family deserves a false sense of security," said Chris Repto, a risk analyst for Citigroup in New York. "Once we have a bubble to provide a fragile foundation, we can begin building pyramid scheme on top of pyramid scheme, and before we know it, the financial situation will return to normal."

- Taking risks while not supporting its consequences
- Many instances (insurance, information asymmetry, principal agent problem...)
- Russian Brady bonds (1990-1998)
- Singapore Management director at Arthur Andersen
- One of the causes of the present crisis

12/12/2008 \$50 Billion Fraud Charge: Madoff's 'Big Lie' Hits Hedge Funds Fairfield Sentry, Kingate From [Bloomberg](#)



"The existence of large trust fund balances (2.4 trillions dollars) ... does not, by itself, increase the government's ability to pay benefits. Put differently, these trust fund balances are assets of the program agencies and corresponding liabilities of the Treasury, netting to zero for the government as a whole." Federal Budget document (2009)

+100 trillion liability!

Questions?

- How to measure risks? Illusion of low risks...
- Moral hazard and conflict of interest
- Development of culture of integrity and ethical behavior (informed by behavioral psychology)
- Melting the cash-flow freeze (ex: WIR direct network banking in Switzerland (www.wir.ch))
- Preventing other financial bubbles: a new definition of inflation for macro and monetary policies (Financial Ratio Index (FRI), total fixed assets + working capital, excess supply of money...)
- Regulations: illusion of control and law of unintended consequences
- How to preserve innovations/creativity while mastering instabilities?

- **Fundamental error: “perpetual money machine”**
(overgrowth of the “financial economy” versus the “real economy”)
- **Encouraging over-spending to solve a crisis due to over-spending?**
- **Melting the cash-flow freeze (ex: WIR direct network banking in Switzerland (www.wir.ch))**
- **Long-term growth based on returning to fundamentals** (human capital, infrastructure promoting new innovations and growth...)
- **Novel opportunities for innovation and Earth sustainability**
- **Preventing other financial bubbles: a new definition of inflation** (Financial Ratio Index (FRI), total fixed assets + working capital, excess supply of money...)

Why bubbles are not arbitrated away?

1. limits to arbitrage caused by noise traders (DeLong et, 1990)
2. limits to arbitrage caused by synchronization risk (Abreu and Brunnermeier, 2002 and 2003)
3. short-sale constraints (many papers)
4. lack of close substitutes for hedging (many papers)
5. heterogenous beliefs (many papers)
6. lack of higher-order mutual knowledge (Allen, Morris and Postlewaite, 1993)
7. delegated investments (Allen and Gorton, 1993)
8. psychological biases (observed in many experiments)
9. positive feedback bubbles

a Financial Crisis Observatory

ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

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ETH Zurich - D-MTEC - Welcome to the Chair of Entrepreneurial Risks - Financial Crisis Observatory

Financial Crisis Observatory

Financial Crisis Observatory

Description

Highlights

Is there an oil bubble?

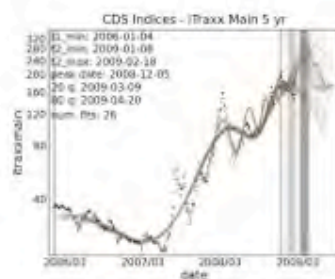
Pertinent articles

Websites and Blogs

Market Anxiety Measures

The Financial Crisis Observatory (FCO) is a scientific platform aimed at testing and quantifying rigorously, in a systematic way and on a large scale the hypothesis that financial markets exhibit a degree of inefficiency and a potential for predictability, especially during regimes when bubbles develop.

Current analysis and forecasts



CDS (19 February 2009)

Our analysis has been performed on data kindly provided by Amjed Younis of Fortis on 19 February 2009. It consists of 3 data sets: credit default swaps (CDS); German bond futures prices; and spread evolution of several key euro zone sovereigns. The date range of the data is between 4 January 2006 and 18 February 2009. Our log-periodic power law (LPPL) analysis shows that credit default swaps appear bubbly, with a projected crash window of March-May, depending on the index used. German bond futures and European sovereign spreads do not appear bubbly. (See [report](#) for more information.)

OIL (27 May 2008)

Oil prices exhibited a record rise followed by a spectacular crash in 2008. The peak of \$145.29 per barrel was set on 3 July 2008 and a recent low of \$40.81 was scraped on 5 December, a level