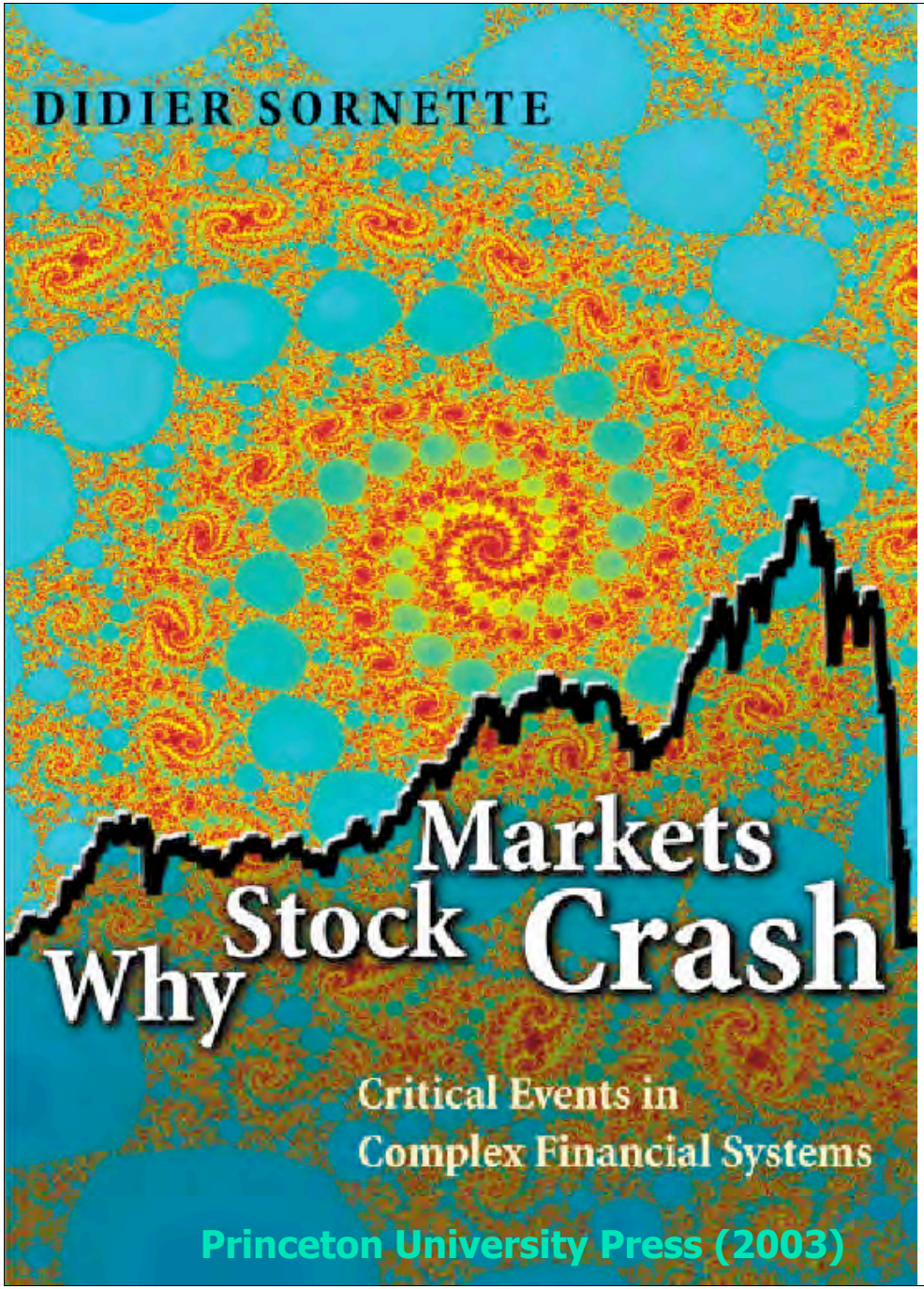

DEBUNKING THE 2008 FINANCIAL CRISIS

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Y. Malevergne (Univ. Lyon, France)
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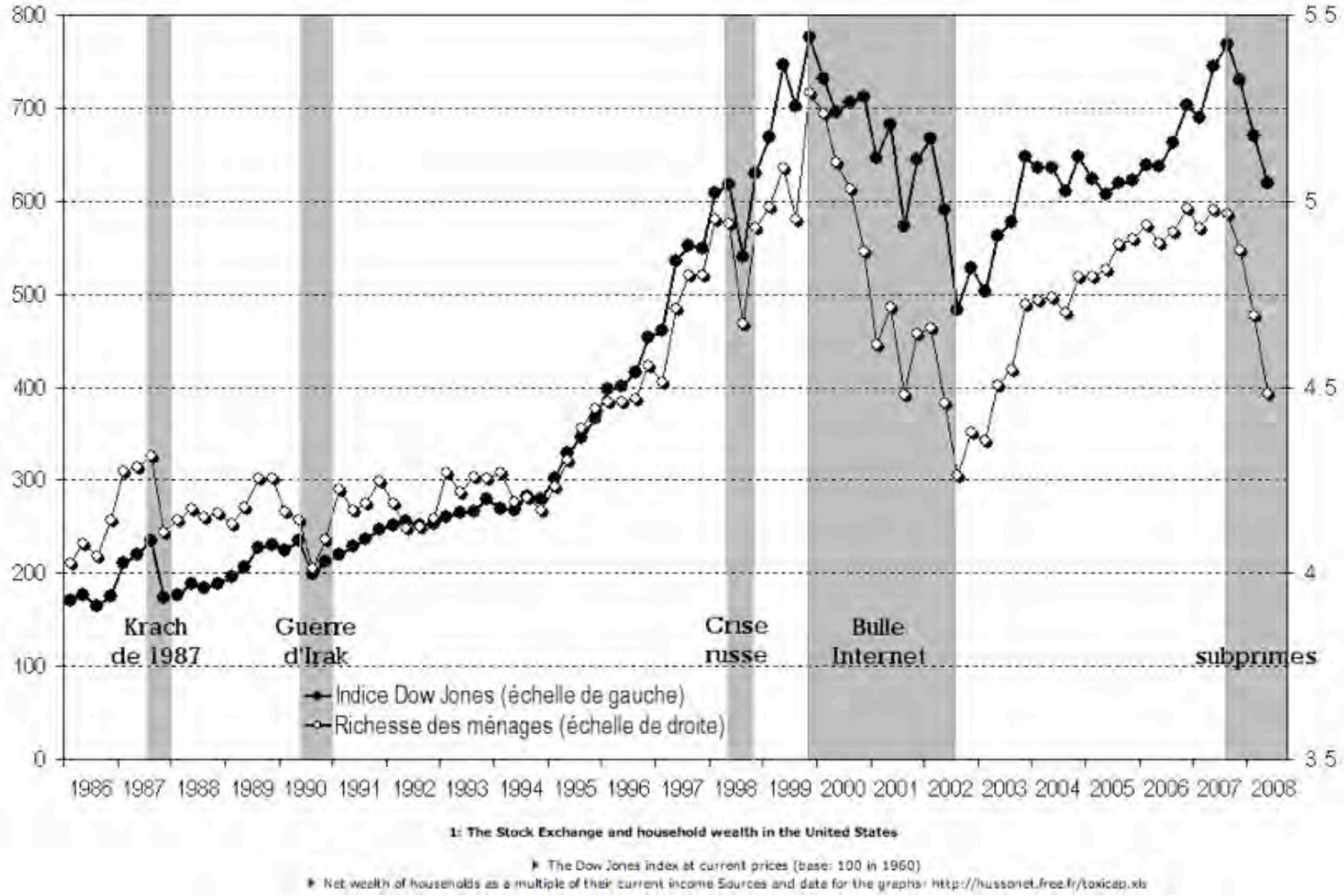
W. Yan (ETH Zurich)
A. Huesler (ETH Zurich)
M. Fedorovsky (ETH Zurich)
S. Reimann (ETH Zurich)

A 13y History of the 2008 crisis

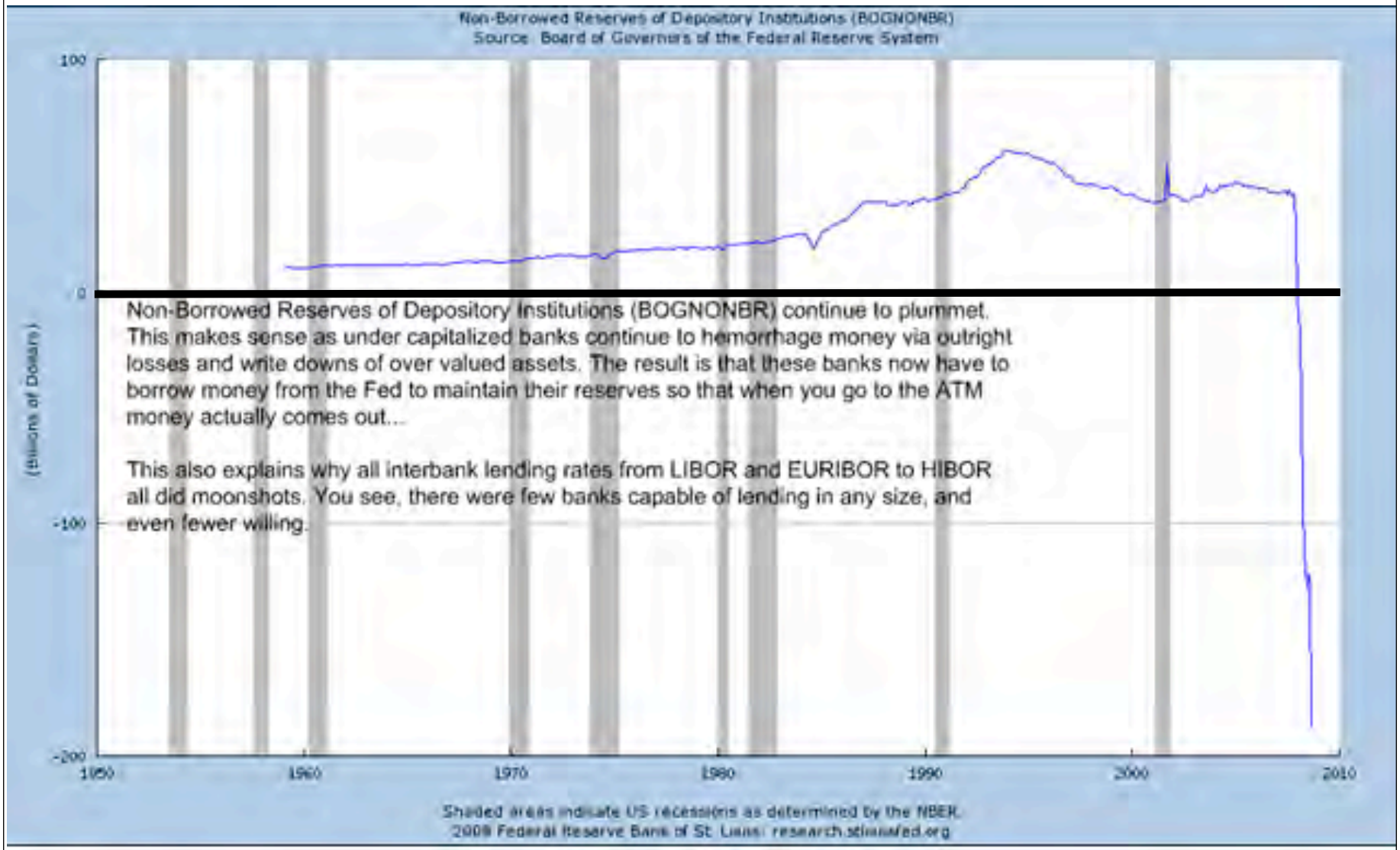
- The ITC “new economy” bubble (1995-2000)
- Slaving of the Fed monetary policy to the stock market descent (2000-2003)
- Real-estate bubbles (2003-2006)
- MBS, CDOs bubble (2004-2007) and stock market bubble (2004-2007)
- Commodities and Oil bubbles (2006-2008) Consequences (deep loss of trust, systemic instability)
- Solution? Financial Ratio Index $(FRI)_2$



1: The Stock Exchange and household wealth in the United States

- The Dow Jones index at current prices (base: 100 in 1960)
- Net wealth of households as a multiple of their current income Sources and date for the graphs: http://hussonet.free.fr/toxicap.xls

source: Michel Husson


Non-Borrowed Reserves of Depository Institutions (BOGNONBR)
Source: Board of Governors of the Federal Reserve System
100
0
-100
-200
(Billions of Dollars)
1950
1960
1970
1980
1990
2000
2010
Non-Borrowed Reserves of Depository Institutions (BOGNONBR) continue to plummet. This makes sense as under capitalized banks continue to hemorrhage money via outright losses and write downs of over valued assets. The result is that these banks now have to borrow money from the Fed to maintain their reserves so that when you go to the ATM money actually comes out...
This also explains why all interbank lending rates from LIBOR and EURIBOR to HIBOR all did moonshots. You see, there were few banks capable of lending in any size, and even fewer willing.
Shaded areas indicate US recessions as determined by the NBER.
2009 Federal Reserve Bank of St. Louis: research.stlouisfed.org

THE NASDAQ CRASH OF APRIL 2000

"New Economy": ICT

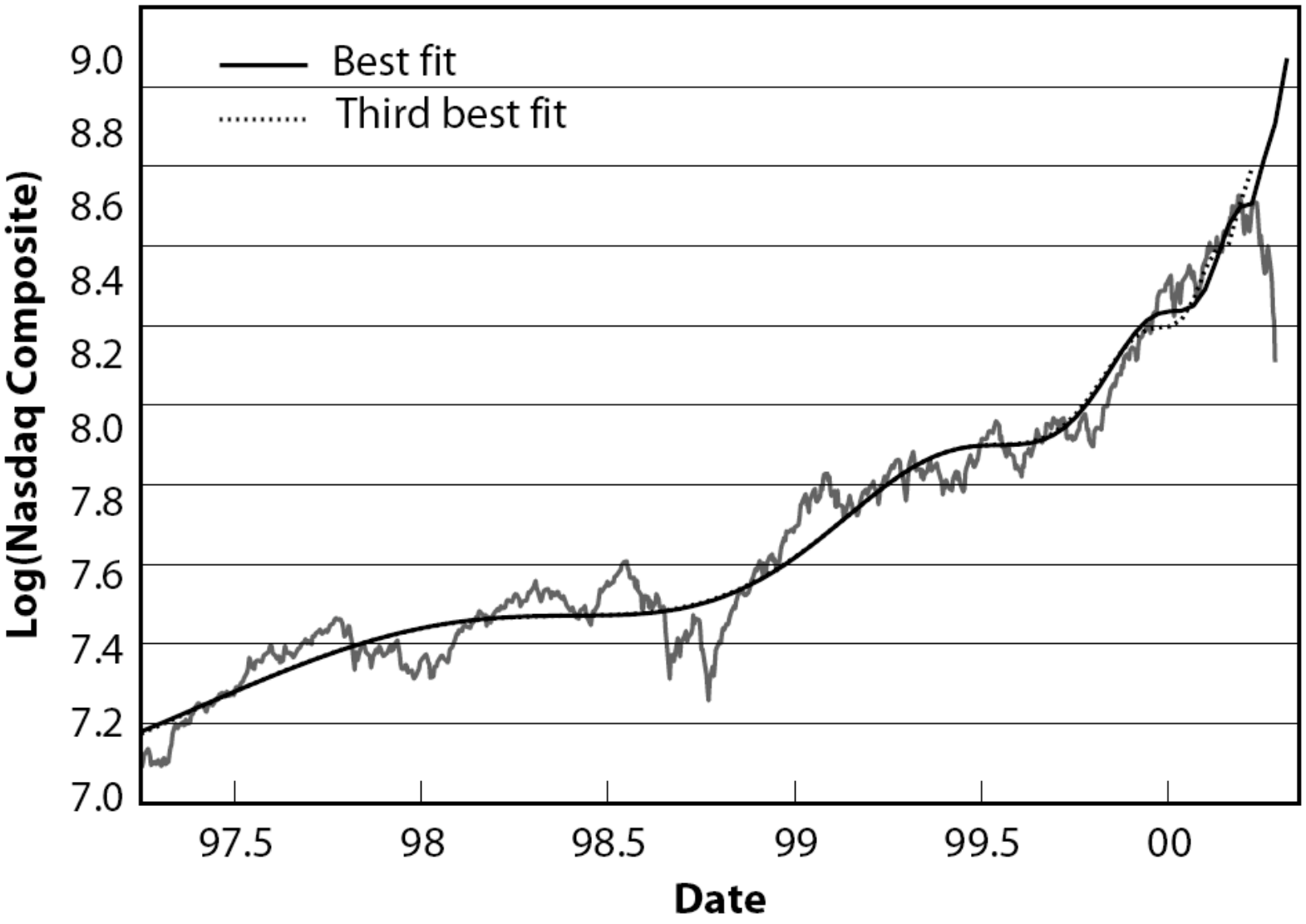
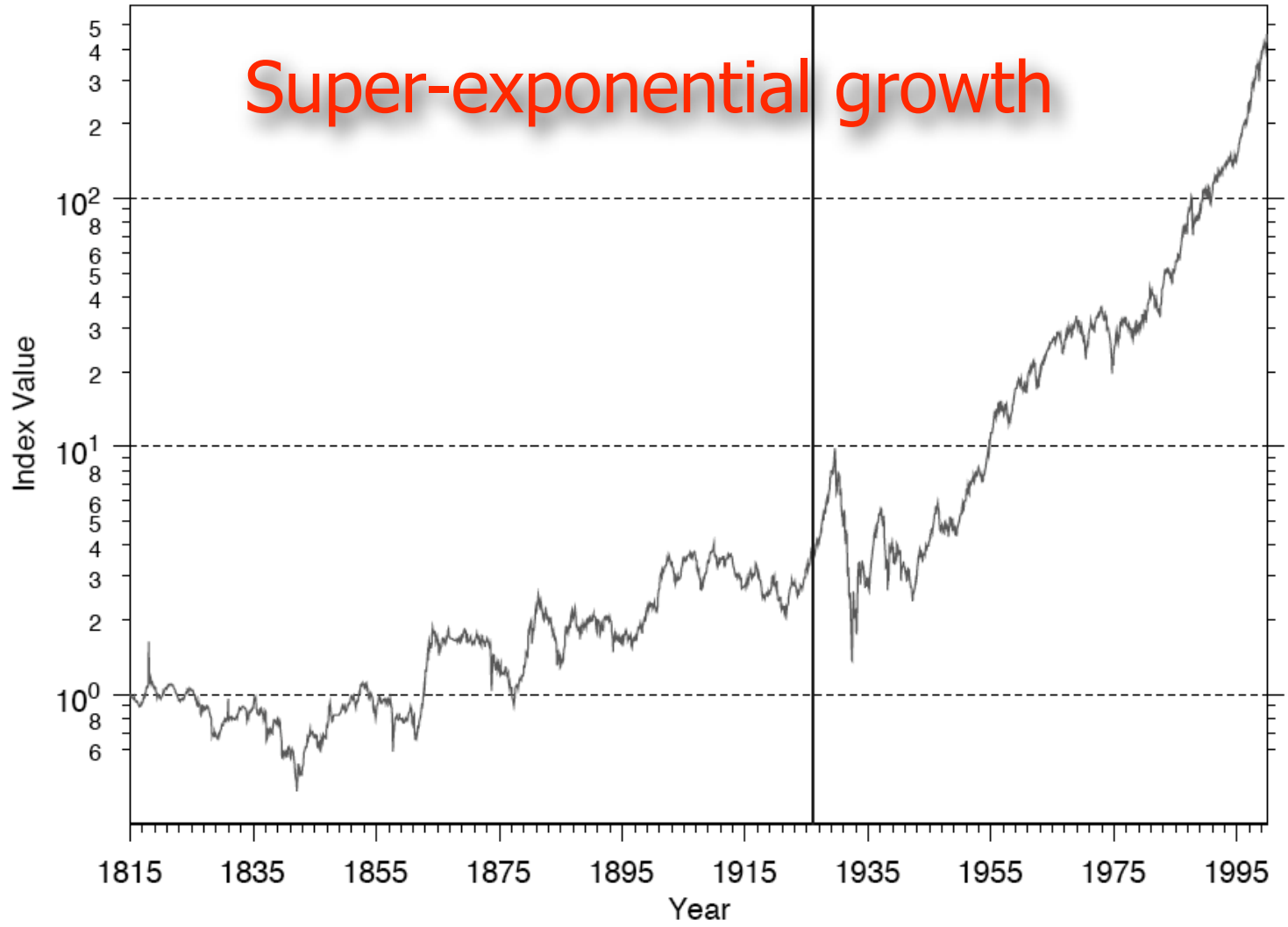


Figure 1: Monthly Capital Appreciation Index 1/1815-12/1999



Price-weighted NYSE Index (1/1815-12/1925) with Ibbotson and Sinquefield Index (1/1926-12/1999)

A NEW HISTORICAL DATABASE FOR THE NYSE 1815 TO 1925: PERFORMANCE AND PREDICTABILITY

W.N. Goetzmann, R.G. Ibbotson and L. Peng
Yale School of Management, July 14, 2000

Foreign capital inflow

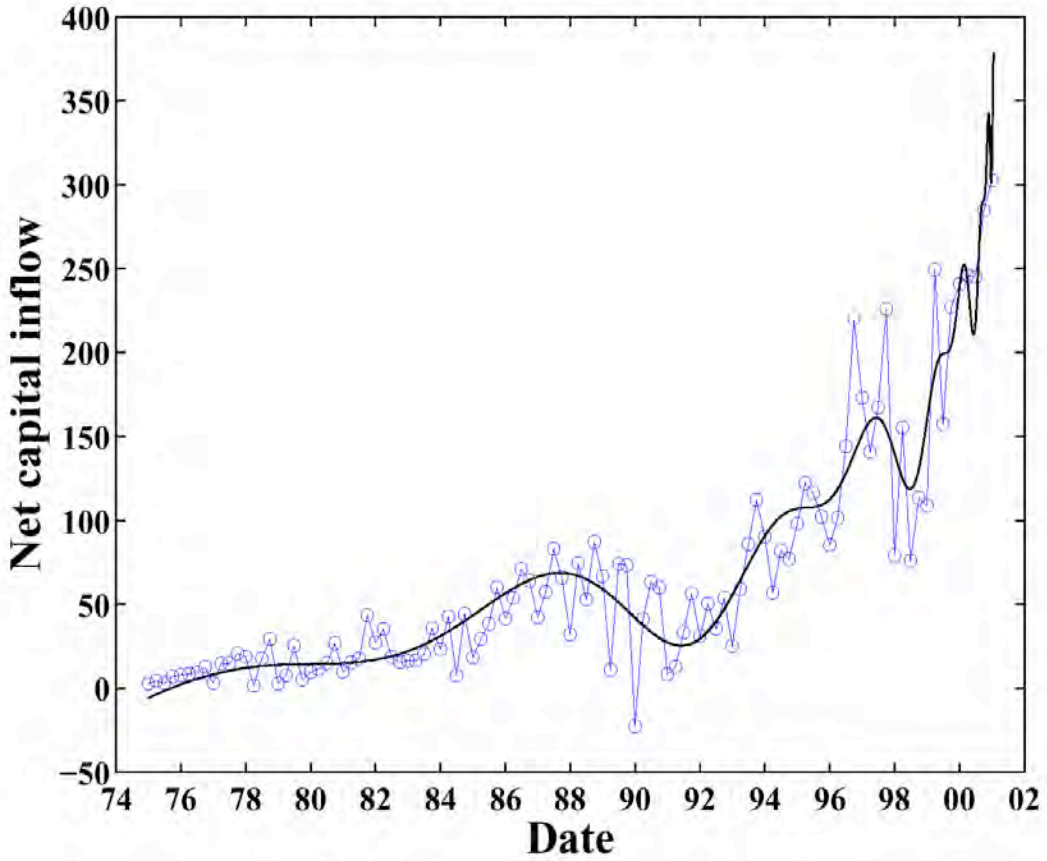


Fig. 2. Fit of the time evolution of the foreign net capital inflow $I(t)$ in the USA from 1975 till the first quarter of 2001 when it reached its maximum, by a second-order Weierstrass-type function given by expression (1). The predicted critical time is $t_c = 2001/03/12$, the power-law exponent is $m = 0.01$, and the angular log-frequency is $\omega = 4.9$. The fitted linear parameters are $A = 7355$, $B = -6719$, $C_1 = 21.5$ and $C_2 = 16.2$. The r.m.s. of the residuals of the fit is 22.810.

THE NASDAQ CRASH OF APRIL 2000

•1995-2000: growing divergence between New Economy and Old Economy stocks, between technology and almost everything else.

•Over 1998 and 1999, stocks in the Standard & Poor's technology sector rose nearly fourfold, while the S&P 500 index gained just 50%. And without technology, the benchmark would be flat.

•In January 2000 alone, 30% of net inflows into mutual funds went to science and technology funds, versus just 8.7% into S&P 500 index funds.

•The average price-over-earnings ratio (P/E) for Nasdaq companies was above 200.

•New Economy was also hot in the minds and mouths of investors in the 1920s and in the early 1960s. In 1929, it was utilities; in 1962, it was the electronic sector.

EXPECTATIONS of strong future growth

- better business models (small required capital, reduced delay in payments…)
- the network effect (positive returns and positive feedbacks)
- first-to-scale advantages
- real options (value of fast adaptation to grasp new opportunities)

Probably true… but problem of timing…

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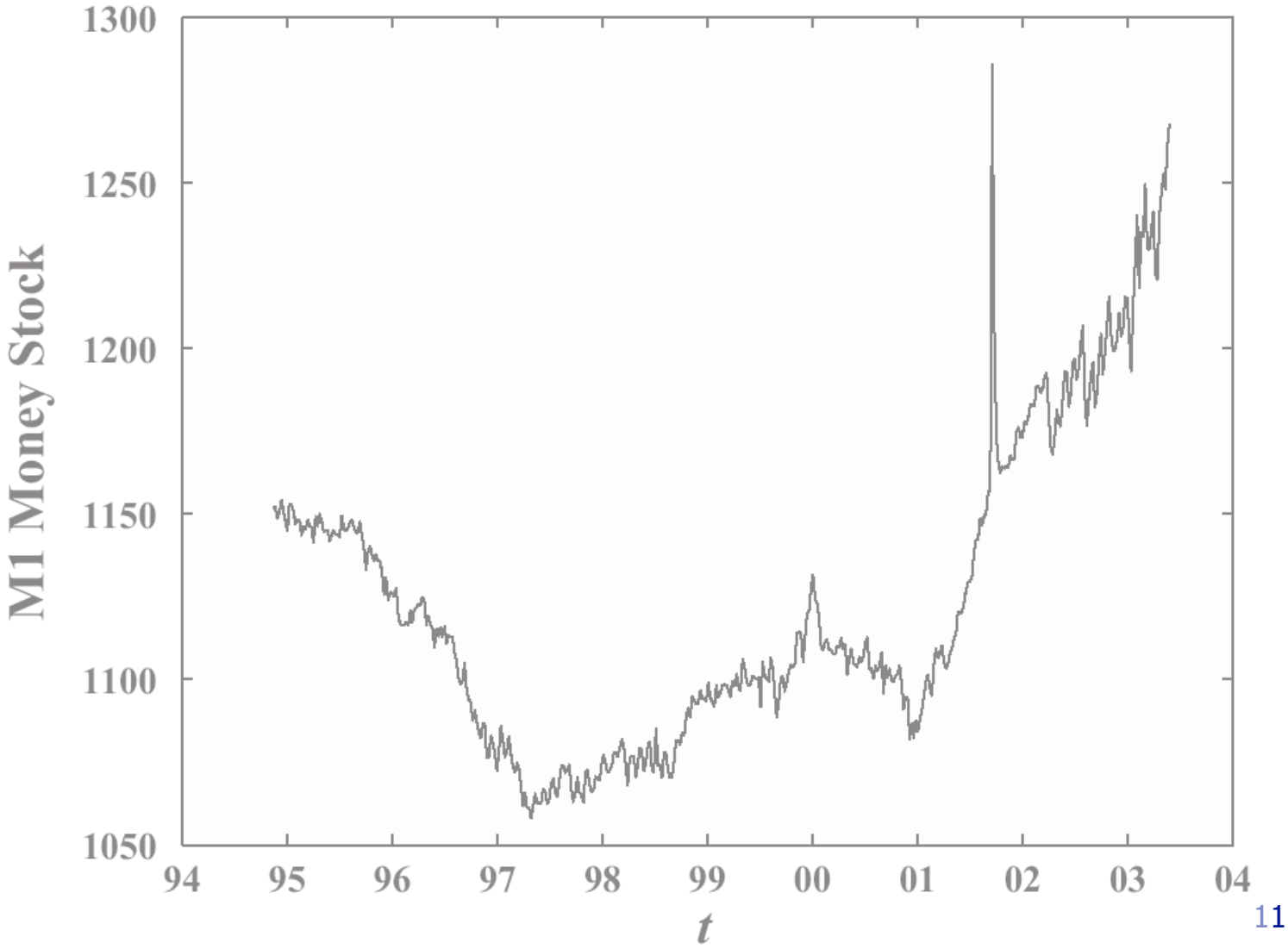
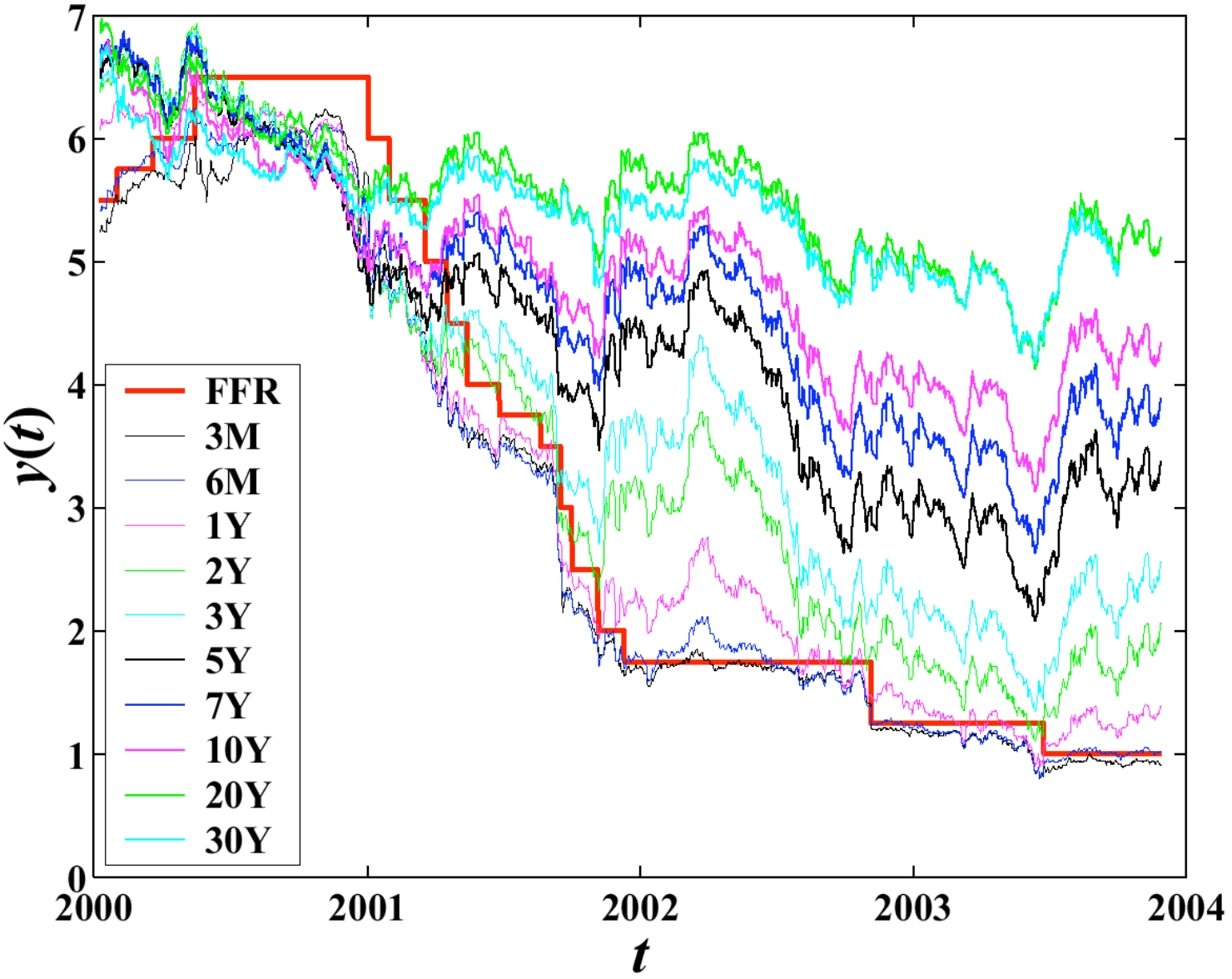
Growth of Money supply (M1)

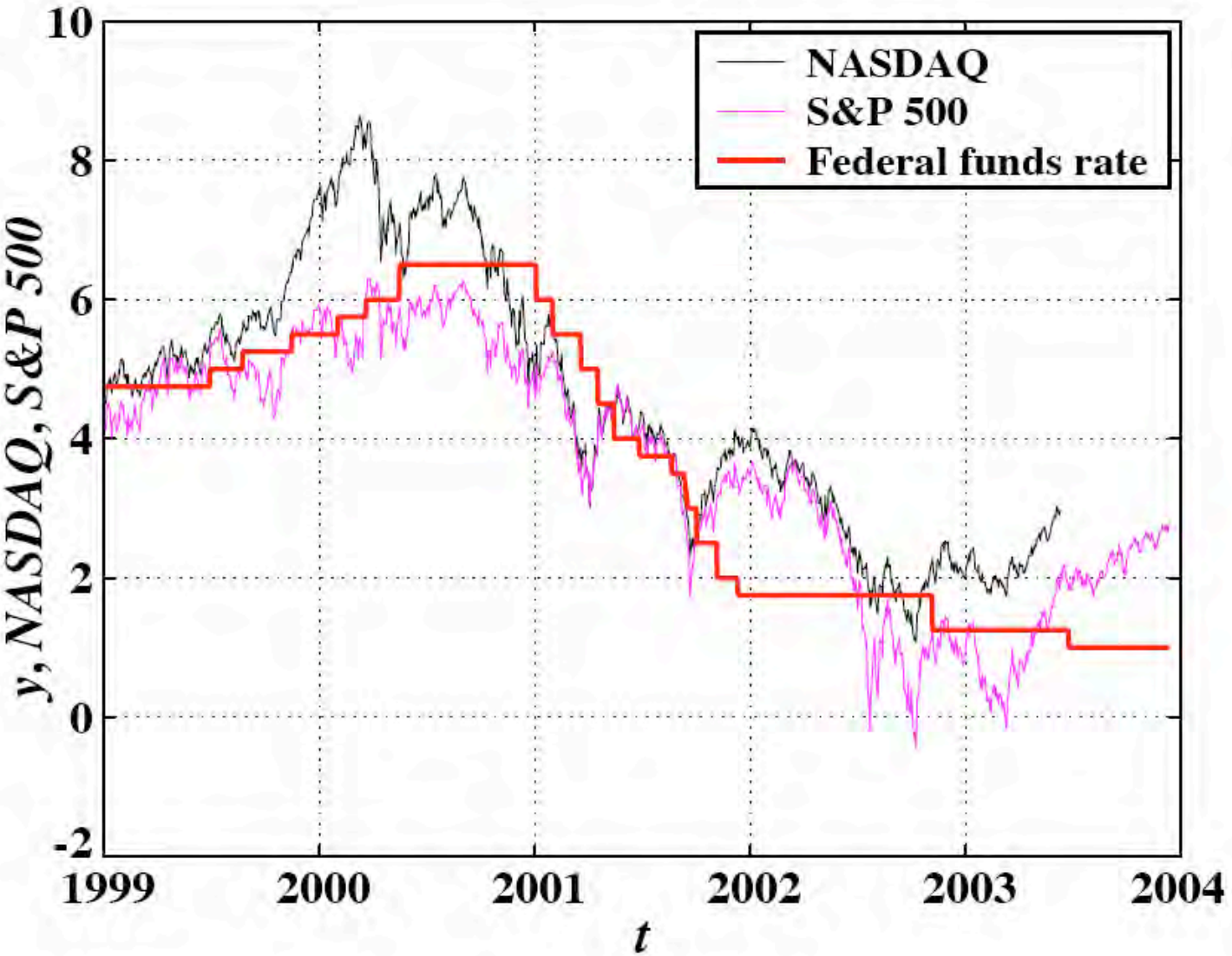


Causal slaving of the US Treasury Bond yields to the stock market

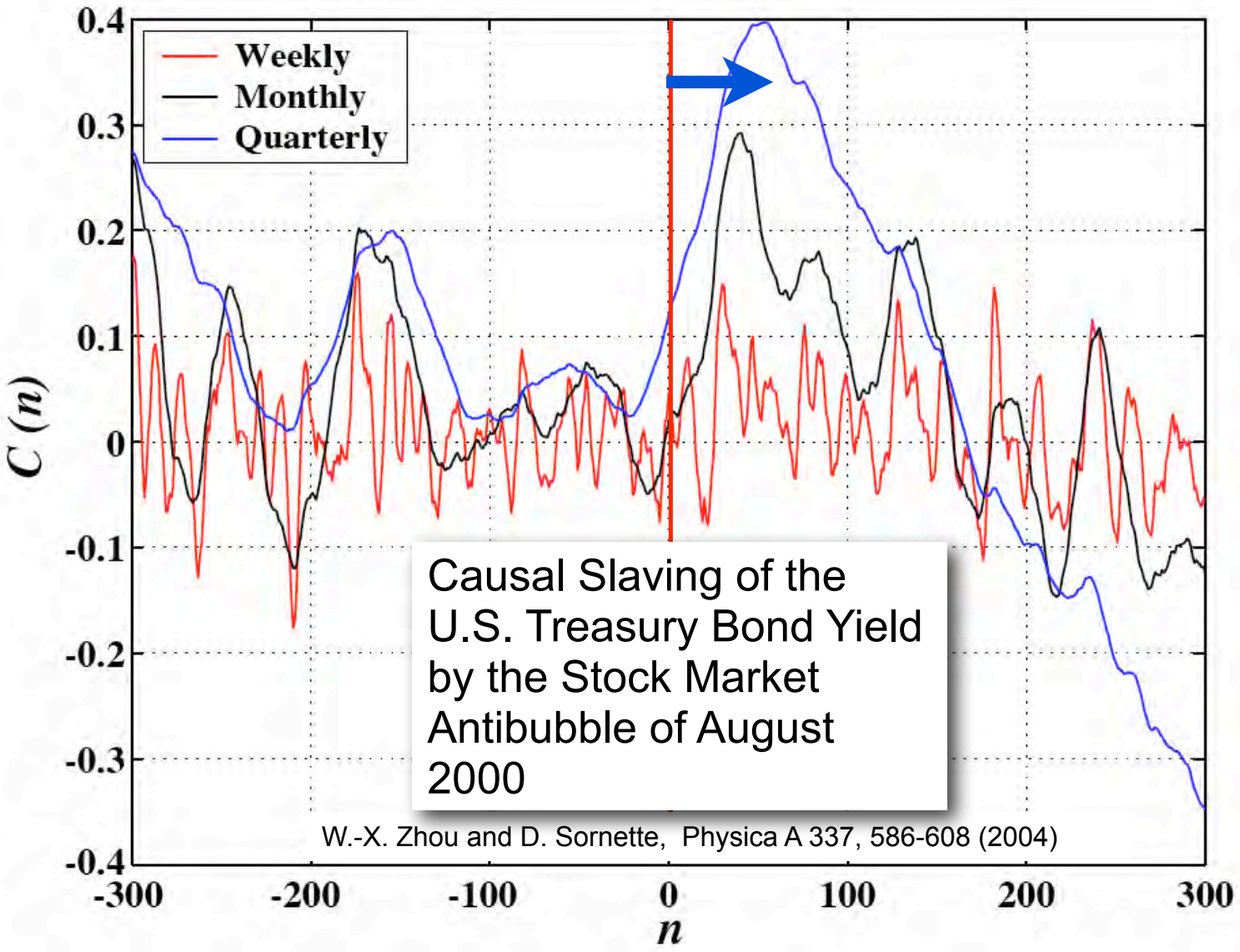


W.-X. Zhou, D. Sornette / Physica A 337 (2004) 586–608

"SLAVING OF THE FED TO THE STOCK MARKET



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: $x \to 5x - 34$ and $z \to 10z - 67$.



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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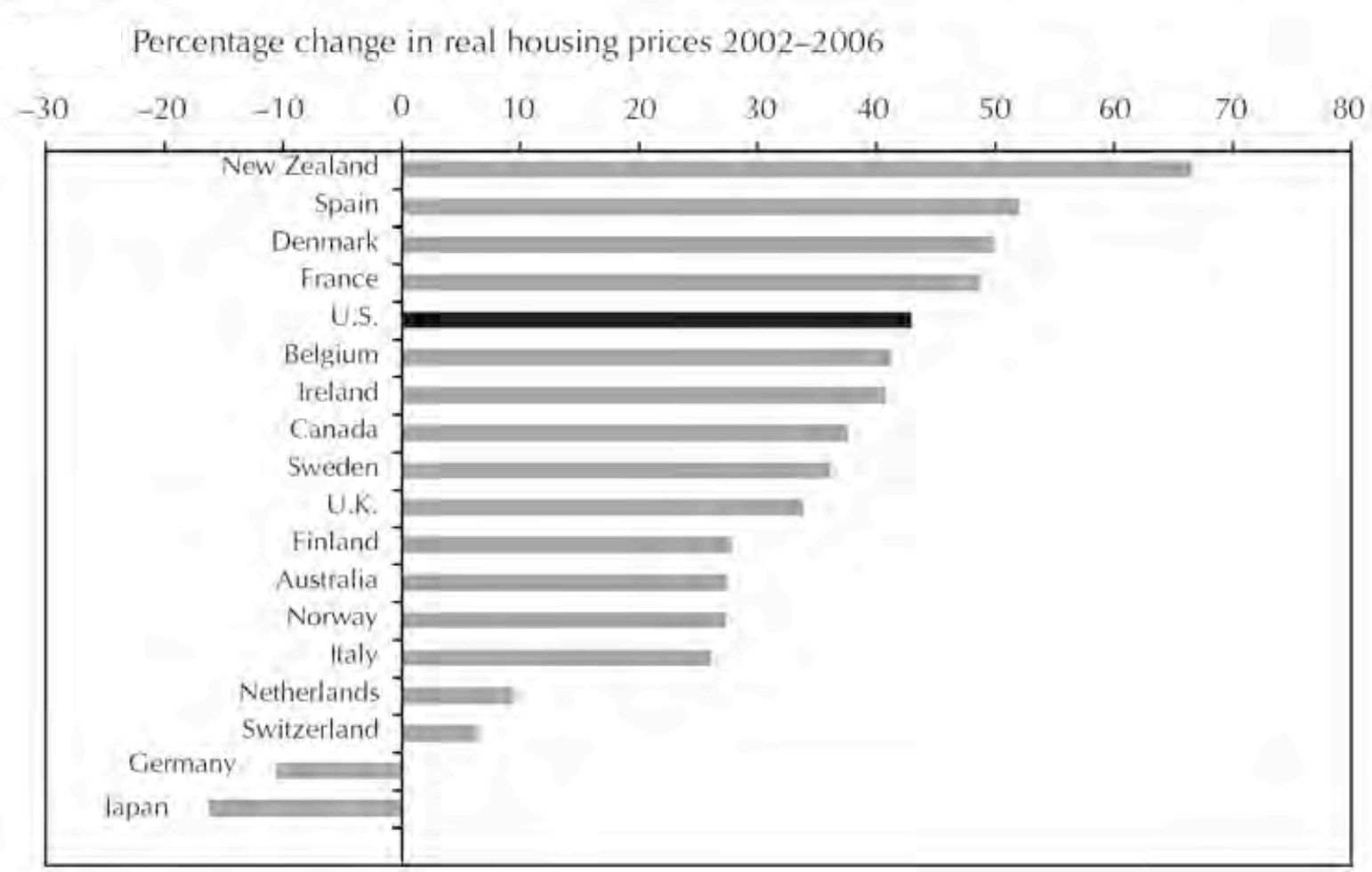
Real-estate bubbles



Sources: Shiller; BIS.

Real-estate in the UK

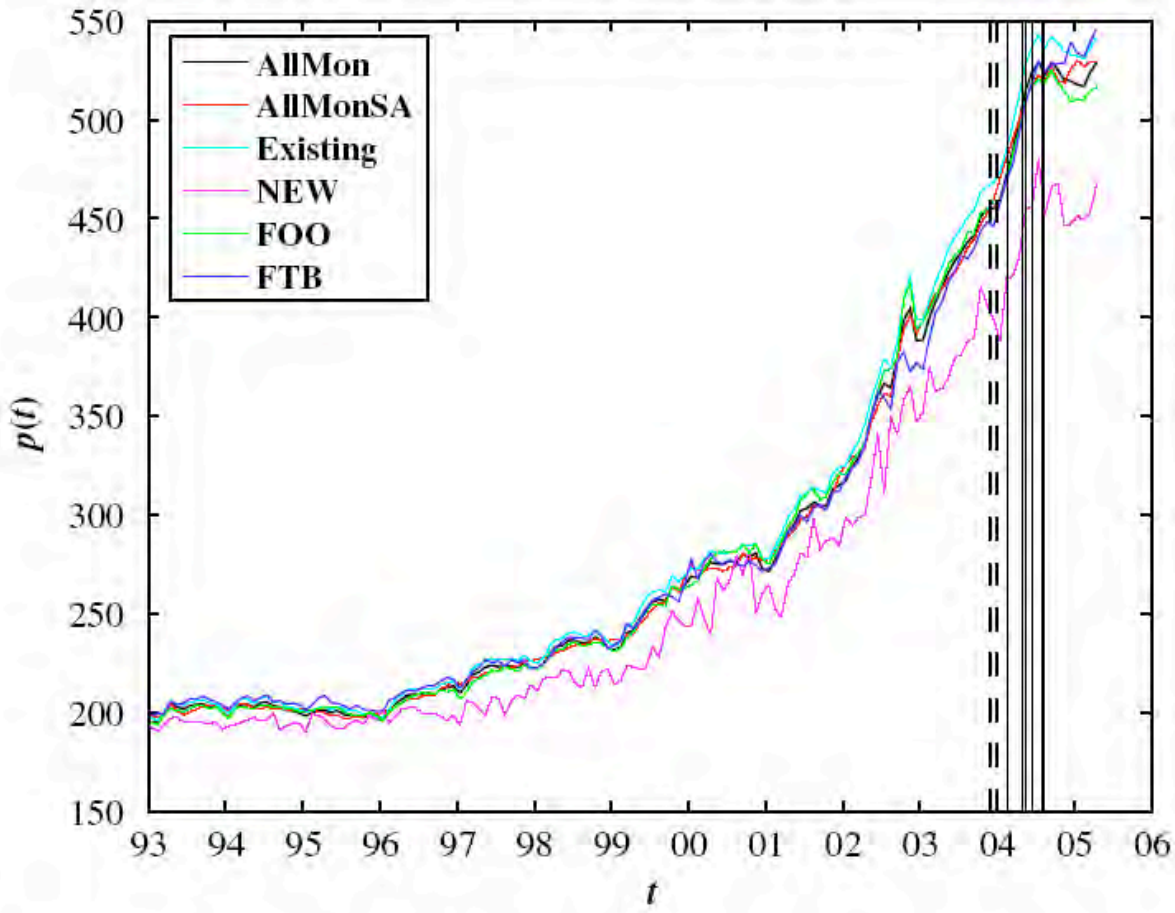


Fig. 1. (Color online) Plot of the UK Halifax house price indices from 1993 to April 2005 (the latest available quote at the time of writing). The two groups of vertical lines correspond to the two predicted turning points reported in Tables 2 and 3 of [1]: end of 2003 and mid-2004. The former (resp.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

W.-X. Zhou, D. Sornette, 2000–2003 real estate bubble in the UK but not in the USA, Physica A 329 (2003) 249–263.

Real-estate in the USA

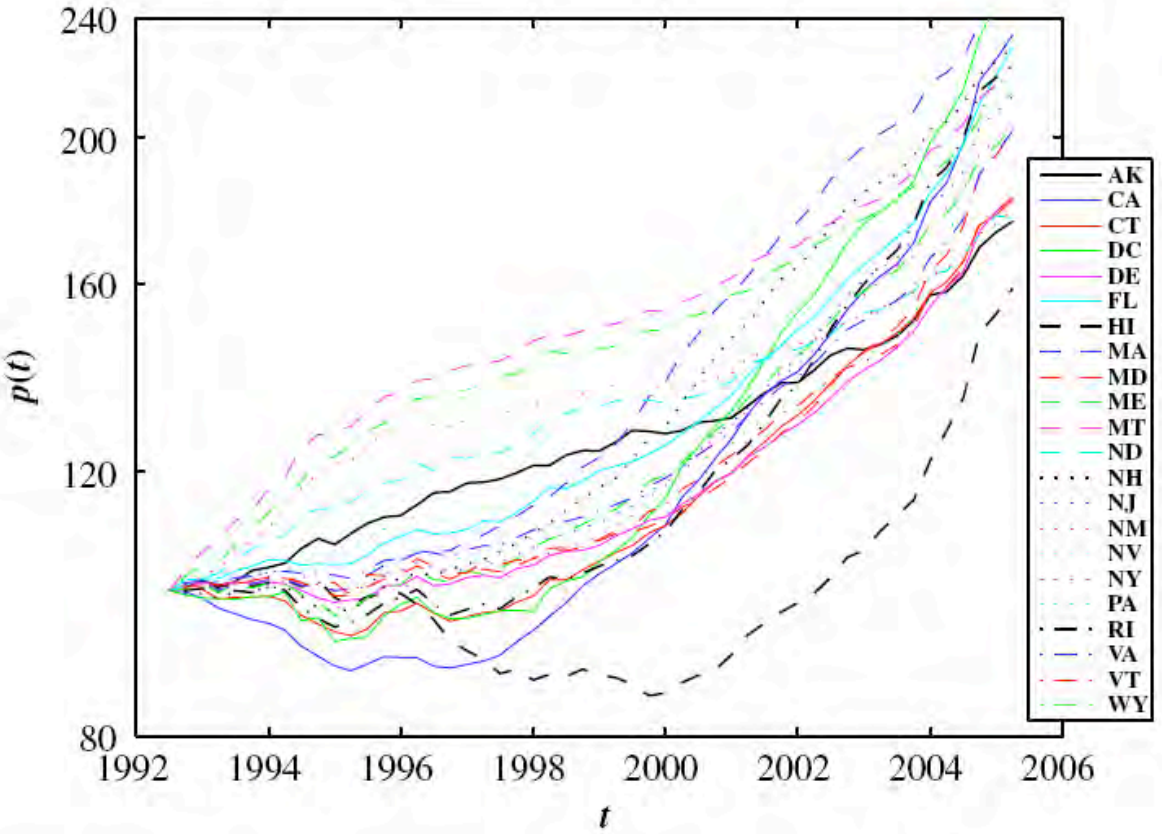


Fig. 5. (Color online) Quarterly average HPI in the 21 states and in the District of Columbia (DC) exhibiting a clear upward faster-than-exponential growth. For better representation, we have normalized the house price indices for the second quarter of 1992 to 100 in all 22 cases. The corresponding states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

W.-X. Zhou, D. Sornette / Physica A 361 (2006) 297–308

717 VERNON WY
BURLINGAME, CA 94010

(2005)

2 Bedrooms, **1** Bath(s)
1,310 Estimated Sq. Ft.

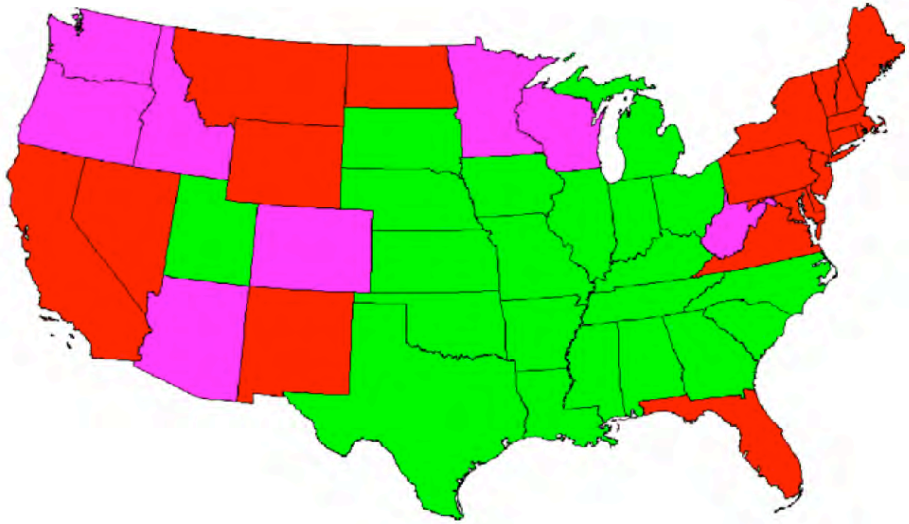
Listing #: 620130

$1,049,000

And this with the median household income in San Mateo County of ~$70,000. With 20% down, the mortgage for a "starter" $1M house would be 11-12 times the median income. Even if one were "buying up" to one of these houses, say, with equity of 50%, the mortgage/median income ratio would be 7:1!!!

From late '02 and early '03 to date--the bubbliest phase--the value of the property below is estimated to have more than DOUBLED, peaking at an estimated $1.16M in summer-fall '05, an annualized increase in value of ~14% from '96. However, before the one order of magnitude of exponential growth of the bubble commenced in late '02, the rate of growth of the value of this property was ~6.9%/yr. Were the value to regress to the pre-bubble trend, the estimated value would be $620,000-$820,000 over the course of the next 4 years or a 30% to 40-45% nominal decline and -11% to -18%/yr. in real terms (at the trend 2.7% CPI).

Our study in 2005 identifies the bubble states



Fall 2007

Hammered

Delinquency rates for construction loans for single-family homes.

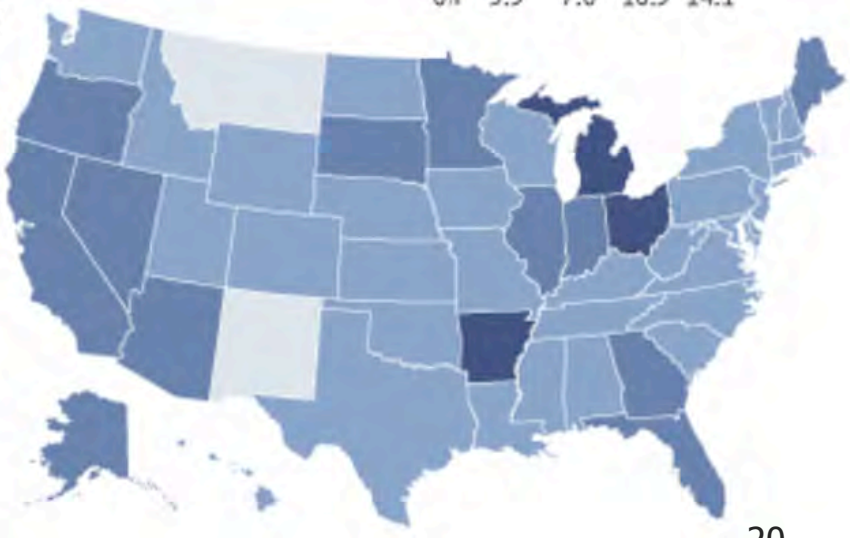
Loans at least 30 days past due

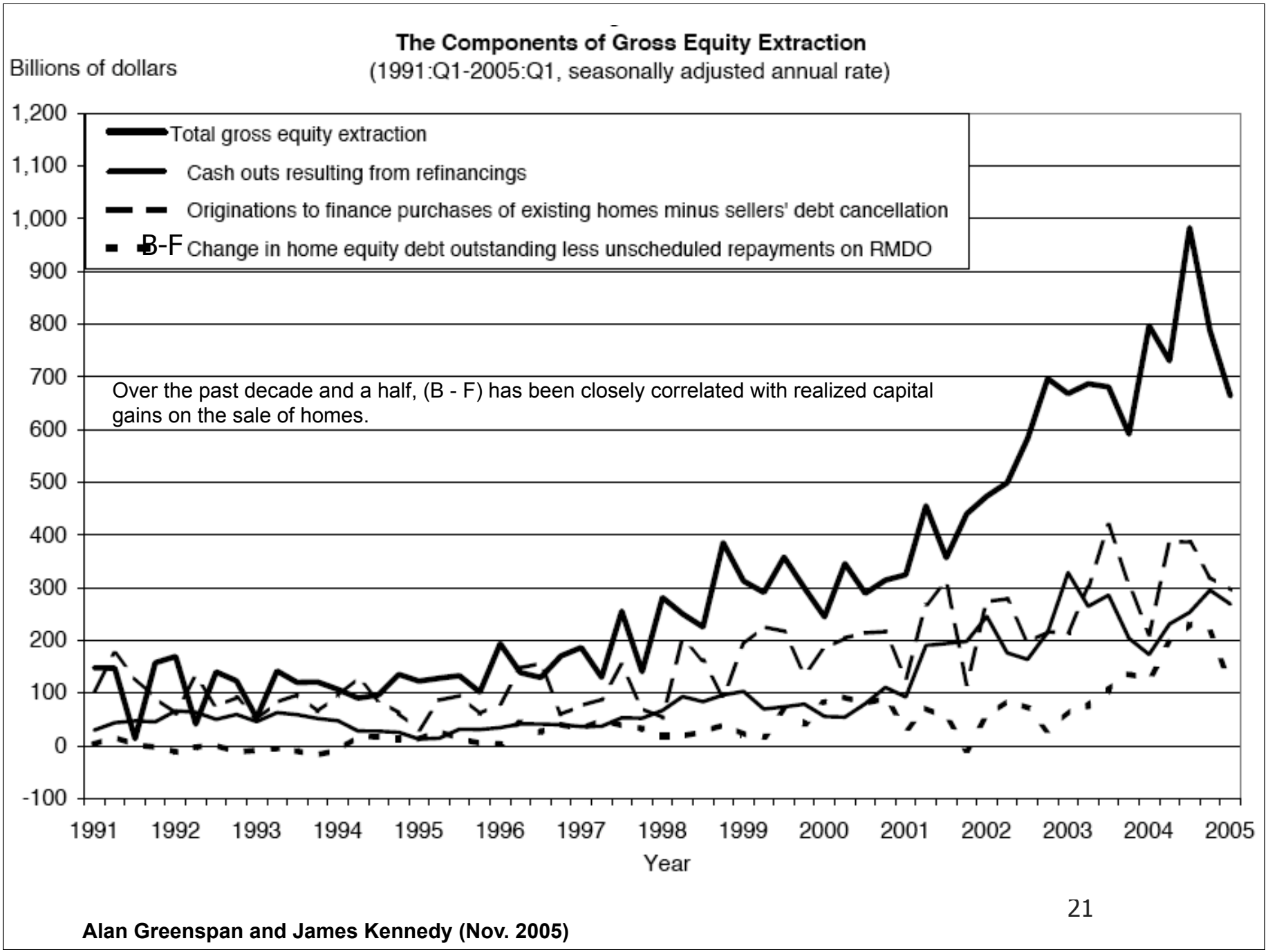
0% 3.5 7.0 10.5 14.1

Fourth quarter 2007

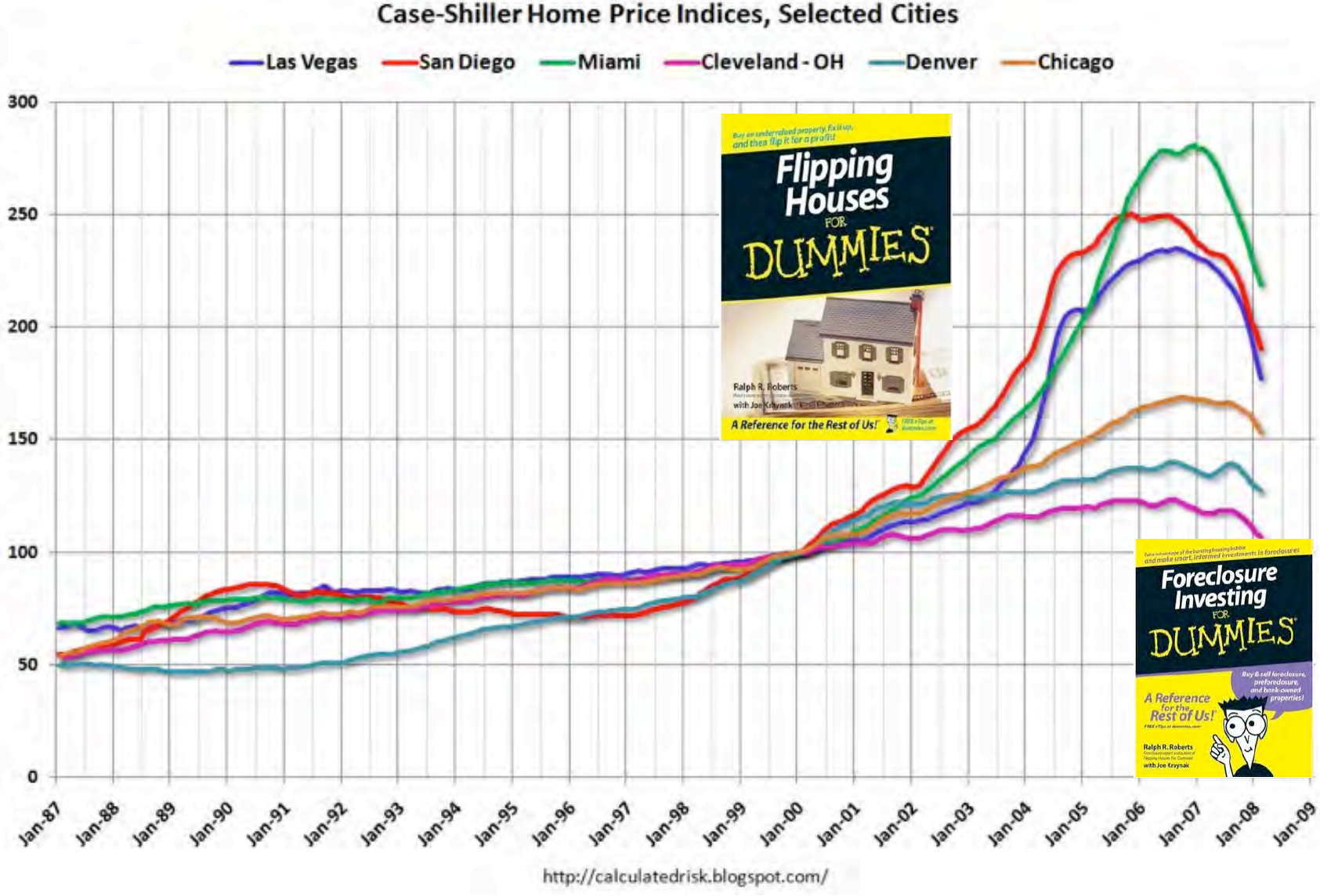
Highest rates

Michigan	14.0%
Ohio	13.7
Arkansas	11.1
Arizona	10.3
Minnesota	10.0
Florida	9.9
Georgia	9.6
South Dakota	9.2





Alan Greenspan and James Kennedy (Nov. 2005)



This graph shows the year-over-year price changes for the Case-Shiller composite 10 and 20 indices (through February), and the Case-Shiller and OFHEO National price indices (through Q4 2007).

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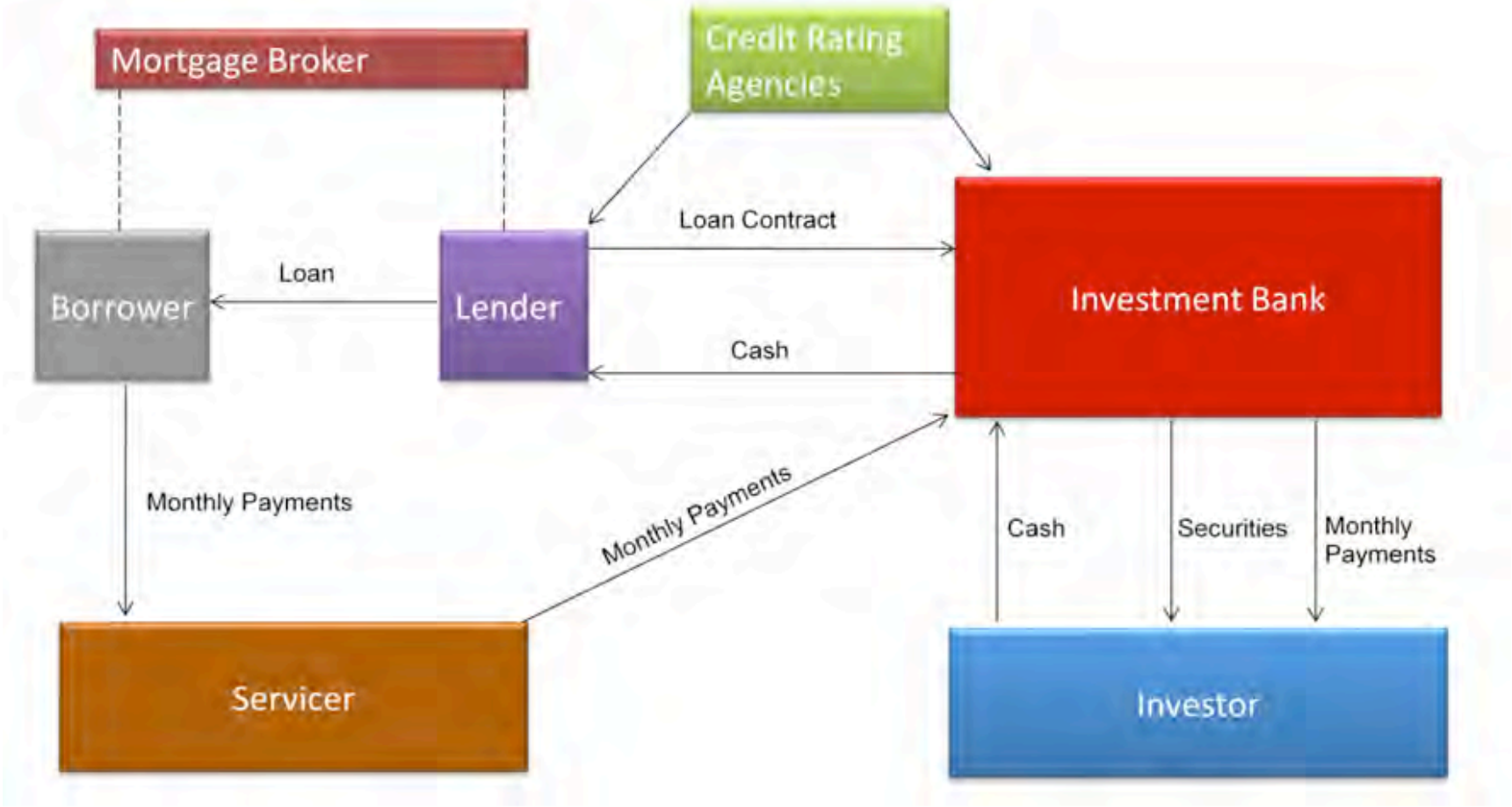
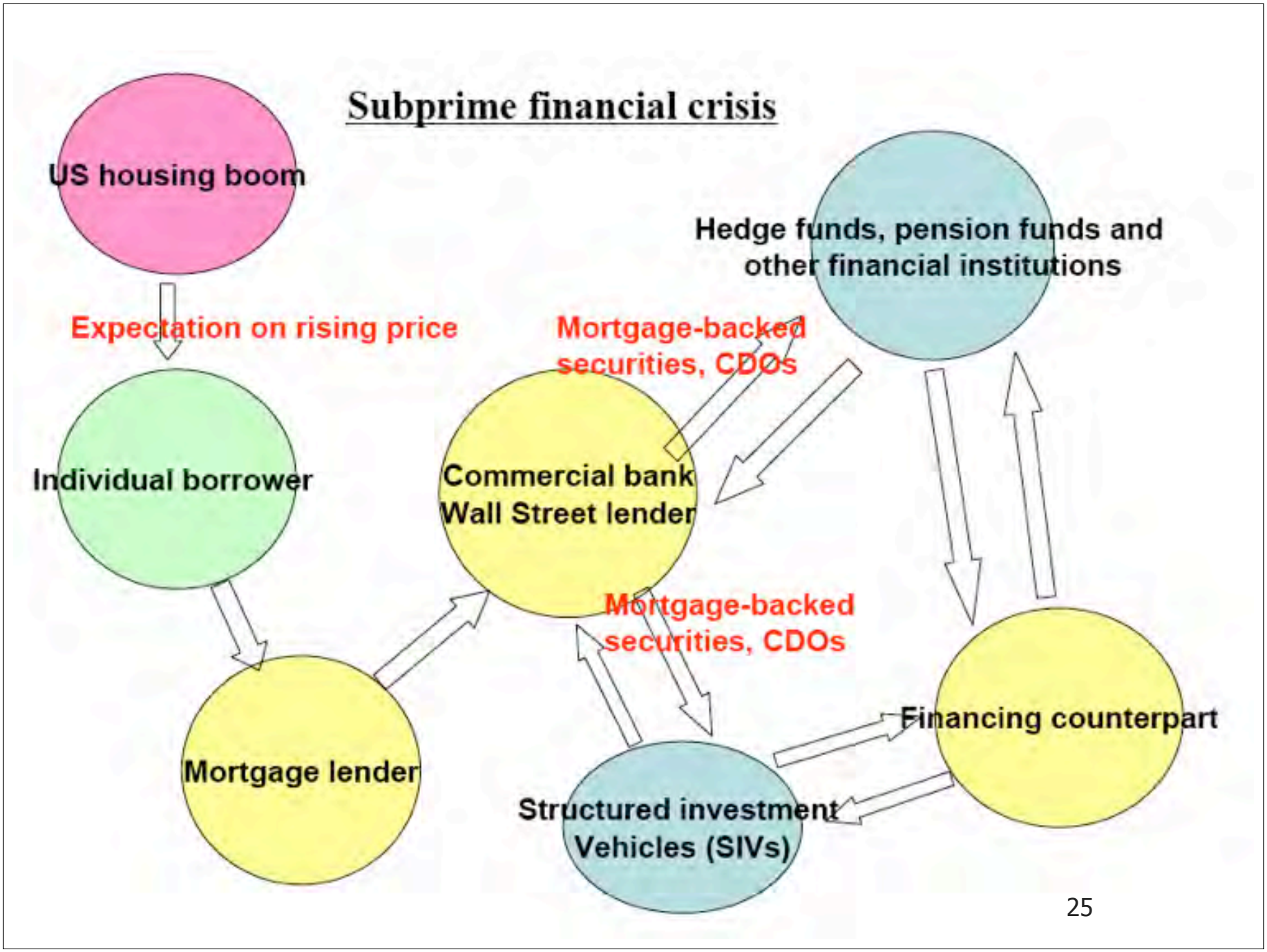
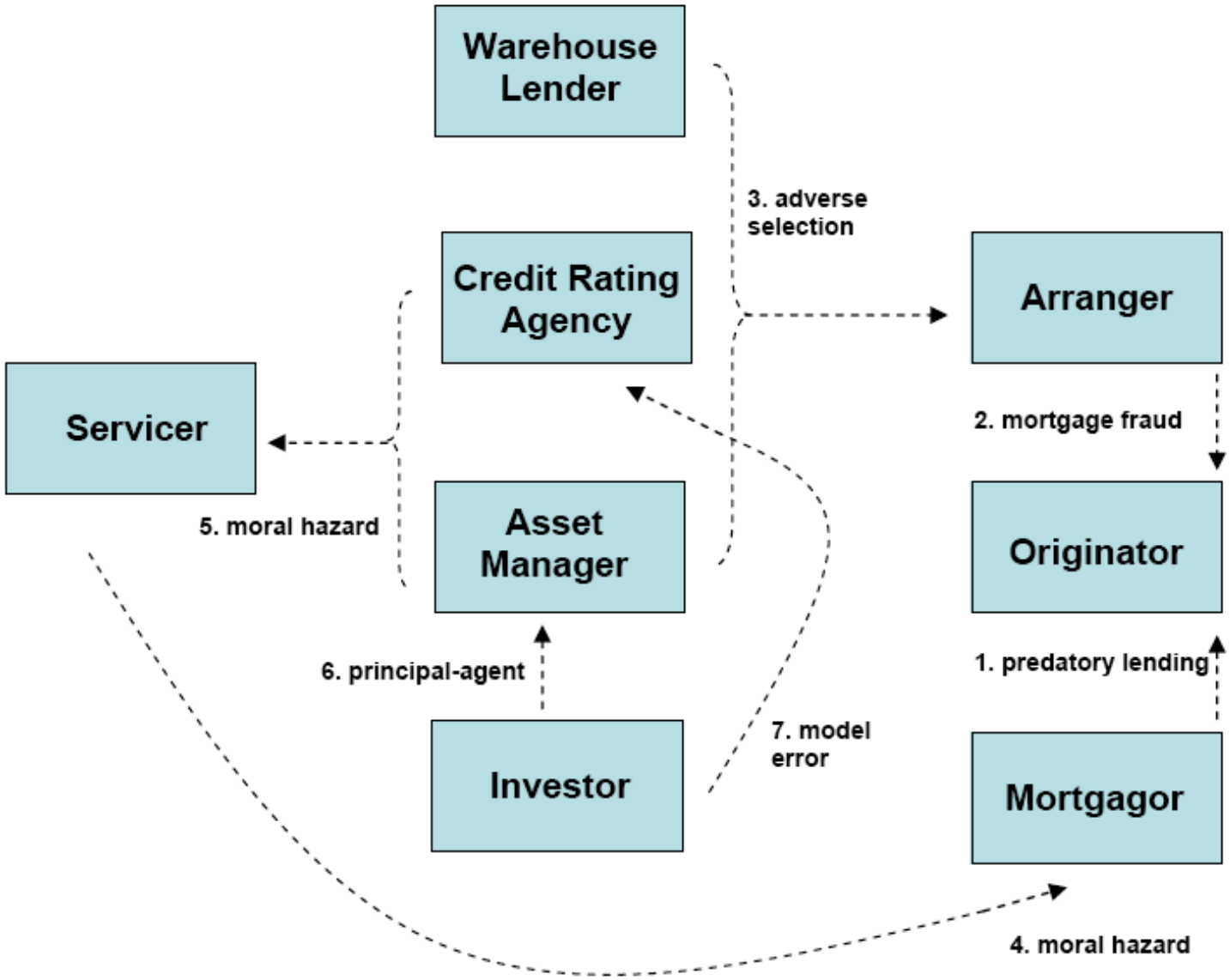
Securitisation model

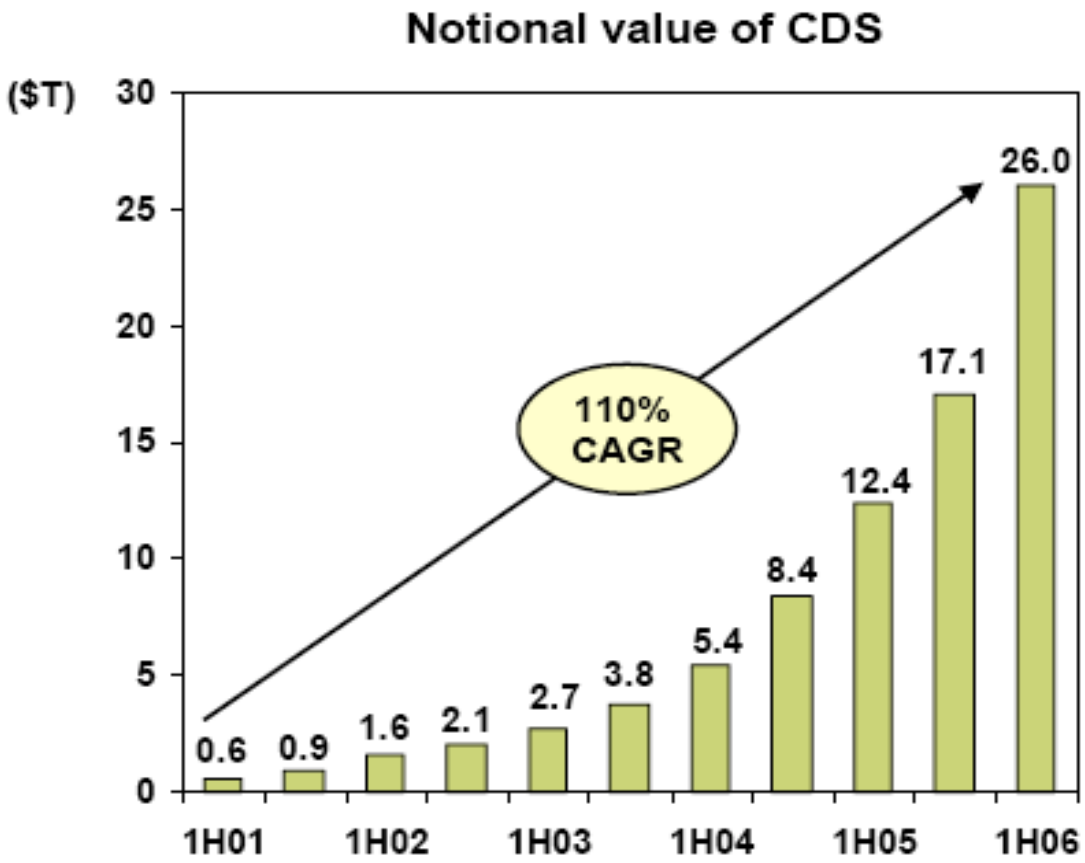


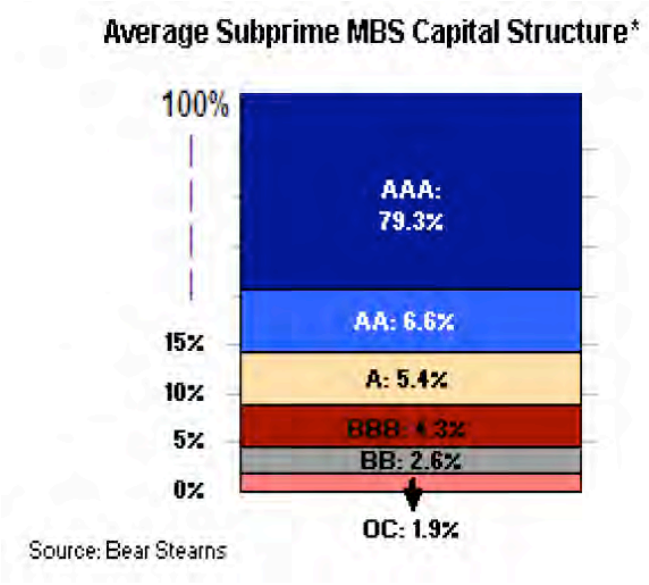

Subprime financial crisis
US housing boom
Hedge funds, pension funds and other financial institutions
Expectation on rising price
Mortgage-backed securities, CDOs
Individual borrower
Commercial bank Wall Street lender
Mortgage-backed securities, CDOs
Financing counterpart
Mortgage lender
Structured investment Vehicles (SIVs)

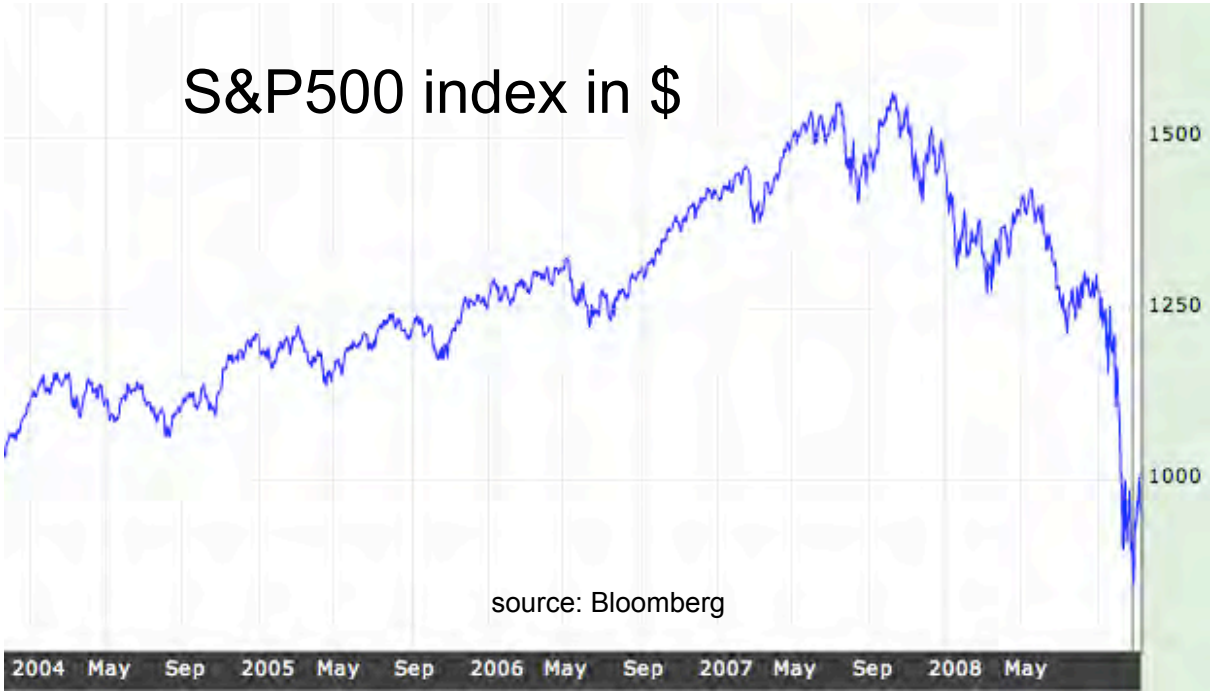
Key Players and Frictions in Subprime Mortgage Credit Securitization

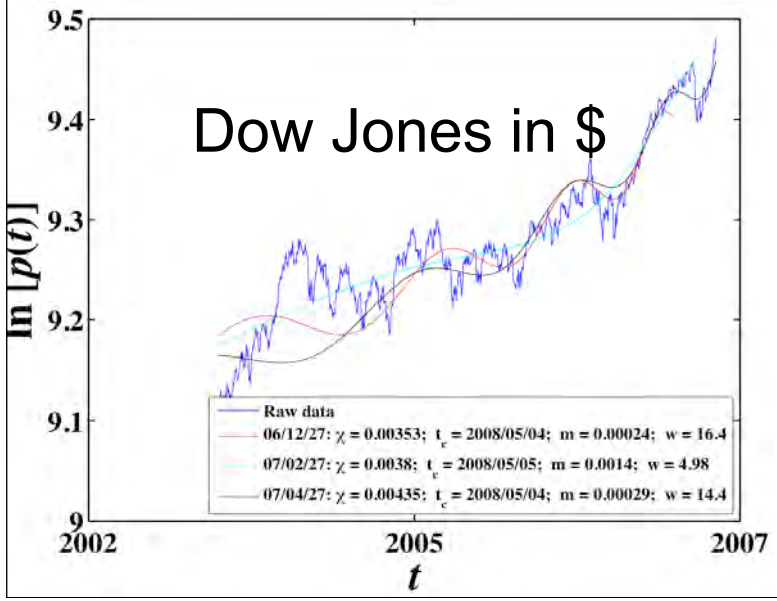


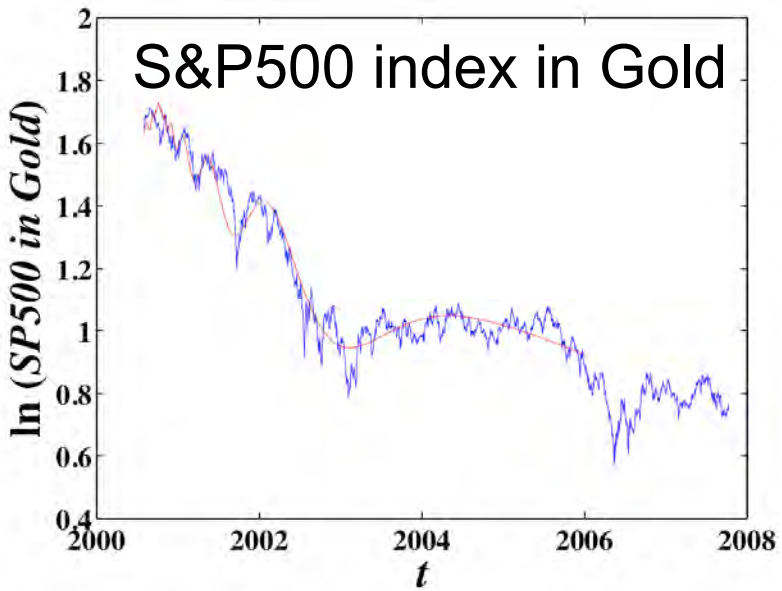
Securitization of non-financial assets (commodities, real-estate, credit)






S&P500 index in $
1500
1250
1000
source: Bloomberg
2004 May Sep 2005 May Sep 2006 May Sep 2007 May Sep 2008 May


Dow Jones in $
ln [p(t)]
9.5
9.4
9.3
9.2
9.1
9
2002
2005
2007
t
Raw data
06/12/27: χ = 0.00353; t_c = 2008/05/04; m = 0.00024; w = 16.4
07/02/27: χ = 0.0038; t_c = 2008/05/05; m = 0.0014; w = 4.98
07/04/27: χ = 0.00435; t_c = 2008/05/04; m = 0.00029; w = 14.4


S&P500 index in Gold
ln (SP500 in Gold)
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
2000
2002
2004
2006
2008
t

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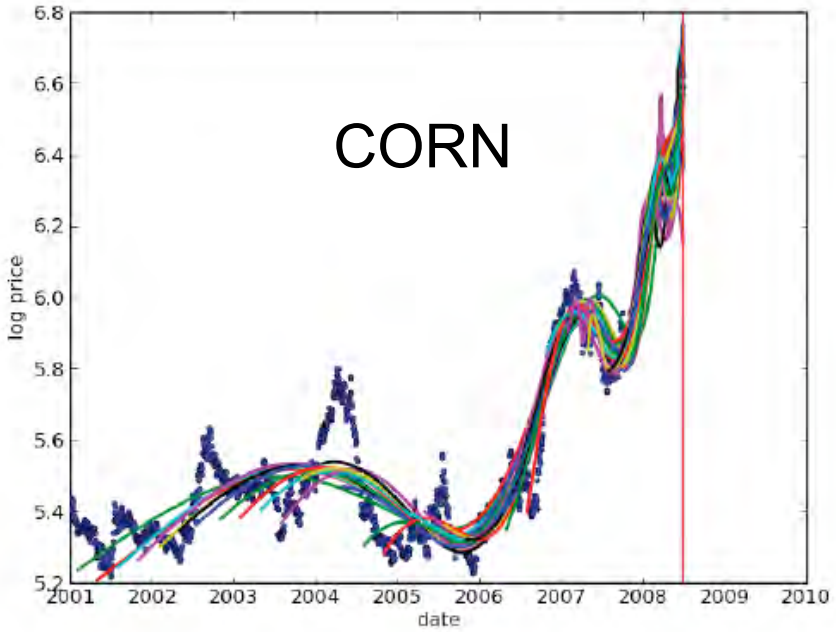
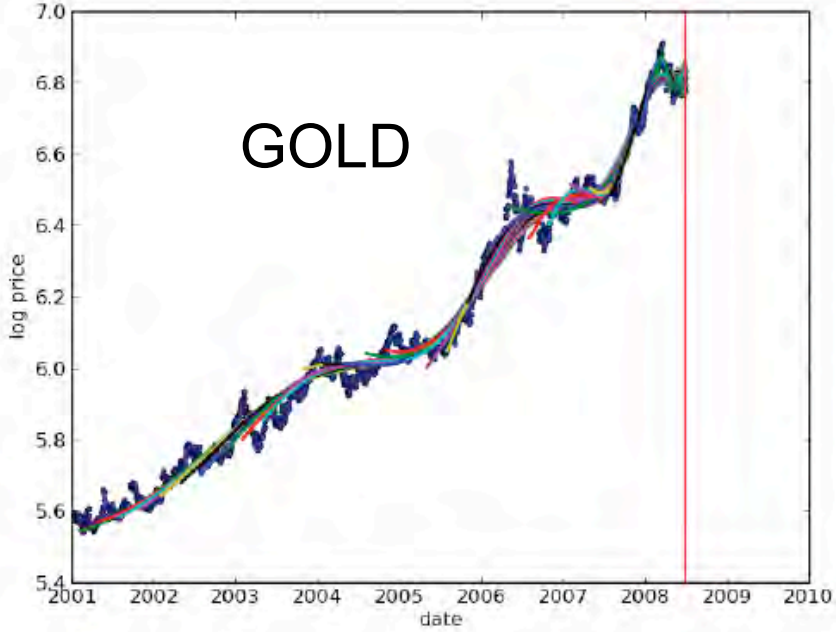
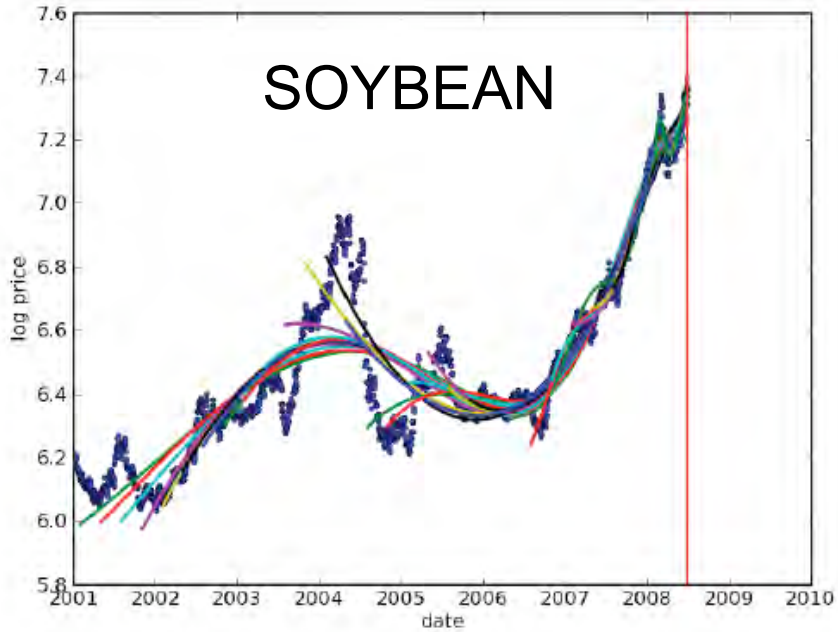
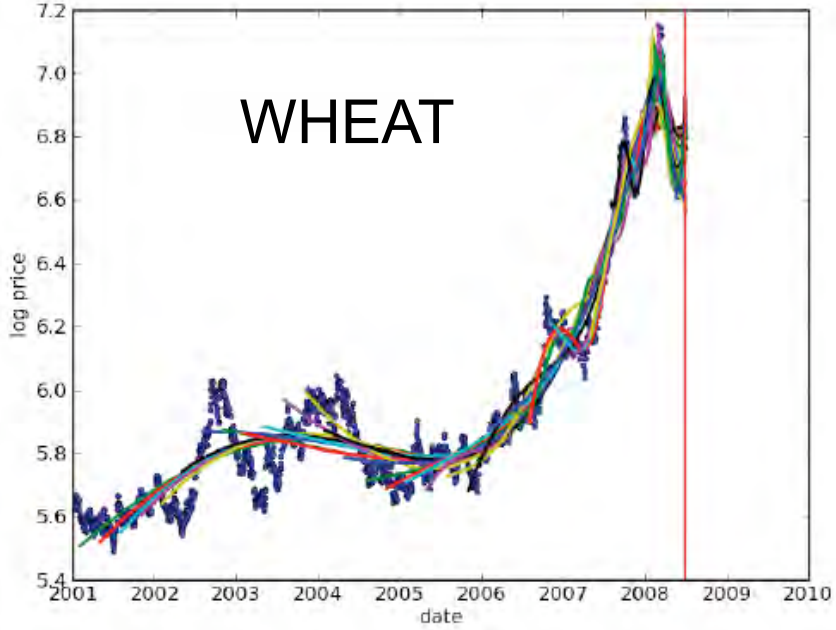
source: R. Woodard

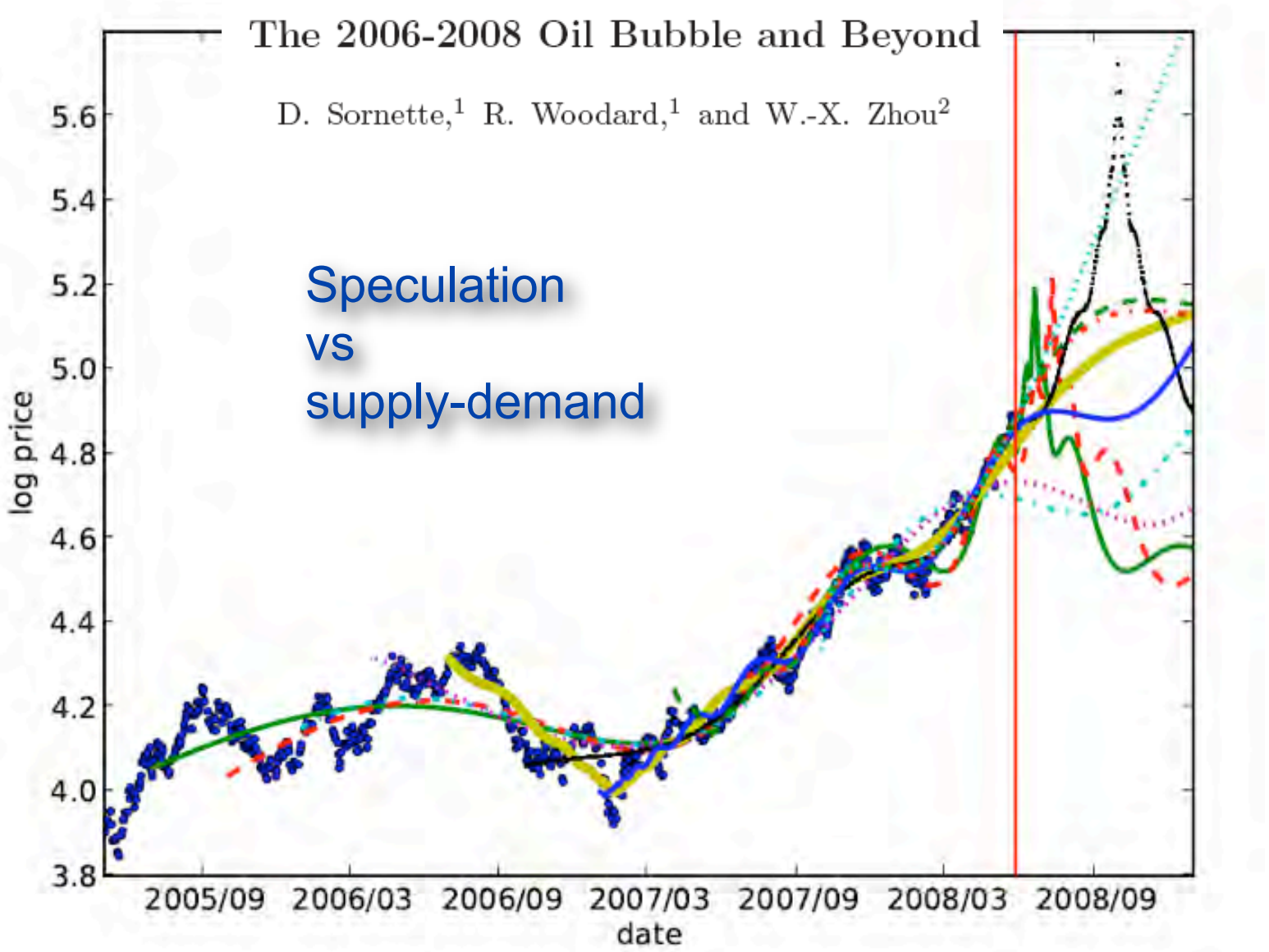




R.Woodard and D.Sornette (2008)







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

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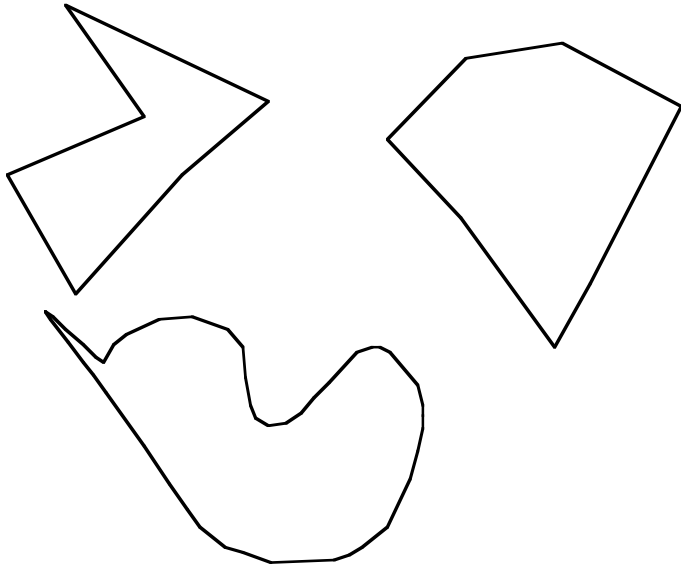
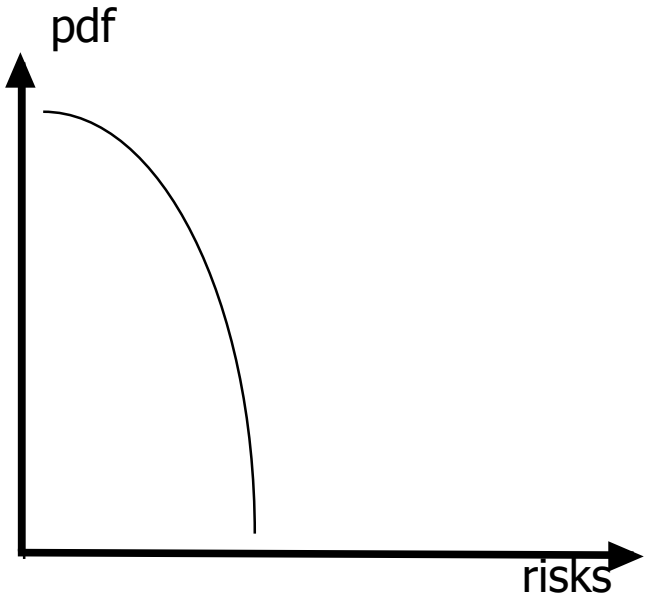
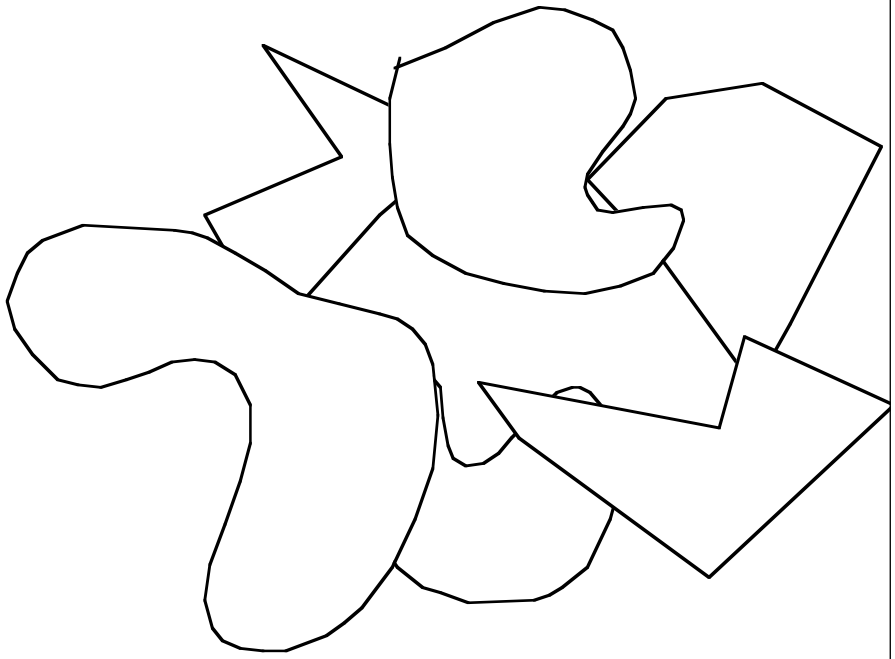
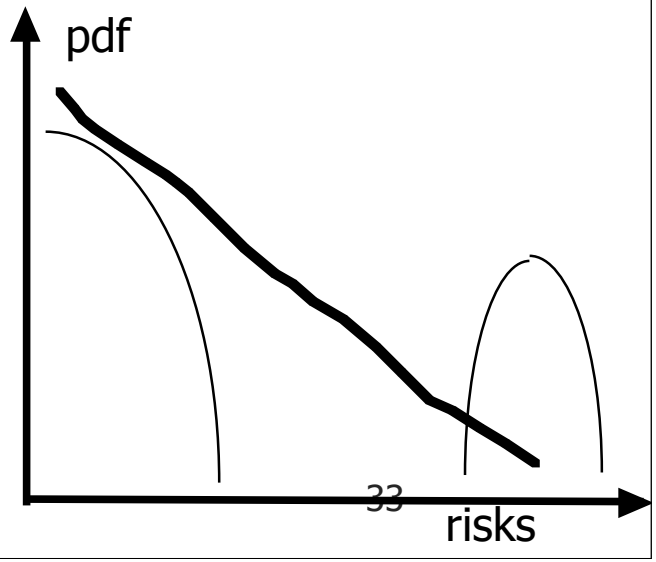
Separation of financial and credit risks



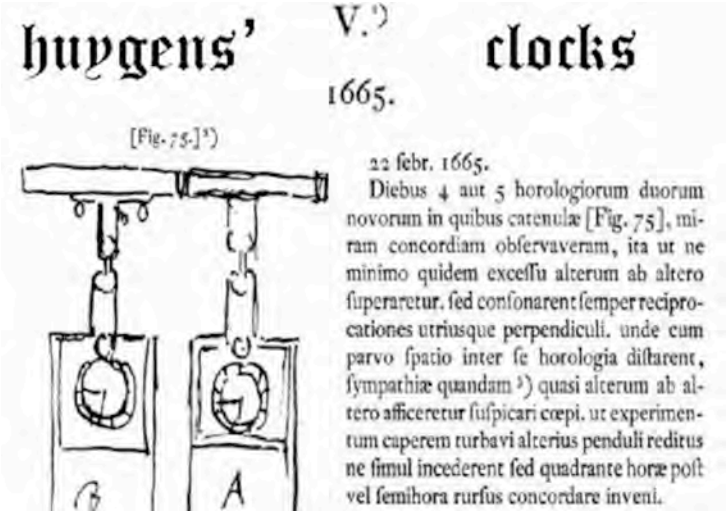


Securitization leads to larger inter-connectivity





SYNCHRONISATION AND COLLECTIVE EFFECTS IN EXTENDED STOCHASTIC SYSTEMS



huygens' V.[1] clocks

1665.

[Fig. 75.][2]

22 febr. 1665.

Diebus 4 aut 5 horologiorum duorum novorum in quibus catenulæ [Fig. 75], miram concordiam obſervaveram, ita ut ne minimo quidem exceſſu alterum ab altero ſuperaretur. ſed conſonarent ſemper reciprocationes utriusque perpendiculi. unde cum parvo ſpatio inter ſe horologia diſtarent, ſympathiæ quandam [3] quasi alterum ab altero afficeretur ſuſpicari cœpi. ut experimentum caperem turbavi alterius penduli reditus ne ſimul incederent ſed quadrante horæ poſt vel ſemihora rurſus concordare inveni.

Fireflies

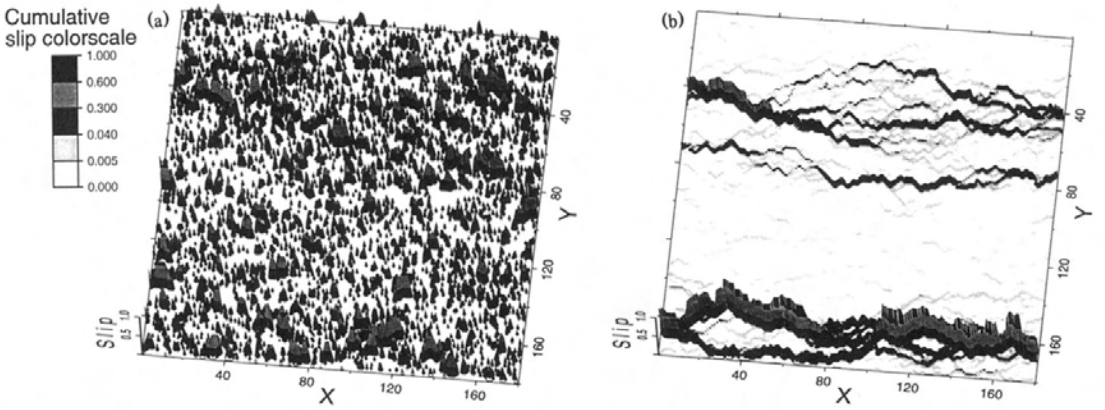
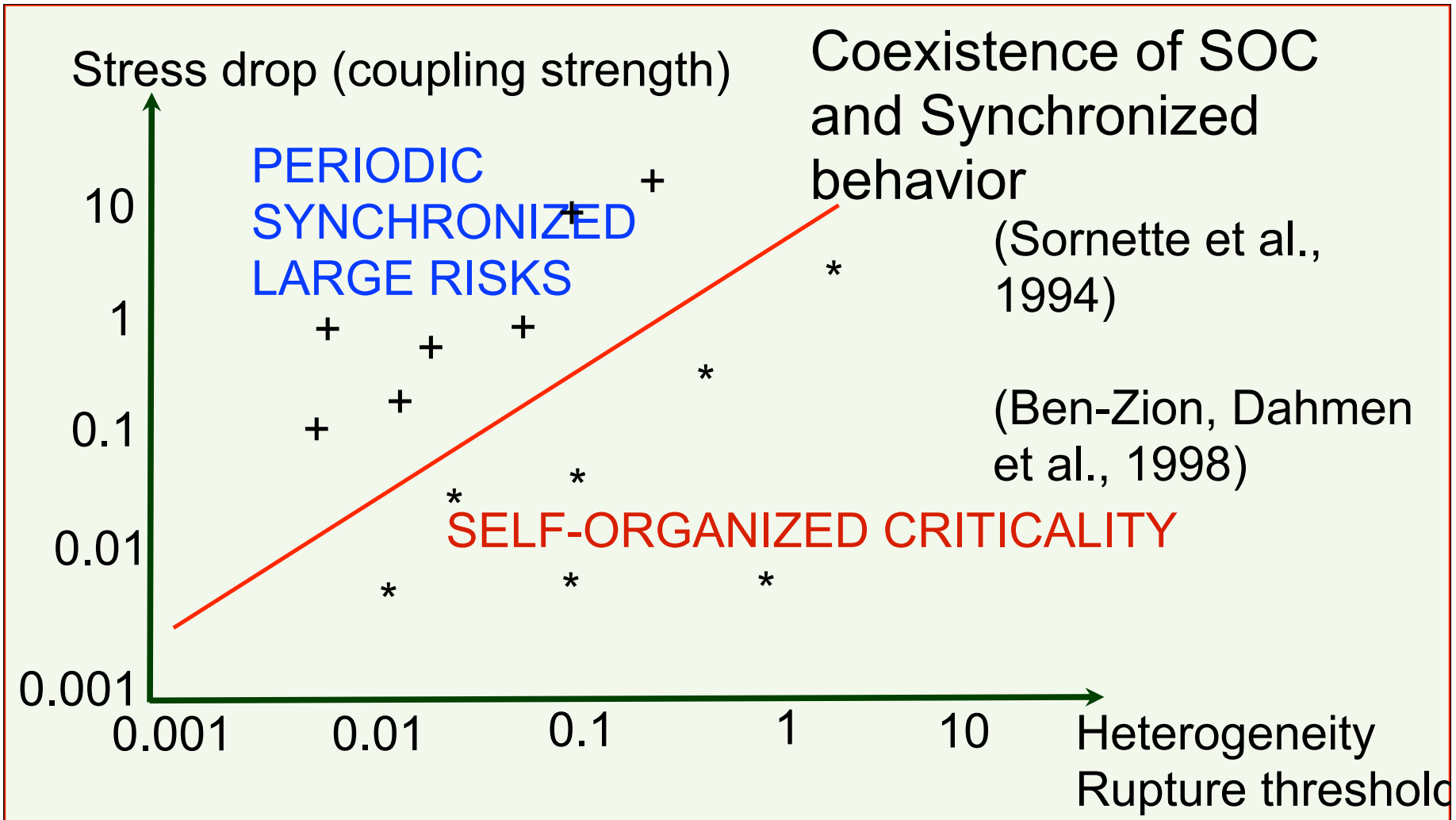


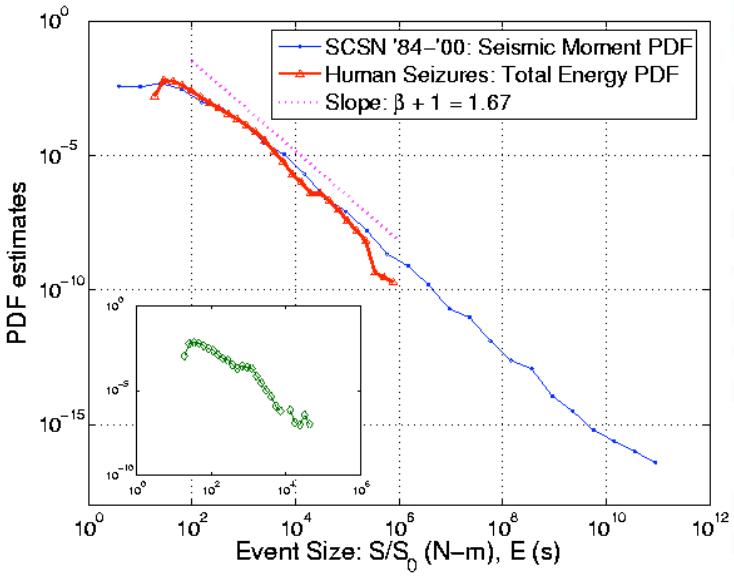
FIG. 1. Evolution of the cumulative earthquake slip, represented along the vertical axis in the white to black color code shown above the picture, at two different times: (a) early time and (b) long time, in a system of size $L=90$ by $L=90$, where $\Delta\sigma=1.9$ and $\beta=0.1$.

Miltenberger et al. (1993)

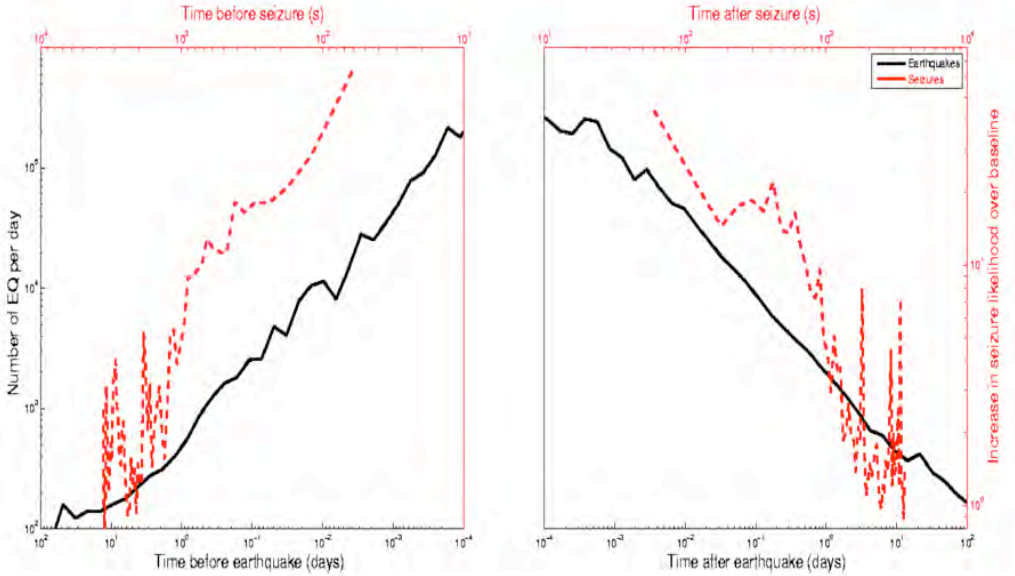


"Phase diagram" for the model in the space (heterogeneity, stress drop). Crosses (+) correspond to systems which exhibit a periodic time evolution. Stars * corresponds to systems that are self-organized critical, with a Gutenberg-Richter earthquake size distribution and fault localization whose geometry is well-described by the geometry of random directed polymers.

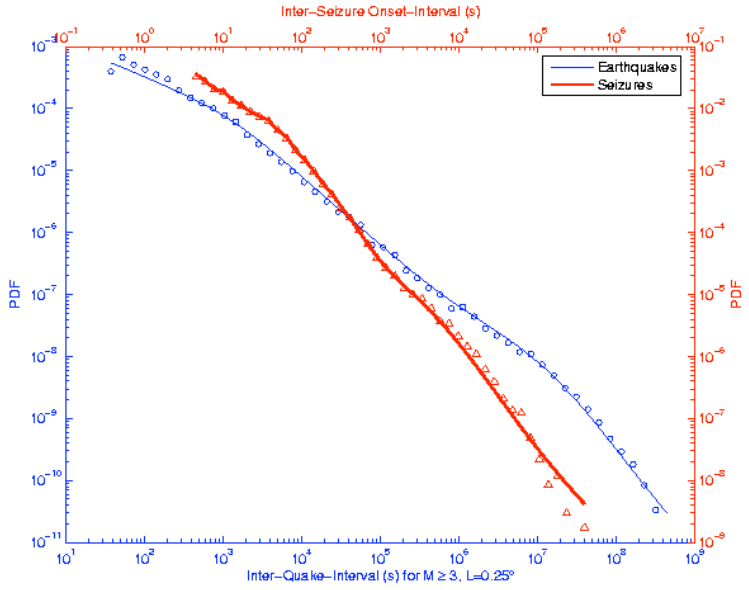
Gutenberg-Richter distribution of sizes



Omori law: Direct and Inverse

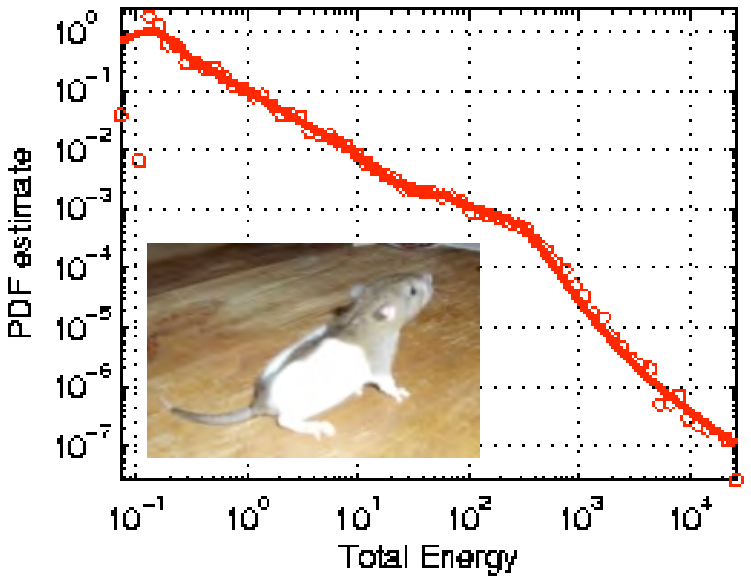


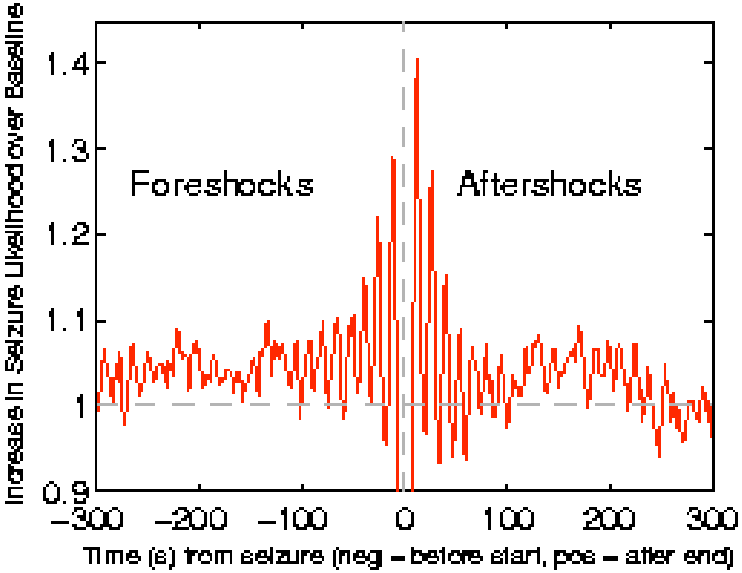
pdf of inter-event waiting times

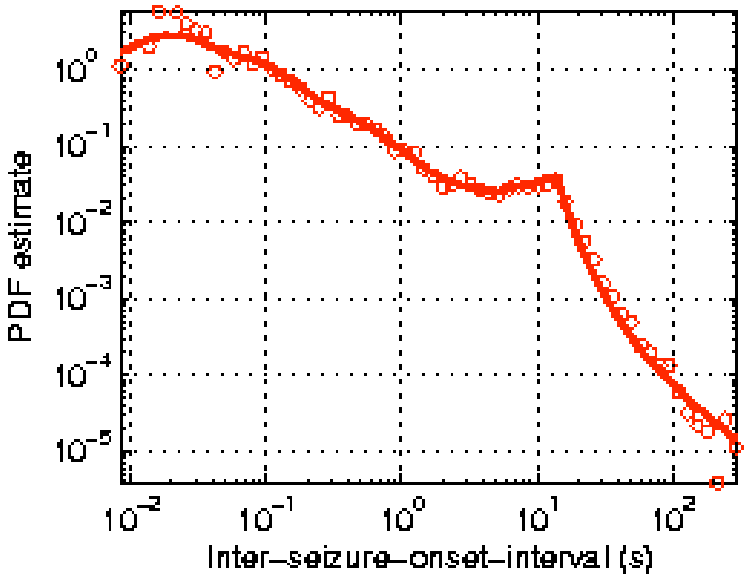


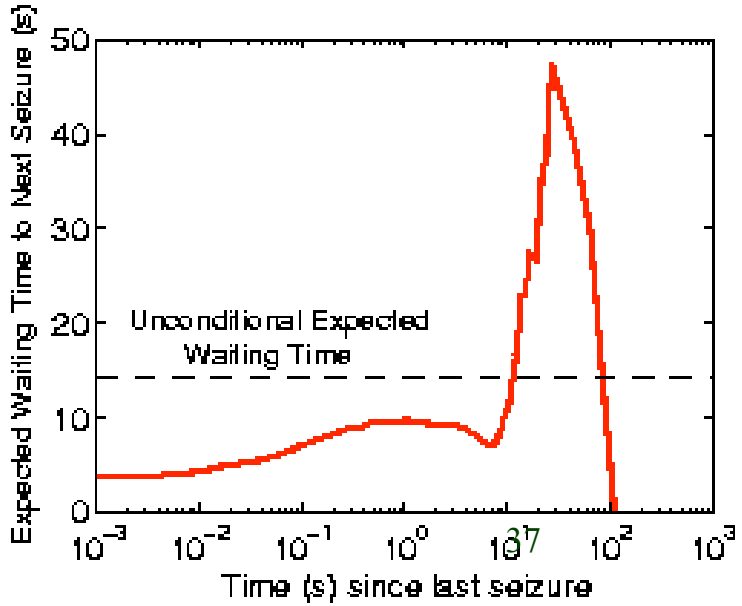
The longer it has been since the last event, the longer it will be since the next one!

19 rats treated intravenously (2) with the convulsant 3-mercapto-proprionic acid (3-MPA)



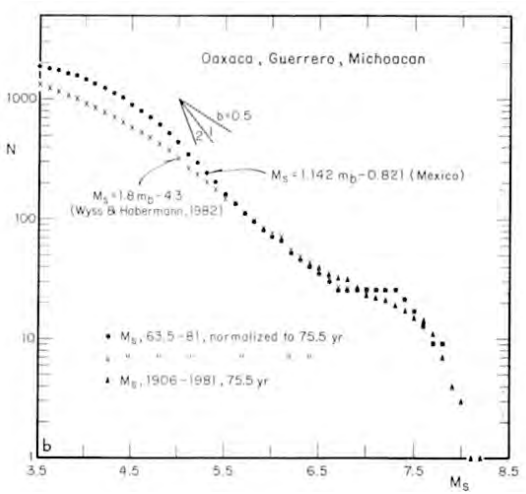




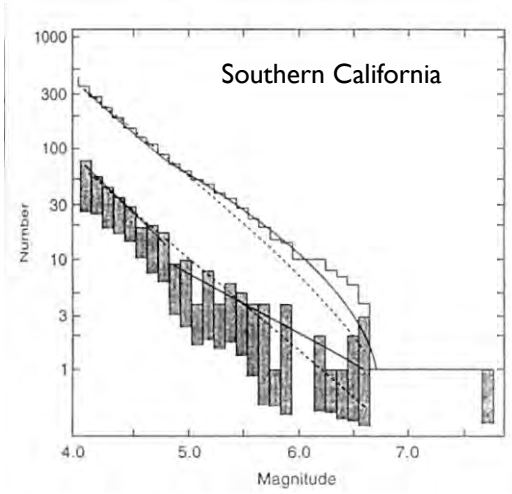


Complex magnitude distributions

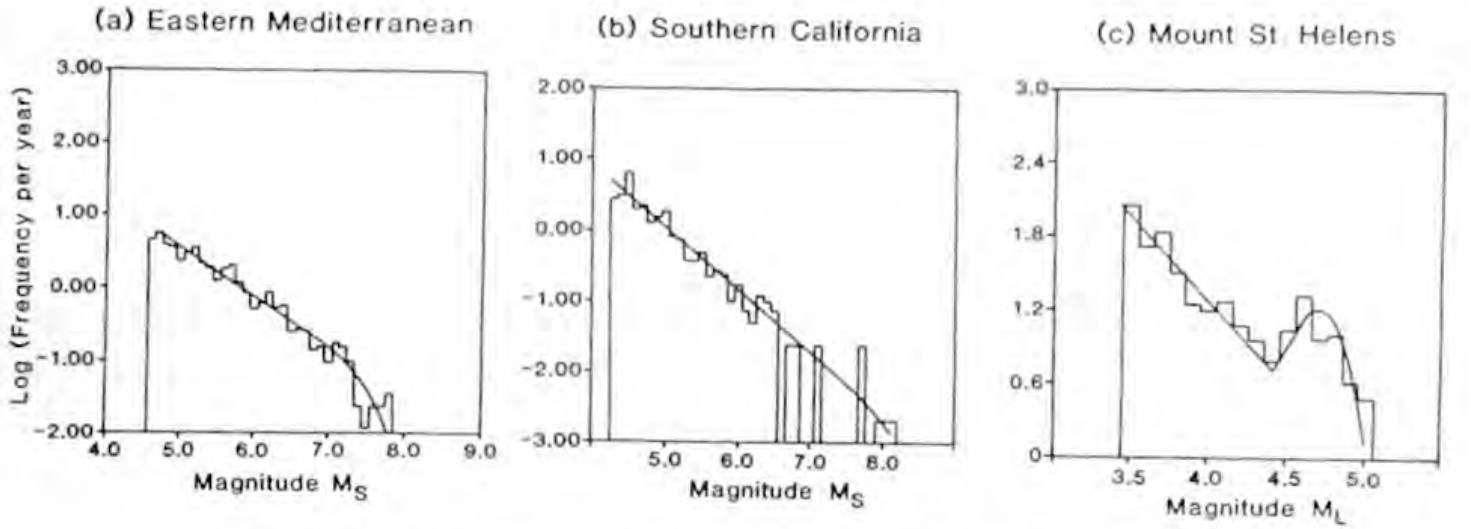
Characteristic earthquakes?



Singh, et. al., 1983, BSSA 73, 1779-1796



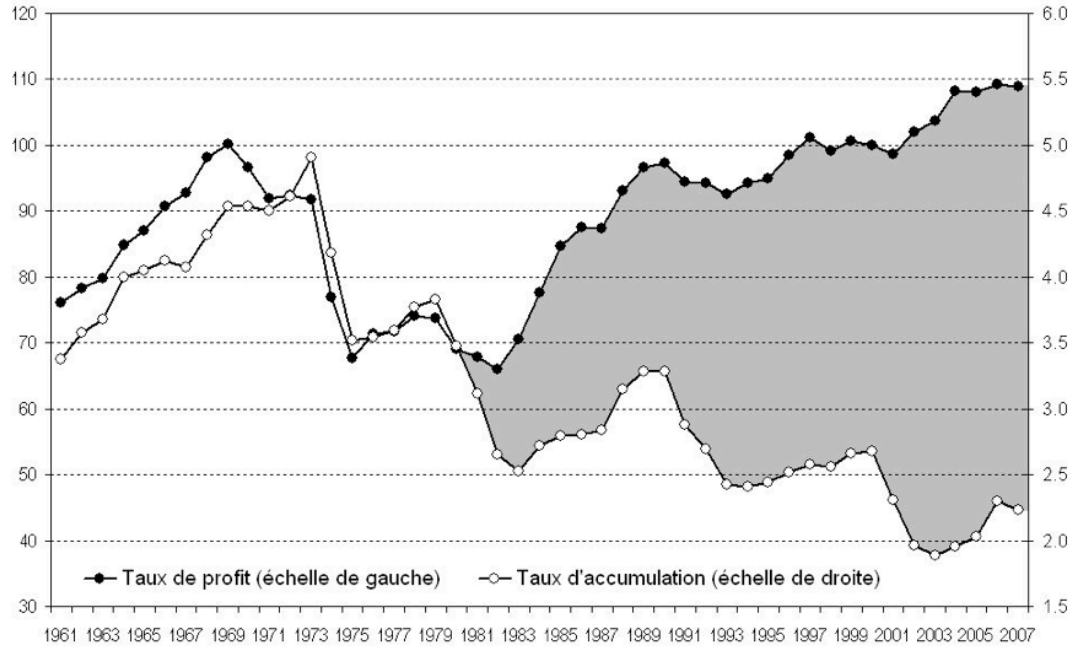
Knopoff, 2000, PNAS 97, 11880-11884



Main, 1995, BSSA 85, 1299-1308

A 13y 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)
- Solution? Financial Ratio Index (FRI)?

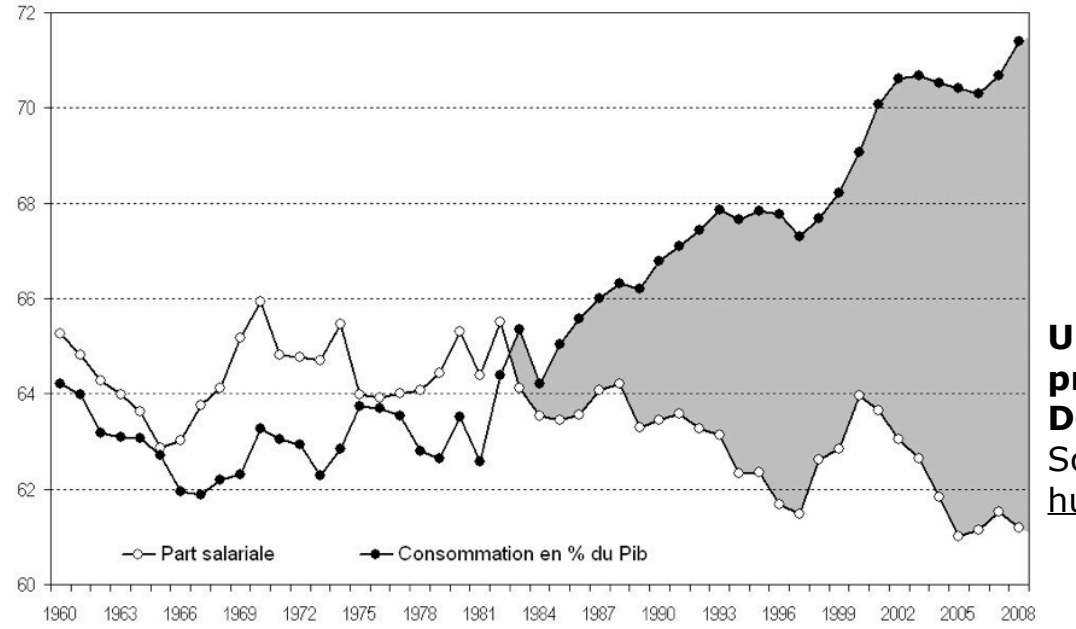


Rate of profit and rate of accumulation: The United States + European Union + Japan

* 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

Thee 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 growh... 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

- 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.

- As long as the incomes drawn from financial assets are re-invested, the fortunes increase independently of any material link with the real sphere and the variation can potentially become infinite.

- 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.

- Intelligence of the crowd: general loss of trust can be restored by removing uncertainty through frank clarification
- Fight moral hazard (ex: clawback permission...)
- Regulations (illusion of control and the law of unintended consequences)
- Development of culture of integrity and ethical behavior (informed by behavioral psychology)
- “Robust Investment” approach (W. Buffet)
- The overgrowth of the “financial economy” versus the “real economy”
- Financial Ratio Index (FRI) (total fixed assets + working capital, excess supply of money...)

Main Messages

- Do excesses exist? Financial bubbles?
- Why are they so difficult to identify? (academic view vs. practitioners vs Fed)
- Real-estate bubble and MBS bubble
- Why are they dangerous? Systemic risks
- What can be done? Better metrics vs. moral hazard and herding

Predictions and Preparation: complexity theory applied to such collective processes provides clues for precursors and suggests steps for precaution and preparation.

Why bubbles are not arbitraged 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

What are bubbles?
How do detect them?
How to predict them?

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.

Journal of Economic Surveys (2008)

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."