Learning Lessons? The Global Financial Crisis in Retrospect.

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ABSTRACT: The main contribution of this paper is a Timeline of the Global Financial Crisis (GFC) from 1720 to 2015. It is accompanied by analysis in which I distinguish between the sufficient conditions for the GFC (the conjunction of many things which occurred before the GFC, which were correlated with the GFC, and perhaps influenced it) and the necessary conditions for the GFC (those things without which the GFC would not have occurred). Is it possible to distinguish between elements of the two sets? Avoiding unnecessary regulation in the future, while ensuring against a repetition, would suggest that one must strive to do so, for policy reasons, as well as for understanding the paths that led to the GFC. I conclude that three conditions were necessary for the financial crisis in the U.S., which, in turn, resulted in the GFC. All were failures of regulation.

Keywords: Global Financial Crisis, timeline, necessary and sufficient conditions, regulation.

JEL Codes: G010, G180, R310

1. Preamble

IN ITS LEADER of October 13, 2008, the *Financial Times* (*FT*) characterized the western world's banking system as suffering "the equivalent of a cardiac arrest." The collapse of confidence in the system means that "it is now virtually impossible for any institution to finance itself in the markets longer than overnight." This occurred less than a month after Lehman Brothers (LB) collapsed, without bailout. Six months earlier Bear Stearns (BS) had been bailed out after JP Morgan Chase (JPM Chase) had bought it for $10 a share, at the regulator's urging. After LB fell, who would be next? And if LB, who was not at risk? Despite the earlier U.S. government bailouts of the erstwhile government mortgage originators (and still seen as government-sponsored enterprises, or GSEs), the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac), and the later bailout of the world's largest insurer, American International Group (AIG), everything changed with the demise of LB.

The *FT* was describing the freezing of the interbank credit market. After LB's fall, so-called counterparty risk was seen as prohibitive to prospective lenders, at any price. This was revealed in the TED spread, the difference between the cost of interbank

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1. Earlier versions of this timeline appeared in the December, 2008, and June, 2009, issues of *The Australian Journal of Management*, under the titles of "The dominoes fall: a timeline of the squeeze and crunch" and "Anatomy of a credit crisis," respectively. It was presented at the 2010 Conference of the Paul Woolley Centre for the Study of Capital Market Dysfunctionality University of Technology, Sydney, October, 2010. It has also been published in the *Journal and Proceedings of the Royal Society of New South Wales*, **146**(447 & 448): 3−16 and A1−A43, 2013.

lending, the London Inter Bank Offered Rate, or Libor, on three-month loans in U.S. dollars, and the closest instrument to risk-free, three-month U.S. government bonds. In normal times the TED spread is between 10 and 20 basis points (bp), or 0.10 and 0.20 percent per annum, but on October 10, the TED spread reached 465 bp, when a lender could be found. In November, 2008, it had fallen back to below 200 bp.

I sit in a coffee shop that sports the sign "We are cash only, sorry for the inconvenience :-)". I'm sure this is to avoid the hassle of credit cards, but such signs were massing off-stage in mid-October, 2008. How so? Imagine that banks refused to honour other banks' credit card debts. Then cash would soon become king for retail purchases. But what of letters of credit, used in international trade? What of other bank-backed credit instruments? And cash, fiat money, also relies on trust and confidence—of government. And where the government can't be trusted ... well, look at Zimbabwe.

Thankfully, the U.S., U.K., European and Australian governments understood the abyss that faced the world economy, and the U.K. action at supporting its ailing banks and guaranteeing interbank lending was soon imitated elsewhere. The 2008 financial crisis, although severe, has not been catastrophic. Millions, however, saw the value of their assets on the stock market dwindle, and millions more lost their houses and their savings. Alan Greenspan (2010) called it the once-in-a-hundred-years event.

The crisis was triggered by the bursting of the U.S. housing bubble, and U.S. housing prices tumbled as the crisis led to further sales to improve liquidity. Many also lost their jobs, at first in the finance industry, but later increasingly in the real economy.

But shed no tears for the shareholders or top managers of the U.S. finance companies. The best description I have seen of the process that resulted in the subprime (SP) mortgage meltdown is a piece by Michael Lewis (2008), author of *Liar's Poker*. Lewis gives a very insightful timeline of the unfolding of the crisis. Johnson (2009, 2010) argues that since none of the bankers has sought personal bankruptcy, and the banks have avoided harsh measures in the 2010 U.S. financial reform act, it constitutes a "quiet coup."

There are three kinds of indicators of the progress of the GFC: prices and interest rates in financial markets, the performance of firms in the finance industry (at least at first), and then government responses to the growing crisis. Using Lewis's description and the weekly updates in *The Economist*, I have put together my own timeline of the crisis, from the far past to the present. Except where otherwise indicated, all dollar amounts are U.S. dollars.

2. What Caused the GFC?

In June, 2009, almost two years after the first market signs of the GFC and following my editorials in two issues of the *Australian Journal of Management* (Marks 2008a, 2008b), as well as publishing a revised timeline of the GFC (in the June 2009 issue of the *Journal*, with an updated version below), it was time to begin attempting to answer the question of what caused the GFC. This is not simple. Many decisions and actions, by many individuals and organisations, came together to cause the GFC. Even asking whether it would still have happened absent any one of these decisions or actions is difficult to answer since it is counterfactual, and we can't run history again with this single difference in order to answer such questions.

Instead, in the timeline, I have listed decisions and actions that together accompanied the GFC, as well as market indications of the crisis, and subsequent government actions in attempting to alleviate the crisis. (I will not here engage in the debate of what government policies are appropriate except to say that apparently Richard Nixon was wrong when he claimed in 1971—over 40 years ago—that: “We are all Keynesian now.” Conservative politicians, both here and abroad, appear to be unaware of the merits of incurring short-term debt to pay for Keynesian stimuli and the virtues of the automatic macro stabilisers of the modern economy.)

Looking at the timeline (which is now much richer than the version I published in Marks 2008b and 2009), I count these significant events:

1. six changes to U.S. legislation from 1977 to 2008;
2. two changes in financial institutions’ ownership;
3. a change in corporate governance;
4. several new technologies;
5. a couple of market and extra-market events;
6. three regulatory changes that might have contributed to the financial crisis of 2008, and two changes that were in response to events in 2008; and
7. at least six changes in corporate behaviour.

I have also included several Cassandras—voices warning of danger who were ignored or, worse, shouted down, since 1994, but more prevalent in the two years 2007−2009. Accompanying these have been a series of denials, and, more recently, a number of admissions of prior mistakes. Before I discuss these in more detail, I repeat that it must remain a question of individual judgment about which of the earlier actions caused the GFC.

2.1 The six legislative changes

The six legislative changes are all in the U.S.A. In 1977 U.S. banks were offered incentives to lend to poor people.[2] In 1980, usury controls for U.S. mortgages were lifted, allowing higher interest rates for risky borrowers.[3] In 1988, discrimination in the U.S. mortgage market was outlawed.[4] In 1999, many 66-year-old restrictions on U.S. banks were lifted, and bank regulation was eased.[5] In 2000, self-regulation of derivatives was affirmed, and some (such as the then recently invented credit default swaps, CDSs) were explicitly exempted from state gaming regulations.[6] In 2008, the (new) regulator was given the power to place government-sponsored enterprises (GSEs), such as Fannie Mae and Freddie Mac, into receivership or conservatorship.[7] It is debated whether this was a

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2. 1977 October 12: *The Community Reinvestment Act*.

3. 1980 March 31: *The Depository Institutions Deregulation and Monetary Control Act*.

4. 1988 September 13: *The Fair Housing Act*.

5. 1999 November 12: The Gramm-Leach-Bliley *Financial Services Modernization Act* repeals the Glass-Steagall Act of 1933.

6. 2000 December 21: *The Commodities Futures Modernization Act*.

cause or an effect of the financial crisis (McLean 2009).

Since the GFC was triggered by the bursting of the U.S. housing bubble (which, as Greenspan (2010) points out, unlike the 1987 stock-market collapse or the “tech wreck” of the early noughties, was not limited in the extent of its impacts), it is appropriate to focus on U.S. legislation. Both sides of politics saw political advantages in increasing home ownership, which, in itself, need not have led to the housing bubble—other countries, such as Australia, have also encouraged home ownership, without (yet) bursting housing bubbles, and without such consequences in the aftermath of a housing crisis.

Of these legislative changes, with hindsight, the repeal of the 1933 Glass-Steagall Act was the most significant: not the elimination of the geographic limits on bank operations, but rather elimination of the distinction between trading banking and investment banking. Given the disappearance of the investment-bank partnerships (starting with Salomon Brothers in 1981 (see below)), the banks’ managers now faced strong incentives to grow. Which they did: the market share of the five largest U.S. banks rose from 8% in 1995 to 36.5% in June 2010.

Of course, after LB the powers that be decided that AIG and the rest were “too big to fail” (TBTF), a policy that has since been repudiated by King (2009) and even Greenspan (2010), and which raises issues of “moral hazard:” not only do managers of TBTF institutions take more risks than managers of smaller institutions, the risks they pose to counterparties are lower and so their costs of capital are lower than the costs charged to small institutions. This is a recipe for even greater concentration in future.

If there were economies of scale for larger banks, then at least there might be some upside to this growth, but Greenspan (2010) and others argue that there is no evidence of such economies, once banks have grown beyond a relatively small size.

2.2 Changes in financial institutions’ ownership

The changes in financial firm ownership occurred over 18 years: in 1981 the first of the Wall Street investment banks, Salomon Brothers, previously a private partnership—as were all such investment banks then—sold itself, to become a publicly traded corporation.[8] The other banks followed suit, until the last, Goldman Sachs, went public in 1999. They were now using what was predominantly other people’s money. In 1997, the U.K. building society (or thrift), Northern Rock, demutualised to become a bank, the first of several.[9] Ten years later Northern Rock would experience the first bank run in the U.K. since 1866.

Changes from partnerships to private corporations are significant because of the changes in incentives that occur. Venturing their own money, private partners are less likely to take extravagant risks than are managers putting others’ money at risk, especially if their annual bonuses are tied to the amount of fees the company receives from its clients and if there is a period of at least a year before any chickens come home

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7. 2008 July 30: The *Federal Housing Finance Regulatory Reform Act*.

8. 1981 August 1: Salomon Brothers, a private partnership since its founding in 1910, sells itself to Phibro Corp., a commodities firm.

9. 1997 October 1: Northern Rock floats as a demutualised building society.

to roost. Moreover, if there is no clawback provision to penalise employees whose judgment later turns out to have been misguided or wrong, then observers should not be surprised if unduly risky decisions are made.

This, after all, is what happened in the U.S. subprime mortgage market, with mortgages securitised and diced and repackaged. Moreover, the companies relied on to adequately signal the riskiness of these opaque financial instruments, the credit rating agencies (CRAs), also faced the perverse incentive that it was the sellers of these instruments, not the buyers—those who stood to lose if the ratings were inadequate—who were the customers of their services.

The credit ratings history of a single instrument—a residential mortgage pool put together by GS called GSAMP 2006-S5—exemplifies the issues of opaqueness and perverse incentives: when issued in August 2006 the best tranche in the pool was rated (twice) at AAA; a year later it was down-rated to Baa, the lowest investment grade; four months later it was down-rated to "junk;" four months later it was further down-rated; by the end of 2008 it was no longer being traded. While GSAMP 2006-S5 might have been a once-off, sadly it is merely a representative of a myriad similar instruments.

The CRAs, by charging fees to the companies whose products they rated, also faced perverse incentives. Indeed, there was potentially a clear conflict of interest, as Hannover Re's experience can attest.[10] Moreover, since the CRAs played a mandated role since the 2004 Basel II Accord, any shortcomings in their performance could (and did) have a serious effect during the crisis. The very existence of CRAs is a testament to the existence of asymmetric information; failures of theirs contributed to overall market failure.

The issue of incentives is pervasive in the GFC: even absent the spillover effects of the systemic risks associated with the SP mortgage bubble, if the incentives are perverse, then the actions of the actors will be perverted. In this case, it is foolish to expect efficient outcomes.

2.3 Change in corporate governance

The change in corporate governance occurred in 1993, when American International Group (AIG) took control of Financial Products (FP), whose activities later crippled AIG.[11]

The alliance between AIG and FP, although a once-off, highlights the issue of the subsidiary of an insurance company betting the house in activities not central to insurance. That AIG had bought a thrift specifically in order to fall under the regulation of the Office of Thrift Supervision (OTS), a prime example of regulator shopping, is another example of AIG straying from insurance.

Moreover, there is another issue of incentives here: the entire budget of the OTS is paid by assessments on the institutions it regulates. And the OTS, a later report finds, despite overseeing several companies that are primarily insurers, had only a single employee with expertise in insurance. AIG was the world's largest insurer.

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10. See the entry of March 2003.

11. 1987 January 27: American International Group (AIG) and Financial Products (FP), a new risk-management firm, sign a joint venture agreement.

2.4 Several new technologies

The new technologies are: the 1977 invention of the first of many credit derivatives,[12] including credit-default swaps (CDSs) in 1997,[13] whose use later laid AIG low; and the 1983 invention of the collateralised mortgage obligation (CMO), which extended earlier invention of the (mortgage-backed security) MBS.[14]

The new technologies developed in the financial sector have been touted as improving the ability of the industry to handle risk, an increase of efficiency that has been reflected in the more than doubling in the value added in the finance and insurance sector as a share of U.S. GDP (from 3½% to almost 8%) in the fifty years from 1960 (Greenspan 2010, Exhibit 7). And yet others, such as Paul Volcker, doubt that the newly invented derivatives have been such a boon; indeed, the very opacity of their value contributed to the freezing of the short-term credit market that the editorial in the October 2008 *FT* was referring to above, and their lack of transparency has been a high price to pay for any gains in efficiency.

An ongoing research project could, perhaps, demonstrate the social contribution of the financial sector.[15] This is important given several things: the growth of the relative size of the sector in advanced economies (and the U.K. it was proportionately five times larger than in the U.S., according to Mervyn King); the damage caused to entire economies by the events of 2008; and not least by the size of the remuneration packages received by top managers in the sector, even in the wake of the GFC and when institutions were in receipt of government bail-out payments.

The asymmetric information that their lack of transparency exemplifies—where few if any truly understand the value of such derivatives as CDSs—should remind us that General Equilibrium Theory (GET) assumes full information, inter alia. Indeed, some have called GET "utopian economics" (Cassidy 2009), and contrast the elegance but unreality of this theory with "realistic economics," with its "hidden information," spillovers, and other forms of market failure. Is it an ideology to believe in the Platonic ideal of GET in the face of forty years of research which has shown that it is an ideal, but not realistic? How long after the events of 2008 will it be before some erstwhile believers forget the flaws in the GET and return to the fold?

2.5 Market and extra-market events

In 1998, Russia defaulted, which led to the rescue of Long-Term Capital Management (LTCM), but no increase in regulation;[16] indeed, the 2000 *Commodities Futures Modernization Act* expressly excludes derivatives from any state or federal regulation,

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12. 1977: With the Bank of America (BofA), Salomon Brothers issues the first privately backed mortgage-backed securities (MBSs).

13. 1997 December: A team at JP Morgan (JPM) develop many of the credit derivatives that are intended to remove risk from companies' balance sheets.

14. 1983 June: Larry Fink is the co-inventor, for Freddie Mac, of the collateralised mortgage obligation (CMO).

15. But see Shiller (2012).

16. 1998 September 23: LTCM is saved.

despite analysis done after the near catastrophe of 1998. In 2001, the Al Qaeda attacks[17] and the earlier bursting of the tech bubble led to a permissive monetary policy (with low interest rates), that, Taylor (2007) and other argue, was sustained for too long, resulting in global financial imbalances. Greenspan (2010) argues that these low short-term rates had little effect on mortgage rates, and so cannot be held responsible for the subprime blowout.

The issue of the lack of savings in the U.S. and the lack of consumption elsewhere, most particularly in China, with a resulting global imbalance, might be seen as another cause of the U.S. housing bubble. And yet it might also be seen as a consequence of U.S. consumption: the Chinese (and other creditor nations) stepped in to fund U.S. consumption by buying U.S. government debt, U.S. Treasuries. I leave it for others to continue this debate.

2.6 Recent regulatory changes

In 2004, the U.S. Securities and Exchange Commission (SEC) relaxed the minimum capital requirement for securities firms and investment banks, leading to much higher bank leverage.[18] In 2007 the SEC eliminated the "uptick" rule for short sales of securities.[19] But in 2008, as a reaction to the evident crisis, the SEC began tightening regulations: in July banning "naked" short selling of several financial corporations;[20] in September tightening its 2004 relaxed capital requirements for investment banks (closing the stable door?);[21] and in October the Congress was told that the SEC had only one officer left in the Office of Risk Management.[22]

The two changes of July and September were taken in response to the collapsing mortgage market and the behaviour of the Wall Street investment banks in increasing their gearing the previous years. The earlier actions (including the underinvestment in risk management at the SEC) exacerbated the crisis, when it came: the Consolidated Supervised Entities program of the SEC was introduced in order to convince the Europeans that the U.S. investment banks operating in Europe were adequately supervised in the U.S., after pressure from the top brass of the Wall Street investment banks, who were evidently responding to a belief that the Europeans would be tougher regulators than those at home; the evidence of later testimony that the SEC was underinvesting in its risk management office tends to support their beliefs. The subsequent rise in gearing only made things worse in 2008. It remains to be seen whether abolition of the uptick rule had any effect: some believe that it might have strengthened

17. 2001 September 11: The destruction of the World Trade Center.

18. 2004 July 21: The SEC launches the "Consolidated Supervised Entities" program.

19. 2007 July 6: After 73 years, the SEC eliminates the "uptick rule."

20. 2008 July 21: The SEC bans "naked" short selling of the stocks of Fannie Mae and Freddie Mac and 17 large finance companies.

21. 2008 September 25: The SEC abolishes the 2004 "Consolidated Supervised Entities" program.

22. 2008 October 7: Before the congressional Committee on Oversight and Government Reform, the former chief accountant at the SEC reveals that the SEC's Office of Risk Management was cut back to a single employee.

the short sellers' impacts, but not everyone believes that short selling should be proscribed, even in extremis. Moreover, in the decades during which the rule was in place, the minimum "tick" had been revised from an eighth of a dollar down to a cent.

2.7 Changes in corporate behaviour

Over the past forty-odd years there have been many changes in corporate behaviour: in the 1970s, Moody's started charging fees to finance companies, rather than their customers;[23] in 1986 American pension funds started buying CMOs, their first investments in home mortgages;[24] in 1987 international banks started buying CMOs;[25] in 1998 trade in CDSs began, between AIG and JPM;[26] in 1999 Fannie Mae eased the credit requirements on mortgage loans it would buy from banks and other lenders;[27] in 2004, after the SEC's agreement to relax capital requirements for investment banks, Merrill Lynch's capital ratio rose to 40:1 (or 2½%);[28] in 2005, after its credit rating fell to AA from AAA, and it had to post an additional $1.16 bn collateral, AIG stopped writing new CDSs, although pre-existing contracts exist as I write. [29] The issuance of SP mortgages, virtually non-existent at the beginning of 1995, peaked at $125 bn in Q4 2005, only to collapse to none three years later.[30] Without these "toxic" instruments, the firms down the line left holding the contracts would not have suffered the losses they did after the housing bubble burst, and the credit crash would not have become a financial crisis, which in turn would not have become the Great Recession, affecting people around the globe.

I do not subscribe to the view that the managers of the institutions, by and large, were miscreants.[31] I believe that they were responding to the incentives they faced. If their actions are now seen to have contributed to the GFC, or at least to the financial crisis in the U.S. in 2008, it was because of the incentives the system provided them, although the GS trader found guilty of securities fraud in August 2013 might not be the last.

The changes in corporate behaviour highlighted here, as well as other changes listed in the Timeline, are a function of these incentives, and in many cases, the incentives

23. 1970s: The CRA Moody's begins to charge fees to the companies whose products it rates, instead of the potential customers of these products.

24. 1986 June: American pension funds hold about $30 bn of CMOs; three years ago none.

25. 1987: The London office of Salomon Brothers sells $2 bn of the first tranche of CMOs to international banks.

26. 1998: AIG FP begins to write CDSs, at first with JPM.

27. 1999 September: Fannie Mae eases credit requirements on mortgage loans it will buy from banks and other lenders.

28. 2004 July 21: Before the "Consolidated Supervised Entities" program, leverage of 12:1 is typical; after, more like 33:1 (and up to 40:1 in the case of ML).

29. 2005 March 15: AIG's credit rating falls to AA from AAA; as a result, AIG has to post $1.16 bn in collateral for AIG FP's existing positions, and by the end of 2005 AIG FP stops writing CDSs.

30. 2006: In Q4 2005 the issuance of SP mortgages peaked at $125 bn.

31. Ferguson (2012) argues strongly that many banking executives were miscreants.

banking executives faced were a function of the beliefs of the regulators that the markets are always efficient. For example, Alan Greenspan stated that, in many ways, "private counterparty supervision remains the first line of regulatory defense." He argued that firms' reputations would keep them honest. Later, he expressed surprise that this had not occurred. Nobel Laureate Stiglitz (2009) stated that his professional career has been devoted to exploring the consequences of one form of market failure—asymmetric information—that should have given true believers pause, but did not.

We should not be surprised that some banking executives lobbied, and lobbied successfully, for the regulators and legislators to alter the incentives they faced. The 1999 Gramm-Leach-Bliley Act that repealed the Depression-era Glass-Steagall Act is the most prominent example. Another is the SEC's 2004 introduction of the Consolidated Supervised Entities program, whose advent occurred much to the satisfaction of the lobbyists.

We have attempted to identify proximate causes of the GFC. Any deeper explanation of how and why these changes occurred when they did must await a more profound analysis.

3. Which Conditions were Sufficient?

In Weisberg's words (2010): There are no strong candidates for what logicians call a sufficient condition—a single factor that would have caused the crisis in the absence of any others. There are, however, a number of plausible necessary conditions—factors without which the crisis would not have occurred.

We have considered a range of possible causes above: changes in legislation, changes in ownership, changes in corporate governance, new technologies, market events, changes in regulation, and changes in corporate behaviour. I would rule out some of these as causes, in the sense that they played little if any part in the unfolding of the crisis, which would likely have occurred in their absence.

I do not believe the change in corporate governance at AIG (its alliance with FP) was a cause, even if the FP division was riding on the insurers' AAA credit rating, and earning much revenue for AIG: in fact the fall in AIG's credit rating was not caused by the activities of FP, although the re-rating had a clear impact on FP and AIG.

The only possible influence of the 1998 failure of LTCM (in the absence of regulation of derivatives the event might have led to, absent the strong opposition that prevented this) could have been that the moral hazard associated with "too big to fail" became clearer to the Wall Street investment banks: but there were so many other factors changing that it would be difficult to point to the LTCM failure and bailout as having any influence, in the absence of first-person testimony.

As I remarked above, there is no clear picture whether global imbalances were a cause or an effect of Americans' consumption and the saving habits of Chinese households: the imbalance in household saving/consumption patterns is reflected in the flows of capital and goods across the Pacific. I leave it to others to discuss this further.

There is no evidence that abolition of the uptick rules had any impact on the unfolding of events. At most, it might have made short selling of the stocks of compromised financial institutions easier, but there is no compelling evidence that such short selling, let alone the absence of the uptick rule, exacerbated the unravelling of the financial markets in 2007 and 2008.

Many of the changes in U.S. laws and regulations were in response to the development of new analyses (such as the Black-Scholes technique for pricing options) and new technologies that many believed (and still do) had improved the efficiency of the allocation of risk and intermediation of the financial markets.[32] In this case, lobbyists argued, why not relax the restrictions, some of which dated back seventy or eighty years?

Subsequently, restrictions were eased on mortgage lending, on the operations of banks and investment banks; new technologies, such as derivatives, were protected from what were evidently seen as heavy-handed regulators; investment banking partnerships became banking corporations, and owners became managers (of other people's money). These new technologies relied on the use of higher mathematics, but were often constructed using simplifying assumptions (such as normally distributed events) which later turned out to be wrong.

And the financial institutions responded to the changes in incentives and opportunities that resulted (often as a response to pressure on legislators and regulators from these same institutions' managers): gearing was increased; new lending with less restrictive criteria for approvals (SP mortgages, for instance) took place; there were incentives to push for easing in more regulations and to develop new forms of derivatives.

Moreover, as Charles Prince's famous quote (of July 9, 2007) confirmed, firms could not afford to decline to dance, to engage in these activities on the back of the growing housing bubble—to do so would be to lose out to one's competitors, both corporate and peers, a situation not unlike an *n*-person Prisoner's Dilemma, or the famous Tragedy of the Commons. But then that's what John Biddulph Martin was describing after the South Sea Bubble in 1720.

4. Personalities?

In the first version of the timeline, I deliberately avoided referring to individuals because I then believed the crisis was a systemic failure rather than the consequence of individuals' actions. This view is similar to that espoused in Posner (2009). In this version, I have included people's names and have also given their highest university qualification, since I think it is impossible to understand how the crisis evolved while ignoring the identities of the players, for good or ill. This approach is closer to that of Tett (2009) and others. But I do not believe that any are to blame for the crisis.

The crisis did not crept up on us completely unawares. A number of Cassandras tried to warn us (or at least the U.S. Congress): James Bothwell in 1994; Brooksley Born in 1998 and 1999; Ed Gramlich in 2004; Timothy Geithner in 2004; Raghuram Rajan in 2005; Ben Bernanke in 2005 and 2007; Richard Hillman in 2007; John Taylor in 2007; Meredith Whitney in 2007; Warren Buffett in 2007, 2008 and 2009; C.K. Lee in 2008; George Soros in 2008; and, Paul Volcker in 2009 (somewhat after the event).

But these brave men and women had little, if any, impact or were too late. Arrayed against them were the optimists, most significantly Alan Greenspan, Robert Rubin, Arthur Levitt Jr., Hank Paulson, Larry Summers, Joe Cassano and Dick Fuld. Whether self-interest or ideological blindness, or a mixture of these, led to the optimists'

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32. The sector has clearly grown in relative size in the U.S. and the U.K.; whether there was a commensurate benefit to these economies before 2007 remains to be demonstrated.

arguments is not yet clear.

After the crash had arrived, it is true, Alan Greenspan did accept "partial" responsibility and later he allowed that temporary bank nationalization might be appropriate "once every century." Ben Bernanke has also spoken of the lack of regulation of AIG's financial activities, and the consequences. Others in positions of authority have been mute; perhaps they are writing their memoirs.

5. Europe

Beyond the U.S., the sub-prime mortgage debacle has triggered a sovereign debt crisis in the eurozone. The transmission link was that European banks had bought large numbers of mortgage-backed securities based upon U.S. home loans. As the crisis developed, many of these loans turned bad, and in some cases imperiled the banks. In Iceland, the banks failed. In Ireland and elsewhere the government announced guarantees: the private debt was replaced by sovereign debt. The next problem was the size of the bad debts, together with the flight of bank deposits as the plight of the banks became clearer. The size of the banking system in some European countries is much larger than the national economy (in Ireland's case, over twice the size). Hence the government guarantees had a significant impact on the governments' sovereign debt, as reflected in rising government bond rates: the riskier the sovereign debt, the higher the rate. Moreover, higher sovereign debt, together with political pressure for government austerity, led governments to cut their deficits. This in turn weakened their economies.

In the case of Iceland, the local currency, the krona, collapsed, which caused pain for households that had borrowed in foreign-currency-denominated loans, but the massive devaluation provided a fillip for Icelandic exporters and so for the whole economy. Within the eurozone, however, devaluation is not an option. Its problem is that monetary union, with the common currency, is flawed: monetary policy is determined by the European Central Bank in Frankfurt, but there is no lender of last resort (such as the U.S. Fed) or European bank regulator or, most importantly, no common fiscal policy. This means that no single country in the eurozone can devalue its own currency, and it also means that there is no means for the better performing regions of Europe to support the worse performing regions, in contrast to the U.S., where Florida (and Floridians), hard hit by the bursting of the housing bubble, were supported by payments from U.S. taxpayers.

In the absence of fiscal union, the Maastricht Treaty, which sets out the necessary conditions for the monetary union that produced the euro, required annual national debt of no more than 3% of GDP and accumulated national debt of no more than 60% of GDP, inter alia. For a country to join the eurozone, it is necessary that its government budget satisfy the Maastricht conditions, an imperfect substitute for fiscal union. After the euro was launched, the Maastricht conditions were relaxed somewhat, and no country in the eurozone now satisfies the 60% limit. The case of Greece is unique, since its reported government budget before joining had been manipulated to appear to satisfy the Maastricht requirements, on advice from Goldman Sachs.

How the eurozone sovereign debt crisis will be resolved is unclear as of this writing. Both debtors and creditors (not least the northern creditor banks) would stand to lose if any country left the eurozone, an eventuality which was not envisaged in the Maastricht Treaty. At the same time, there is reluctance to advance fiscal union (which would require a loss of sovereignty by individual countries) or to develop a common banking regulator or to declare a lender of last resort for the eurozone. Are the capital controls recently introduced in Cyprus the first split in the eurozone?

6. Conclusions

In an earlier paper in this *Journal*, May (2011) pointed to the GFC as one of several pressing public policy issues that require rigorous analysis as a step towards appropriate policy. This paper is an attempt to begin such rigorous analysis, at least of the proximate causes of the GFC. To understand how the underlying political environment had changed in the 75 years since the Great Depression, changes which allowed the triggers discussed above to occur, would require deeper analysis of the political economy of regulation and legislation in the U.S. and beyond, an analysis I do not attempt here.

In summary, I believe the crisis was brought on mainly by three actions in the U.S.: first, the repeal on November 12, 1999, of the Glass-Steagall Act of 1933 (prohibiting the consolidation of financial institutions and insurance corporations), which led to a vast increase in the market dominance of the major banks; second, the Congressional decision enshrined in the *Commodities Futures Modernization Act* (signed into law by President Clinton on December 21, 2000), which explicitly exempted derivatives from government regulation; and, third, the SEC’s decision on July 21, 2004, to relax the capital adequacy requirements of Wall Street banks, which allowed them to expand their leverage threefold or more. These were failures of regulation, not acts of venality. The failures of the CRAs were a symptom of the existence of asymmetric information, a form of market failure. Another way of looking at what happened is that, like the Prisoner’s Dilemma or the Tragedy of the Commons, it was a phenomenon where individually rational actions were collectively irrational: no investment bank could afford not to trade in credit default swaps, since others would do so at the first bank’s competitive expense, but the eventual aggregate outcome was the credit crisis. Such phenomena cannot be resolved by individuals alone, however well meaning they might be; instead, they require effective regulation, which failed here, over a period of years.

Please email me (robert.marks@gmail.com) for references to any specific item in the timeline, or any other comments. An updated version of the timeline is available on-line, at http://www.agsm.edu.au/bobm/papers/marksfinal.pdf. Note that dollars are U.S. dollars throughout.

The Timeline

1720 June: John Biddulph Martin of Martin's Bank, an English banker who buys into the South-Sea Co. at £500 per share after they have risen from £100, only to lose the lot, "When the rest of the world are mad we must imitate them in some measure."

1776 March 9: In *The Wealth of Nations*, Adam Smith advocates preventing banks from issuing notes to speculative lenders: "Such regulations may, no doubt, be considered as in some respects a violation of natural liberty. But those exertions of the natural liberty of a few individuals, which might endanger the security of the whole society, are, and ought to be, restrained by the laws of all governments." [1−3, 423−24]

1899: Thorstein Veblen's *The Theory of the Leisure Class* is published in London by Macmillan. He argues that consumption is driven by *envy*, not *greed*; hence his term, "conspicuous consumption," made easier with easy credit. (See also the late Fred Hirsch's *The Social Limits to Growth*, H.U.P., 1976.)

1900: Louis Bachelier publishes his Sorbonne PhD thesis, *Théorie de la spéculation*, the first work to discuss the use of stochastic, Brownian motion to evaluate stock options.

1909: John Moody publishes the first publicly available bond ratings, focused entirely on railroad bonds; investors pay for the ratings.

1936: U.S. bank regulators prohibit banks from investing in "speculative securities" (or "junk bonds") using the CRAs.

1938: The Roosevelt administration founds Fannie Mae as a government program to buy mortgages from lenders, to free up capital for other borrowers, such as low- and middle-income households who might not otherwise be considered creditworthy. It starts with $1 bn in purchasing power.

1944 July: At Bretton Woods, N.H., 44 nations agree to the dollar replacing the pound sterling as the world's reserve currency. Given other countries' current-account surpluses, the U.S. becomes the "consumer importer of last resort."

1968 August 1: President Lyndon Johnson's *Housing and Urban Development Act* creates both the first mortgage-backed securities and the first subprime loans. In turn, the U.S. Government National Mortgage Association (Ginnie Mae), overseen by the Department of Housing and Urban Development (HUD), will buy these mortgages, and in tandem with Fannie Mae (now converted to a publicly traded company owned by investors, taking it "off-budget"), repackage them as mortgage-backed securities for sale to investors.

1970: To provide competition for Fannie Mae, the Nixon administration founds Freddie Mac, another GSE. It goes public in 1989.

1970: The New York Stock Exchange (NYSE) agrees to allow dealer-brokers to sell their shares to the public. (They had been allowed to incorporate in the 1950s.) The first brokerage firm to do so is Donaldson, Lufkin & Jenrette.

1970 February: The Nixon administration presides over the first mortgage-backed security sale. Ginnie Mae issues a new type of bond known as a residential mortgage-backed security (RMBS); the first one is backed by $7.5 million of loans originated by Tower Mortgage. But the program will be frozen in 1971 by HUD secretary George C. Romney because of predatory lenders and unscrupulous house flippers defrauding first-time home buyers.

1973 May: Fischer Black and Myron Scholes publish “The Pricing of Options and Corporate Liabilities,” which includes the Black-Scholes formula for pricing options.

1975 June 26: The Securities and Exchange Commission (SEC) allows U.S. banks to base their capital requirements on the credit rating agencies’ (CRAs) ratings of the securities they hold.

1975 May 1: The SEC abolishes the custom of charging customers a fixed commission to trade stock.

1977: With the BofA, Salomon Brothers’ Lewis Ranieri (BA St.Johns) issues the first privately backed MBSs. He is reputed to have coined the word “securitization.”

1977 October 12: *The Community Reinvestment Act* offers U.S. lending institutions incentives to issue loans to low-income borrowers.

1978: “There is no other proposition in economics which has more solid empirical evidence supporting it than the efficient-markets hypothesis,” asserts Michael Jensen (PhD Chicago ’68).

1970s: The CRAs—Moody’s, Standard & Poor’s—begin to charge fees to the issuing companies whose products they rate. Previously, potential investors of these products paid for the ratings. A clear potential conflict of interest.

1980 March 31: *The Depository Institutions Deregulation and Monetary Control Act* eliminates all usury controls on U.S. mortgage rates, permitting lenders to charge higher rates of interest to borrowers who pose elevated credit risk, including those with weaker or less certain credit histories.

1981 August 1: Salomon Brothers, a private partnership since its founding in 1910, sells itself to Phibro Corp., a commodities firm. The new entity will be known as Phibro-Salomon Inc. until 1986, when Salomon gains control and changes the name of the parent company to Salomon Inc. This is the beginning of the transformation of Wall Street investment banks from private partnerships to publicly traded corporations, which is completed when Goldman Sachs (GS) goes public in May 1999.

1982 October 15: The Garn-St. Germain *Depository Institutions Act*, that ends the restrictions on mortgage lending introduced in the 1930s after the financial crisis of the Great Depression, is signed into law by President Reagan (Eureka BA ’32).

1983 June: Larry Fink (UCLA MBA ’76), a bond trader at First Boston, is the co-inventor, for Freddie Mac, of the collateralised mortgage obligation (CMO), which slices packages of mortgages into several different “tranches” of risk, rated and sold separately as securities, with corresponding interest rates: the riskier, the higher. Freddie Mac issues its first CMO. Larry Fink will found BlackRock in 1995.

1984: The British Bankers Association (BBA) issues the first Libor interest rate, as a benchmark for the growing number of new financial products.

1985 March: For Sperry Lease Finance Corp., First Boston sells the first non-mortgage, asset-backed securities.

1986 June: American pension funds hold about $30 bn of CMOs; three years before none of their $600 bn of assets was invested in home mortgages.

1987: The London office of Salomon Brothers sells $2 bn of the first tranche of CMOs to international banks looking for higher-yielding short-term investments.

1987 January 27: American International Group (AIG) and Financial Products (FP), a new risk-management firm, sign a joint venture agreement. FP will use computers, derivatives, and AIG's AAA credit rating.

1988: Citibank invents the Structured Investment Vehicle (SIV). At their peak in July 2007 SIVs will have over $400 bn under management, but will have vanished two years later.

1988 January: Between June 1983 and January 1988, $60 bn of CMOs have been sold by Wall Street investment banks: a boost to American home finance.

1988 March 8: The *New York Times* (*NYT*) editorialises: "Few economic historians now find the logic behind Glass-Steagall persuasive." It argues for "modernizing Depression-era regulation of financial services."

1988 July: The Basel I accord is published, stipulating a set of minimum capital requirements for banks, which will be enforced in law by the G-10 countries in 1992. These make holding bank capital and ABSs expensive for a bank, depending on the CRAs' ratings. A loophole means that banks can provide a liquidity facility to a SIV of up to 360 days without holding capital against it, so long as it is undrawn.

1988 September 13: *The Fair Housing Act* of 1988 prohibits discrimination in the U.S. housing market. In mortgage lending: No one may take any of the following actions based on race, color, national origin, religion, sex, familial status or handicap (disability): Refuse to make a mortgage loan; Impose different terms or conditions on a loan, such as different interest rates, points, or fees; Refuse to purchase a loan; or Set different terms or conditions for purchasing a loan.

1989 August 9: As part of the *Financial Institutions Reform, Recovery and Enforcement Act*, the Office of Thrift Supervision (OTS), an agency of the U.S. Treasury, is established to regulate federal savings banks and savings and loans, as a consequence of the savings-and-loans crisis. The entire budget of the OTS is paid by assessments on the institutions it regulates, several of which will fail in the GFC.

1990: JPM becomes the first bank to receive permission from the Fed to underwrite securities, so long as its underwriting business does not exceed 10% of its revenues.

1990 September 22: The *NYT* editorialises in favour of repealing the Glass-Steagall Act of 1933: It "was passed in part ... [because of] a belief ... that banks and stocks were a dangerous mixture."

1991 December 10: The Maastricht Treaty is agreed, setting up an "irrevocable" monetary union, without a central finance ministry or a mechanism for countries to abandon the euro.

1992: The Bush administration passes the *Federal Housing Enterprises Financial Safety and Soundness Act*, ostensibly to avoid a repeat of the Savings & Loan bailout. It imposes new affordable-housing goals on Freddie and Fannie, requiring them to accept loans with deposits of 5% or less, and to accept customers with poor credit histories.

1992 September 16: Europe's Exchange Rate Mechanism (ERM) is broken when the U.K. is forced to exit the currency regime, a precursor to monetary union. George Soros (LSE BSc '52) reportedly makes $1 bn short-selling the pound. Italy later exits and the Spanish peseta, Portuguese escudo, and Irish punt are devalued.

1993 August: AIG gains control of FP. AIG chief Maurice "Hank" Greenberg (NY Law School '50) says, "You guys up at FP ever do anything to my Triple A rating, and I'm coming after you with a pitchfork."

1993 November 1: The Maastricht Treaty on European Union comes into force, with four rules for Economic and Monetary Union (the eurozone), purely a monetary union. There are two rules for government finance: the annual Government Deficit should not exceed 3% of GDP, and the Gross Government Debt should not exceed 60% of GDP. They do not include fiscal (spending and taxing) union or eurozone regulation of financial institutions (bank supervision, recapitalisation, deposit insurance, and regulation).

1994 May: A U.S. Government Accounting Office (GAO) report (leader: James Bothwell, UC Berkeley PhD '76) entitled, "Financial Derivatives: Actions Needed to Protect the Financial System," warns that: "the sudden failure or abrupt withdrawal from trading of any of [the 15 major over-the-counter (OTC) derivatives] dealers could cause liquidity problems in the markets and could also pose risks to the others, including federally insured banks and the financial system as a whole." And that: "the federal government would be likely to intervene to keep the financial system functioning in cases of severe financial stress." And that: "in some cases intervention has and could result in industry loans or a financial bailout paid for by taxpayers."

1994 May: In congressional testimony responding to the GAO report, Alan Greenspan (NYU PhD '77, the Chairman of the Board of Governors of the U.S. Federal Reserve, the Fed) says, "Risks in financial markets, including derivatives markets, are being regulated by private parties ... There is nothing involved in federal regulation per se which makes it superior to market regulation."

1996 December 13: In the absence of a euro finance ministry, European Union (EU) leaders consent to a German-inspired "stability pact" designed to impose financial penalties on countries that overstep deficit limits.

1997 January 7: *The Taxpayer Relief Act* exempts most U.S. home sales from capital-gains taxes.

1997 October 1: Northern Rock floats as a demutualised building society. Other demutualisations include Alliance & Leicester, Halifax/HBOS, and Bradford & Bingley.

1997 December: Blythe Masters (Trinity Cambridge BA ’91), Bill Demchak (Michigan MBA), and a team at JPM (including Peter Hancock, Cambridge MA ’80) develop many of the credit derivatives (including credit-default swaps, CDSs, invented at Bankers Trust) that are intended to remove risk from companies’ balance sheets, combining securitization and credit derivatives to create Bistros, or Broad Index Secured Trust Offerings. Masters writes, “By enhancing liquidity, credit derivatives achieve the financial equivalent of a free lunch, whereby both buyers and sellers of risk benefit from the associated efficiency gains.”

1998: AIG FP begins to write CDSs, at first with JPM. CDSs are contracts to insure against the default of financial instruments such as bonds and corporate debt. But CDSs also are bought and sold as bets against bond defaults (or “naked” CDSs if neither party holds the underlying loan). The CDSs contain provisions requiring AIG to put up cash as collateral if its AAA credit rating ever falls.

1998 March 14: Greece enters the ERM.

1998 April 7: Banking giant Citicorp and financial conglomerate Travelers Group announce their planned $140 bn merger, to form Citigroup, the largest financial-services company in the world, helped by recent erosion of laws designed to separate the banking and securities industries.

1998 May 7: Brooksley Born (Stanford Law ’64), chairperson of the Commodity Futures Trading Commission (CFTC), roils colleagues when her agency says that it will consider whether OTC derivatives instruments should remain exempt from regulatory oversight. Later this day, Robert Rubin, Alan Greenspan, and Arthur Levitt Jr. issue a rebuke of Born’s plan, saying in a joint statement, “We seriously question the scope of the CFTC’s jurisdiction in this area.” Rubin (Yale Law ’64) is the Treasury Secretary; and Levitt (Williams BA ’52) is the Chairman of the SEC.

1998 June 1: The European Central Bank (ECB) is established; it will exercise its full powers after the introduction of the euro on 1 January 1999.

1998 July 30: U.S. Treasury Deputy Secretary, Larry Summers (Harvard PhD ’82), in testimony before Congress, argues that “the parties to [OTC derivatives] are largely sophisticated financial institutions that would appear to be eminently capable of protecting themselves from fraud and counterparty insolvencies.”

1998 September 23: As a result of the Russian default of September 1, the hedge fund Long-Term Capital Management’s equity has fallen to $600 million from a high of $4 bn eight months before. The Fed of New York coordinates a rescue package for LTCM.

1999: Nobel Laureate Merton Miller (Johns Hopkins PhD ’52) considering the LTCM failure: “In a strict sense, there wasn’t any risk—if the world had behaved as it did in the past.”

1999 January 1: The single currency (the euro) is launched, with 11 member countries

(Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain).

1999 February 15: *Time* magazine cover picture of the "Committee to Save the World: The inside story of how Three Marketeers have prevented a global economic meltdown—so far"—Alan Greenspan, Robert Rubin, and Larry Summers.

1999 March 3: Brooksley Born, chairperson of the CFTC, in testimony before the House Subcommittee on Capital Markets, Securities and Government-Sponsored Enterprises of the Committee on Banking and Financial Services, reports on analysis conducted by the President's Work Group on Financial Markets into the collapse of LTCM and studies on OTC derivatives. She argues that derivatives should be brought under regulatory supervision, or they "could pose potentially serious dangers to our economy."

1999 March 19: At the Futures Industry Association, Alan Greenspan, Fed Chairman, argues that derivatives should remain unregulated, despite the demise of LTCM six months before and attempts by the CFTC to extend its regulatory reach to OTC derivatives.

1999 September: Taking on significantly more risk, Fannie Mae, the biggest underwriter of home mortgages in the U.S., eases credit requirements on mortgage loans it will buy from banks and other lenders. The American Enterprise Institute warns that an economic downturn could result in a government bailout similar to the savings-and-loan industry rescue in the 1980s.

1999 October 11: Before the American Bankers Association, Alan Greenspan warns that "megabanks being formed by growth and consolidation are increasingly complex entities that create the potential for unusually large systemic risks in the national and international economy should they fail." Moreover, research at the Fed and elsewhere was unable to find economies of scale in banking beyond a modest size.

1999 November 12: The Gramm-Leach-Bliley *Financial Services Modernization Act* repeals the Glass-Steagall Act of 1933, the purpose of which was to prohibit the emergence of consolidated financial/insurance one-stop-shop corporations, in order to reduce the threat of contagion: U.S. banks were not allowed to own insurers or securities companies (and vice versa) and had to operate in a single state, inter alia. Lobbying by Citibank (subsequently to become Citigroup) and others (including Robert Rubin and Larry Summers) has finally borne fruit. The Act allows a range of possible regulators, from the Fed to the SEC (depending on the company's mix of financial services); holding companies that own one or more "thrifts" (savings-and-loans) may choose to be regulated by the Treasury's OTS. Later in 1999 AIG receives approval from the OTS to own a thrift in Delaware, and its entire operation becomes regulated by the OTS. The market share of the five largest U.S. banks will rise from 8% in 1995 to 36.5% in June 2010.

1999 December 9: In a survey on The Future of Finance, *The Economist* warns: "Some of the new financial technologies are, in effect, efforts to bottle up considerable uncertainties. If they work, the world economy will be more stable. If not, an economic disaster might ensue."

2000 September: After 38 years as a subsidiary of Dun & Bradstreet, CRA Moody's is spun off as public company. (It remains the only stand-alone CRA of the big three.)

2000 September 18: Before the American Bankers Association, Alan Greenspan argues that, in the face of rapidly changing technology, "private counterparty supervision remains the first line of regulatory defense."

2000 December 21: *The Commodities Futures Modernization Act*, which allows U.S. banks to continue to self-regulate OTC derivatives, is signed by President Clinton (Yale Law '73). It specifically exempts CDSs and other derivatives from state gaming laws, and excludes certain swaps from being "securities" under SEC rules. Previously, derivatives bets made outside regulated exchanges were legally enforceable only if one of the parties to the bet was hedging against a pre-existing risk, which reduced or eliminated moral hazard: one can only buy fire insurance on one's own property. This Act will encourage GS's actions in the April 2010 Abacus case. Co-sponsored by Phil Gramm (Georgia PhD '67) and Richard Lugar (Pembroke Oxford MA '56).

2001: LB first uses an accounting manœvre known as "Repo 105," which will allow LB to shuffle $50 bn of assets off its books in the months before its collapse in September 2008 to conceal its dependence on leverage, or debt.

2001 January 1: Greece enters the eurozone. Ten-year bond yields: Greek 5.36%, Spanish 5.09%, and Italian 5.16%, German 4.85%. Soon after, GS helps Greece quietly borrow billions of dollars treated as a currency trade rather than a loan, which helps Athens to meet Europe's Maastricht deficit rules while continuing to spend beyond its means.

2001 September 11: Although the destruction of the World Trade Center did not directly contribute to the GFC, U.S. monetary policy (the "Taylor gap" with prolonged low interest rates) and fiscal policy (going into massive deficit as a consequence of the costly invasions of Iraq and Afghanistan and the Bush tax cuts) after the Al Qaeda attacks will exacerbate global financial imbalances.

2002 January 1: The so-called Recourse Rule takes effect. It gives breaks on the Basel I capital requirements to U.S. banks that hold assets with AA and AAA ratings from CRAs (meaning that banks are able to reduce capital requirements for any given risk), despite warnings by Freddie and Fanny, and from the "the Shadow Financial Regulatory Committee," against regulatory capital arbitrage.

2002 November 8: On the occasion of the ninetieth birthday of Milton Friedman (Columbia PhD '46), Ben Bernanke (Governor, and later Chairman, of the Fed; MIT PhD '79), after discussing the role of monetary policy and lack of liquidity, continues: "I would like to say to Milton and Anna [Schwartz (Columbia PhD '64)]: Regarding the Great Depression. You're right, we did it. We're very sorry. But thanks to you, we won't do it again."

2003 March: Moody's Investors Service downgrades the financial strength of Hannover Re, leading to a large drop in the market value of the insurer, despite good credit ratings from other CRAs. Hannover Re was not a customer of Moody's at the time, despite entreaties.

2003 March 3: In his annual letter to shareholders of Berkshire Hathaway, Warren Buffett (Columbia MA ’51) warns that derivatives are “financial weapons of mass destruction.”

2003 May 8: Alan Greenspan at the Conference on Bank Structure and Competition: “As a result [of the use of derivatives and more sophisticated risk measurement and management methods], 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.”

2003 August 28: At the Kansas City Fed’s annual Jackson Hole meeting, William R. White (Manchester PhD ’69), Economic Advisor and Head of the Monetary and Economic Dept. at the the Bank of International Settlements (BIS) recommends to “raise interest rates when credit expands too fast and force banks to build up cash cushions in fat times to use in lean years.” But Greenspan is skeptical: “there has never been an instance, of which I’m aware, that leaning against the wind was successfully done.”

2003 September 14: In a referendum, Sweden votes 55.9% against adopting the euro.

2003 November 24: Germany and France override the EU budget rules after saying they expect to exceed the Maastricht 3% deficit limit for a third year (up to 4.2% predicted for 2003). Spain, Netherlands, Finland, and Austria object.

2004 January 3: Alan Greenspan at the San Diego meetings of the American Economic Association argues that it would be easier to clean up after the bursting of a bubble than identify such a bubble in real time and then prick it.

2004 January 26: Alan Greenspan to the H.M. Treasury Enterprise Conference, London: “[In the past, excessive] leverage brought down numerous, previously vaunted banking institutions, and precipitated a financial crisis that led to recession or worse. But ... Financial derivatives ... have contributed, especially over the recent stressful period, to the development of a far more flexible, efficient, and hence resilient financial system than existed just a quarter-century ago.”

2004 February 23: Alan Greenspan at the Credit Union National Association’s meeting argues that consumers might have been “tens of thousands of dollars” better off with adjustable-rate mortgages (ARMs), instead of standard fixed-rate mortgages.

2004 April 28: To forestall EU regulation of their European operations, the five Wall Street investment banks (Goldman Sachs GS, Merrill Lynch ML, Morgan Stanley MS, Lehman Brothers LB, and Bear Stearns BS), with the assistance of the GS chief Hank Paulson (Harvard MBA ’70), propose to the SEC that if they agree to submit to new rules restricting them from engaging in excessively risky activity, then they will be released from any lending restrictions.

2004 May 21: Edward Gramlich (Yale PhD ’65), Fed Governor, at the Financial Services Roundtable Annual Housing Policy Meeting, argues that the rapid growth of subprime (SP) mortgage lending (nearly a tenfold increase in the nine years 1994−2003) “has been associated with higher levels of delinquency [above 7%], foreclosure, and, in some cases, abusive lending practices.” A further 8% of SP borrowers are in danger of serious delinquency.

2004 May 25: A Standard & Poor's (S&P) analyst advises his bosses that S&P is losing an RMBS deal with Mizuho Bank to Moody's because S&P is more conservative in its ratings and that it will need to change its stance on future deals.

2004 June: The Basel II Accord, the new global rules that regulate bank capital adequacy, scheduled for implementation after 2006 will, under its Standard Approach regulation, require certified CRAs to assign risk coefficients to bank loans and other bank assets.

2004 July 21: Agreeing to the proposal of April 28, the SEC, under its chairman, William H. Donaldson (Harvard MBA '58), launches the "Consolidated Supervised Entities" program, a voluntary program that relaxes the minimum capital requirements for securities firms and investment banks. Beforehand, leverage of 12:1 is typical; after, more like 33:1 (and up to 40:1 in the case of ML). The EU drops its threat to regulate the five banks' European operations.

2004 August 10: Moody's starts using David Xiang Lin Li's Gaussian cupola default function formula in its credit ratings methodology for Collateralized Debt Obligations (CDOs), a type of asset-backed security and credit derivative, including SP mortgages as underlying assets. Li (Waterloo PhD '97) adapted it from the actuarial analysis of "broken-heart" death syndrome in couples to loan default correlation. A week later S&P's follows suit. This direct measurement of risk leads to Moody's relaxing its requirement for diversification of portfolios comprising CDOs.

2004 September 3: The EC announces proposals for a revised fiscal stability pact: looser and more palatable, but Germany objects.

2004 September 17: The Criminal Division of the FBI warns that rampant fraud in the U.S. mortgage industry could become an "epidemic" of financial crimes that could lead to "the next Savings & Loan (S&L) crisis" like the 1980s.

2004 October: In 2003, earnings of financial companies among the S&P's 500 peaked at 30% of total profits. Back in 1995, such earnings accounted for 18.4% of the S&P 500 total.

2004 October 14: At the SIBOS 2004 Atlanta Conference, Timothy Geithner (Johns Hopkins MA '85), chief of the Fed of New York, argues for the development and use of counterparty clearing arrangements in "the more standardized" part of the OTC derivative market, in order to reduce systematic risk. In vain.

2004 October 19: At America's Community Bankers' Annual Convention, Washington D.C., Alan Greenspan opines, "Overall, while local economies may experience significant speculative price imbalances, a national severe price distortion [in the housing market] seems most unlikely in the U.S., given its size and diversity."

2005: U.S. financial-industry profits as a share of U.S. business profits plateaued at 41% in 2004, having not exceeded 16% until 1986, and oscillating between 21 and 30% in the 1990s.

2005 February: Perry Inglis, a director of S&P's structured finance unit writes to colleagues: "I don't want to miss one deal because of our model assumptions either. Is there any possibility of 'tweaking' the default table to get all of this so that we don't have to compromise?"

2005 March 10: In Richmond, giving the Sandridge Lecture at the Virginia Association of Economics, Fed Governor Ben Bernanke ascribes the large and growing U.S. current account deficit to "a global savings glut," with low interest rates, partly because of the build-up of large quantities of foreign-exchange reserves by emerging-market nations following past financial crises, particularly the 1997 East Asia crisis. "[They] increased reserves through the expedient of issuing debt to their citizens, thereby mobilizing domestic saving, and then using the proceeds to buy U.S. Treasury securities and other assets." In discussing the implications of this imbalance, Bernanke warns of "the risk of a disorderly adjustment in financial markets."

2005 March 15: AIG's credit rating falls to AA from AAA the day after Hank Greenberg resigns amid allegations about his involvement in a fraudulent deal with Gen Re. As a result, AIG has to post $1.16 bn in collateral for AIG FP's existing positions, and by the end of 2005 AIG FP stops writing CDSs, but has $80 bn worth of existing "structured products" such as CDOs.

2005 March 20: EU finance ministers bow to German pressure to relax Maastricht deficit rules. Five of the 12 eurozone countries have now breached the 3% ceiling, including Greece, which confirms that its deficit for 2004 was a shade over 6% of GDP.

2005 April 20: The *Bankruptcy Abuse Prevention and Consumer Protection Act* is signed into law by President Bush (Harvard MBA '75), making it more difficult for home owners to discharge their debts. But, instead of falling, the rate of charge-offs for residential real-estate loans will rise from 0.08% before to 2.82% by Q4, 2009, and from 4.48% to 10.66% (Q2, 2010) for consumer credit-card loans.

2005 May 20: In a speech on markets to the Economic Club of NY, Alan Greenspan says, "There are a few things that suggest, at a minimum, there's a little froth in this market [U.S. housing] ... while we don't perceive that there is a national bubble, it's hard not to see that there are a lot of local bubbles." Earlier this week the Fed and other banking regulators warned banks that they should tighten controls on home equity loans "too often offered with no documentation of a borrower's assets".

2005 June 21: The International Swaps and Derivatives Association (ISDA) introduces "Pay As You Go" for speedier settlement of bets using CDSs on asset-backed securities (ABS) against mortgages, following lobbying by a group of prominent traders, including Greg Lippmann (BA Penn '91) at Deutsche Bank (DB).

2005 June 22: In an interview with *BusinessWeek*, Frank Nothaft (Columbia PhD), chief economist of Freddie Mac, says, "I don't foresee any national decline in home price values. Freddie Mac's analysis of single-family houses over the last half century hasn't shown a single year when the national average housing price has gone down."

2005 August 1: In an internal email, Angelo Mozilo (Fordham BS ’60) warns that Countrywide Financial could face “financial and reputational catastrophe” if it continues holding certain risky mortgages on its balance sheet.

2005 August 21: Robert Shiller (MIT PhD ’72) predicts that housing prices exhibit a bubble and could fall 40% in inflation-adjusted terms over the next generation and probably cause a recession.

2005 August 27: Raghuram Rajan (MIT PhD ’91), Economic Counsellor and Director of Research, International Monetary Fund (IMF), presents a paper at a symposium to honour Alan Greenspan’s tenure at the Fed warning that the financial system is taking on potentially dangerous levels of risk. He is mocked. (In September 2013 he will become head of the Reserve Bank of India.)

2005 October 16: Citing research by Thomas Picketty (LSE PhD ’93) and others, Citi publishes the first of two memos by Ajay Kapur, Niall Macleod, and Narendra Singh on “plutonomies, where economic growth is powered by and largely consumed by the wealthy few.” They include the U.S., the U.K., and Canada. Inter alia, the memos argue that global imbalances don’t matter.

2005 October 17: On his blog, Jim Kunstler, after consideration, argues that: “the mortgage industry, a mutant monster organism of lapsed lending standards and arrant grift on the grand scale, is going to implode like a death star under the weight of these non-performing loans and drag every tradable instrument known to man into the quantum vacuum of finance that it creates.”

2005 October 20: Ben Bernanke, chairman of the President’s Council of Economic Advisers, in testimony to Congress’s Joint Economic Committee, says, “Although speculative activity has increased in some areas, at a national level these [house] price increases largely reflect strong economic fundamentals, including robust growth in jobs and incomes, low mortgage rates, steady rates of household formation, and factors that limit the expansion of housing supply in some areas.”

2006: In Q4 2005 the issuance of SP mortgages peaked at $125 bn; by Q2 2008, none would be issued, and ten years earlier, in Q2 1995, virtually none had been issued (Greenspan 2010, Exhibit 4).

2006: From $737 million in 1999, AIG FP’s revenue rose to $3.26 bn in 2005, with an operating income in 2005 of 83% of revenue; this was 17.5% of AIG’s overall operating income that year, up from 4.2% in 1999. From 2001 to 2008 AIG FP’s 400 employees will be paid a total of $3.5 bn.

2006: In 2005 GS bought $20 bn in CDSs from AIG to offset some mortgage bonds it had on its books. By 15 September 2008, GS will have collected $7.5 bn from its AIG CDSs, but will have an additional $13 bn at risk, if AIG fails.

2006: Supported by record profit margins for the sector, financial companies (including investment banks, regional banks, real estate companies, and insurance companies) now contribute 28% of the S&P 500’s total net income. Easily outstripping the other ten sectors, the financial sector profit margin is now 14%, having risen from 8% in little more than a decade.

2006 January: In response to a call for comment on proposed guidelines for the slew of new mortgage products then flooding the market, Paris Welch Romero (an employee of a small mortgage company, with no university qualifications) writes a brief but direct email to the Office of the Comptroller of the Currency summing up her expectations: “Expect fallout, expect foreclosures, expect horror stories.” Her warning will not be heeded, and she will lose her job.

2006 January 31: “It’s fitting for Chairman Greenspan to leave office with the economy in such solid shape. The situation you’re handing off to your successor is a lot like a tennis racquet with a gigantic sweet spot,” says Janet Yellen (Yale PhD ’71), president of the San Francisco Fed, at the February Fed Open Market Committee (OMC) meeting.

2006 March 27: “I think we are unlikely to see growth being derailed by the housing market,” says Ben Bernanke, the new Chairman of the Fed at its March OMC meeting.

2006 March 28: Angelo Mozilo, CEO of Countrywide Financial (the largest U.S. mortgage provider), in a private company email: The 100% loan-to-value SP mortgage is “the most dangerous product in existence and there can be nothing more toxic.” In October 2010 he will settle a civil fraud suit.

2006 April: ML warns that Iceland’s banks have unsustainable levels of borrowing.

2006 April: In the Khoshaba case, the N.S.W. Court of Appeal holds that a loan agreement was an “unjust” contract, in part because a lender had failed to obtain information from the borrowers regarding the purpose of the loan (for a dubious investment in a pyramid [Ponzi] scheme). The decision has implications for lenders in all Australian markets, particularly those providing “low doc” and “no doc” loans, such as SP mortgages.

2006 May 19: The “Report to Fannie Mae Regarding Shareholder Complaints by Mr. Nye Lavalle,” (OCJ Case No. 5595), outlines abusive foreclosure practices, such as submitting false pleadings and affidavits. Apparently, Fannie Mae will turn a blind eye to these abuses.

2006 June: Citi executive, Richard Bowen (Texas), discovers that over 60% of the mortgages Citi is on-selling to Fannie Mae, Freddie Mac and others are defective, a large potential risk to Citi. His warnings to Citi management are unheeded.

2006 June 12: At the Stonier Graduate School of Banking, Washington, D.C., Fed Chairman (since February 1, 2006) Ben Bernanke states, “The management of market risk and credit risk has become increasingly sophisticated.... Banking organizations of all sizes have made substantial strides over the past two decades in their ability to measure and manage risks.”

2006 June 28: “We are getting reports that builders are now making concessions and providing upgrades, such as marble countertops and other extras, and in one case even throwing in a free Mini Cooper to sweeten the deal,” George C. Guynn (Georgia Tech MBA ’70), president of the Atlanta Fed, says at the June Fed OMC meeting.

2006 June 28: “I really believe that the drop in housing is actually on net going to make liquidity available for other sectors rather than being a drain going forward, and that will also get the growth rate more positive," says Susan Bies (Northwestern PhD '72) at the Fed's June OMC meeting.

2006 June 29: The Fed OMC raises the key rate by 25 bp to 5.25%; it will not raise the rate again (to between 0.25% and 0.5%) until 16 December 2015.

2006 August 17: Moody's and S&P rate the safest tranche of a residential mortgage pool put together by GS called GSAMP 2006-S5 as AAA. GSAMP 2006-S5 holds $338 million of second mortgages to SP borrowers.

2006 September 20: "The speed of the falloff in housing activity and the deceleration in house prices continue to surprise us," Janet Yellen says at the Fed's September OMC meeting.

2006 September 20: "We just don't see troubling signs yet of collateral damage, and we are not expecting much," says Timothy Geithner, President of the N.Y. Fed, at the Fed's September OMC meeting.

2006 September 20: "I would say that the capital markets are probably more profitable and more robust at this moment, or at least going into the six-week opportunity, than they have perhaps ever been," Kevin Warsh (Harvard JD '95), the Fed governor who watches Wall Street most closely, says at the Fed's OMC meeting in September.

2006 September 20: "I don't have quite as much confidence as some people around the table that there will be no spillover effect. [...] But I agree that the economy except for housing and autos is still pretty strong, and we do not yet see any significant spillover from housing," says Ben Bernanke at the Fed's September OMC meeting.

2006 September 29: President Bush signs the *Credit Rating Agency Reform Act* into law, to require "nationally recognised statistical ratings agencies" (the CRAs) to register with the SEC. Despite its intent, it will not foster increased competition.

2006 October 13: President Bush signs the *Financial Services Regulatory Relief Act* into law.

2006 October 24: "Of course, housing is a relatively small sector of the economy, and its decline should be self-correcting," Janet Yellen tells the Fed's October OMC meeting.

2006 December 1: In a prescient *FT* article, Gillian Tett described ABN Amro's recently invented constant proportion debt obligation (CPDO) as a highly leveraged bet on whether a basket of corporate bonds will default, while still receiving AAA ratings. In November 2012 these ratings will result in liability for S&P, with its reputational damage.

2006 December 12: "We think the fundamentals of the expansion going forward still look good," says Timothy Geithner, at the Fed's December OMC meeting.

2006 December 28: Californian SP lender Ownit Mortgage Solutions Inc. files for bankruptcy.

2007: From year-end 2004 to year-end 2006, holding banks in the U.S. held between 48% (banks with total assets greater than $100 bn) and 61% (banks with total assets between $1 bn and $100 bn) in loans and leases. (Laux & Leuz 2009)

2007: In 2006 Moody's makes more than 40% of its revenues from credit rating CDOs. Likewise S&P and Fitch's. Moreover, SP mortgages can be repackaged into CDOs in a way that makes "default an extremely low mathematical probability ... If banks were forced to sell securities that had been downgraded, liquidity could dry up," from *The Economist*, July 12, 2007, "AAAsking for trouble."

2007: Two thirds of the U.S. SP mortgages issued in 2006 were securitised. Michael Milken (Wharton MBA '70) calls securitisation the "democratization of capital."

2007: Edward M. Gramlich writes: "one of the nation's primary goals over the next few years should be the avoidance of a domino effect that forces large and unnecessary losses on households through unnecessary or premature foreclosures." Gramlich (2007), p.79

2007 January: An employee of Paulson & Co. Inc. explains investment opportunities: "It is true that the market is not pricing the subprime RMBS wipeout scenario. In my opinion this situation is due to the fact that rating agencies, CDO managers and underwriters have all the incentives to keep the game going, while 'real money' investors have neither the analytical tools nor the institutional framework to take action before the losses that one could anticipate based [on] the 'news' available everywhere are actually realized."

2007 January 1: Slovenia joins the eurozone

2007 January 7: S&P's Perry Inglis discusses a "very serious business issue," that S&P will likely lose the business of ABN Amro, BofA, BNP, UBS, abd Barclays within a week because of the delay in developing a model for CPDOs: "Our reputation is seriously at risk and is in effect in tatters ... effectively handing our market share and revenues to [competitors] Moody's and Fitch on a plate."

2007 January 23: GS executive Fabrice "Fab" Tourre (MS Stanford '00) in an email to a friend: "More and more leverage in the system, The whole building is about to collapse anytime now ... Only potential survivor, the fabulous Fab[rice Tourre] ... standing in the middle of all these complex, highly leveraged, exotic trades he created without necessarily understanding all of the implications of those monstruosities!!!" [*sic*, translated from French in part]. Tourre will be charged by the SEC in April 2010 and be found guilty on six of seven counts of securites fraud in August 2013. He will be the first and perhaps only Wall Street banker to be found guilty of any charges having to do with the GFC.

2007 February: "I think [the housing-market risk] is containable," says Lewis Ranieri, who developed the idea of MBS in the 1970s when he worked at Salomon Brothers. "I don't think this is going to be a cataclysm."

2007 February: GS creates a CDO, Abacus 2007-AC1, at the request of John Paulson (MBA Harvard '80), who will earn $3.7 bn in 2007 by shorting the housing market. GS charges Paulson $15 million to let him secretly select the mortgage bonds that he believes are most likely to lose value, according to the April 2010 SEC complaint. 83% of the mortgage bonds underlying the CDO will be downgraded by CRAs by August, and 99% by early 2008.

2007 February 11: An email to Fabrice Tourre from the head of the GS structured product correlation trading desk: “the cdo biz is dead we don’t have a lot of time left.”

2007 February 15: The U.S. National Association of Realtors (NAR) predicts that home prices will “spring back” in the coming months after reporting that median prices fell in 73 metro areas in Q4, 2006, “the year of contraction.” Median prices for single-family homes in the U.S. fell 2.7% in the year since Q4, 2005.

2007 February 27: The “Shanghai surprise,” when the Shanghai composite index falls 8.8% in a few hours, will spread to other markets around the world, the first sign of the volatility to come.

2007 March 17: A U.S. GAO report (leader: Richard J. Hillman, Scranton BS), “Financial Market Regulation: Agencies Engaged in Consolidated Supervision Can Strengthen Performance Measurement and Collaboration” (specifically, the Fed, the SEC, and the OTS) notes that, although the OTS has been accepted as a competent regulator (of AIG inter alia) by British and French authorities, “while OTS oversees a number of holding companies that are primarily in the insurance business, it has only one specialist in this area,” with little or no collaboration with the SEC or the Fed for this oversight.

2007 March 28: In congressional testimony, Fed Chairman Ben Bernanke testifies, “At this juncture ... the impact on the broader economy and financial markets of the problems in the SP market seems likely to be contained.”

2007 April: BHP Billiton’s friendly approach to Rio Tinto is rejected.

2007 April 5: One S&P CDO analyst to another, arguing that S&P’s CDO rating model is severely underestimating credit risks: “We rate every deal ... it could be structured by cows and we would rate it.”

2007 April 20: Treasury Secretary Henry Paulson delivers an upbeat assessment of the U.S. economy, saying “All the signs I look at” show “the housing market is at or near the bottom.”

2007 May 4: UBS shuts down its internal hedge fund, Dillon Read, after suffering about $125 million of SP-related losses.

2007 June: A Credit Suisse executive in an internal email: “Our diligence process is such a joke. Our expanded eligibility for every fly-by-night [mortgage] originator was so broad then any loan could, and did, get through what passed for diligence here.”

2007 June: Global buy-out volumes peaked at over $150 bn in June.

2007 June 27: “The U.S. looks O.K., and the world looks very strong. Housing here seems as though it will get worse before it gets better, but the rest of the economy seems to be doing reasonably well,” observes Timothy Geithner at the Fed’s June OMC meeting.

2007 July: Rio Tinto buys Alcan for $38.1 bn, mainly using debt.

2007 July: As high-yield CDS premiums veer upwards, the first news articles appear about the U.S. SP mortgage impact on global credit markets.

2007 July 3: A newly hired analyst at S&P, asked how his job was going: “Job’s going great. Aside from the fact that the MBS world is crashing, investors and the media hate us, and we're all running around to save face ... no complaints." Three days later: "This might shake out a completely different way of doing biz [sic] in the industry. I mean come on, we pay you to rate our deals and the better the rating the more money we make?!?! Whats [sic] up with that? How are you possibly supposed to be impartial????"

2007 July 5: Swiss bank UBS's CEO, Peter Wuffli (St Gallen PhD '84), quits. UBS is the world's biggest manager of other people's money.

2007 July 6: After 73 years, the SEC, under Christopher Cox (Harvard MBA & Law '77), eliminates the "uptick rule," which required that each short sale transaction be entered at a price that is higher than the price of the last trade, in effect preventing short sellers from adding to the downward momentum when the price of an asset is already experiencing sharp declines.

2007 July 9: "When the music stops, in terms of liquidity, things will get complicated. But as long as the music is playing, you've got to get up and dance," Citi chief Chuck Prince (Georgetown Law '83) tells the *FT*, adding, "We're still dancing."

2007 July 17: Two of BS' hedge funds, betting on CDOs (backed by SP loans) have lost all $20 bn invested in mortgage-related debt. The high-yield CDS premium soars in the U.S. and Europe.

2007 July 18: Fed Chairman Ben Bernanke acknowledges the increasing risk of the effects of risk-bearing loan delinquencies spilling into other markets.

2007 July 20: U.S. banks accept a long-discussed version of Basel II, which requires the services of the CRAs.

2007 July 23: Treasury Secretary Paulson says the housing slump appears to be "at or near the bottom."

2007 July 24: Countrywide, the largest U.S. mortgage provider, announces an earnings drop.

2007 July 25: Timothy Geithner, the president of the N.Y. Fed, declares in a speech before the Forum on Global Leadership in Washington: "Financial markets outside the United States are now deeper and more liquid than they used to be, making it easier for companies to raise capital domestically at reasonable cost."

2007 July 26: Corporate-bond or loan deals begin to falter, around $17 bn in four weeks. The U.S. National Association of Home Builders says that home sales have fallen 6.6% over 12 months.

2007 July 31: Sowood Capital, a $3 bn hedge fund, lost half its value in July, and sells out, the biggest hedge fund to collapse. Harvard University reports that its endowment has lost $330 million.

2007 August 2: The TED spread surges. A four-year low in the issuing of investment-grade bonds in July. The five Wall Street investment banks' lending commitments grew from $50 bn in 2002 to over $180 bn in 2006.

2007 August 5: American Home Mortgage Investment halts operations. IKB Deutsche Industriebank is bailed out for the first time, by a consortium of banks, after losses in U.S. SP mortgages.

2007 August 7: The Fed decides to keep its federal-funds-rate target at 5.25%. "My own bet is the financial market upset is not going to change fundamentally what's going on in the real economy," said William Poole (Chicago PhD '66), president of the St. Louis Fed. "It is an interesting question why what looks like $100 bn or so of credit losses in the subprime market has been reflected in multiple trillions of dollars of losses in paper wealth," says Fed chair Ben Bernanke at the OMC meeting.

2007 August 8: President Bush apparently rejects suggestions that Fannie Mae and Freddie Mac be allowed to buy some SP loans from stretched banks.

2007 August 9: An investment arm of BNP Paribas, France's biggest bank, suspends withdrawals from three investment funds, citing "the complete evaporation of liquidity in certain market segments of the U.S. securitisation market."

2007 August 9: The ECB responds to a sudden liquidity squeeze and a jump in the Libor by injecting €98.4 bn ($131 bn) into the money markets.

2007 August 9: "It is hard for us, without being flippant, to even see a scenario within any kind of realm of reason that would see us losing one dollar in any of those transactions," says AIG FP head Joseph Cassano (Brooklyn College BA '77) of its CDSs. But in Q3, 2007, AIG will recognize a $352 million unrealized loss on its CDS portfolio.

2007 August 10: In a conference call three days after Tuesday's Fed OMC meeting, the Fed chair, Ben Bernanke warns, "The market is not operating in a normal way," and adds, "It's a question of market functioning, not a question of bailing anybody out ... right now."

2007 August 10: In two days, the average quoted interest rate on asset-backed commercial paper has jumped from 5.3% to 6.14%.

2007 August 11: Quantitative funds, which rely on computer models to make market bets, roiled the markets last week, with several facing losses. As Matthew Rothman (Chicago PhD), quantitative risk expert at LB, said: "Events that models only predicted would happen once in 10,000 years happened every day for three days."

2007 August 16: In a conference call of the Fed OMC, Fed chair Ben Bernanke says there is "a certain amount of panic, a certain amount of markets seizing up, with good credits not being able to be financed, and a good deal of concern that there is a potential for some downward spiral in the markets that could threaten or harm the economy."

2007 August 16: Moody's downgrades the safest tranche in GSAMP-2006-S5 from AAA to Baa, the lowest investment-grade level.

2007 August 16: GS says its funds have been hit by moves that its models suggest are 25 standard deviations away from usual, a likelihood of 6 times 10 to the power of minus 139. As Warren Buffett remarks: "Beware of geeks bearing equations."

2007 August 17: Ben Bernanke, Fed chairman, at the Fed's annual symposium at Jackson

Hole, Wyoming: “It is not the responsibility of the Federal Reserve—nor would it be appropriate—to protect lenders and investors from the consequences of their financial decisions. But developments in financial markets can have broad economic effects felt by many outside the markets, and the Federal Reserve must take those effects into account when determining policy.”

2007 August 20: The Fed reduces the discount rate by 50bp to 5.75%, broadens the kind of collateral, and lengthens the lending term to 30 days.

2007 August 20: Commerzbank of Germany borrowed $350 million at the Fed’s discount window.

2007 August 22: Citigroup, JPM Chase, BofA and the Wachovia Corp. each borrowed $500 million from the Fed. As collateral the banks put up a total of $213 bn in asset-backed securities, commercial loans and residential mortgages, including second liens.

2007 August 22: Countrywide, the largest U.S. mortgage provider, receives $2 bn from the BofA in return for convertible preferred stock.

2007 August 23: Citi, JPM Chase, Wachovia, BofA take up the Fed’s offer of 30-day loan terms. The 3-day AA-rated commercial-paper rate rises from 5.3% to 6.0% for asset-backed securities. From July 2006 to July 2007, U.S. home foreclosures were up by 93%. LB closes its SP lending arm.

2007 August 31: President Bush rules out large-scale federal bailouts, but proposes that the Federal Housing Administration (FHA) help 80,000 SP mortgage borrowers refinance. (Two million Americans will face sharply higher repayments over the next year or so as their “honeymoon” periods end.)

2007 September: John Taylor (Stanford PhD ’73) (2007) argues that in the four years 2002−2005, a positive eponymous “Taylor gap” reveals that U.S. interest rates were too low, resulting in a bubble in U.S. housing prices. (The federal funds rate had fallen from 6.5% at the end of 2000 to 1% in 2003.)

2007 September 6: S&P says it has downgraded just 1% of SP residential MB securities, none affecting AAA bonds. CDO downgrades have affected just 1% of securities by value.

2007 September 10: Mr Joe Lewis discloses that he has bought 7% of BS, at $107 per share.

2007 September 12: Citibank borrows $3.375 bn from the Fed in return for $23 bn worth of assets, including commercial MBS, residential mortgages and commercial loans.

2007 September 14: Northern Rock, the U.K.’s fifth largest mortgage lender, is given a liquidity support facility from the Bank of England (BofE), following the first bank run in Britain since 1866. Northern Rock is the top U.K. securitiser (selling packaged mortgages), followed by Barclays, HBOS, and the Royal Bank of Scotland (RBS). The U.K. government guarantees all deposits at Northern Rock; it already guarantees all small bank deposits. Northern Rock’s shares are valued at 258p on October 13, down from a high of £12.51 on February 9.

2007 September 16: “While I was aware a lot of these [SP] practices were going on, I had no notion of how significant they had become until very late. I didn’t really get it until very late in 2005 and 2006.”—Alan Greenspan on CBS’s “60 Minutes”.

2007 September 18: The Fed cuts the funds rate 50 bp to 4.75%, mentioning the “housing correction” for the first time publicly.

2007 September 19: The U.K. government offers to lend $20 bn to commercial banks in an emergency 3-month auction.

2007 September 25: The U.S. dollar falls to a record $1.41 per €.

2007 October 12: The Dow Jones Industrial Average (DJIA) peaks at 14,093.

2007 October 23: Oil rises to $90/bbl.

2007 October 24: Announcing that ML has suffered the biggest quarterly loss in its history, and the first since 2001, after writing down by $8.4 bn its CDO securities backed by SP mortgages, its CEO, Stanley O’Neal (Harvard MBA ’78), admits, “The bottom line is we—I— got it wrong by being overexposed to SP, and we suffered as a result of an unprecedented liquidity squeeze and deterioration in that market. No one, no one is more disappointed than I am in that result.” In 2006 O’Neal’s bonus was $14 million.

2007 October 24: Jonathan Egol (Chicago MBA ’98) is promoted to a managing director at GS. Since 2004 he and Fabrice Tourre have been selling synthetic CDOs, named Abacus, at first intended to protect GS from losses if the housing market collapses. GS’s clients who buy them will lose billions of dollars, however, when the market collapses. These CDOs consisted of CDSs, not actual mortgages. From 2005 through 2007, at least $108 bn in these securities was issued by GS and others, according to Dealogic.

2007 October 28: MBIA, a monoline (a company that insures corporate bonds and structured products), makes its first-ever quarterly loss. If a monoline is downgraded, so are the bonds it insures. In 1990 MBIA had $931 million in equity and only $200 million of debt; by 2006 it had $7.2 bn in equity against an astounding $26.2 bn in debt, including CDOs. It will remain AAA rated until June 5, 2008.

2007 October 29: ML replaces Stanley O’Neal, whose severance package is $162 million, with John Thain (Harvard MBA ’79), a former chief of the NYSE.

2007 November 1: A pessimistic report of Meredith Whitney (Brown BA ’92), a financial services analyst from CIBC World Market, a subsidiary of Canadian Imperial Bank of Commerce, on Citi’s future, leads to about $369 bn being wiped off the U.S. stock market value. The DJIA slides more than 360 points, or 2.6 per cent. In London, £47 bn will be lost over November 1st and 2nd. Ms Whitney says Citi will need to cut its dividend or sell assets to avert what she says is a $30 bn capital shortfall. Citi loses more than $15 bn of market capitalisation.

2007 November 2: In an interview with the Fed of Minneapolis’s The Region, Eugene Fama (Chicago PhD ’64), father of the “efficient market hypothesis,” says, “The word ‘bubble’ drives me nuts.” Further: “Housing markets are less liquid, but people are very careful when they buy houses. It's typically the biggest investment they're going to make, so they look around very carefully and they compare prices. The bidding process is very detailed."

2007 November 3: Citi executive, Richard Bowen, warns Robert Rubin of flaws in the evaluation of the risks associated with SP mortgages. Citi management allows things to worsen.

2007 November 4: Citi replaces its CEO, Charles Prince, after a possible further $11 bn in SP write-downs. On November 27 the Abu Dhabi Invest Authority buys 4.9% of Citi for $7.5 bn.

2007 November 4: The Fed extends $51.9 bn to the German-Irish bank Depfa and Dexia Credit of Belgium.

2007 November 8: Deutsche Bank borrows a $2.4 bn overnight loan from the Fed secured by $4 bn in collateral.

2007 November 14: In *Deutsche Bank Trust Co. Americas v. Jennings et al.*, a case about 32 foreclosures, Judge Kathleen M. O'Malley of the U.S. District Court for the Northern District of Ohio rules that, because the bank could not produce the legal title to the homes or the actual mortgage papers, the bank may not foreclose.

2007 November 15: For U.S. entities with fiscal years beginning after this date, the Financial Accounting Standards Board (FASB) Statement No. 157 "Fair Value Measurements" becomes effective. FAS 157 specifies that accounting "fair value" for some financial firms' assets (such as derivatives, MBSs, and marketable equity securities) is now market-based, not entity-specific, the so-called "mark-to-market" rule.

2007 November 21: The European covered-bonds market (a $2 trillion source of mortgages) is suspended because of falling prices.

2007 November 21: The spread between high-yield corporate paper and U.S. Treasury bonds has doubled between June and November, from 260 to 520 bp.

2007 November 26: HSBC consolidates $45 bn of two structured-investment vehicles (SIVs).

2007 November 27: Kreditanstalt sets aside $3.4 bn to cover SP losses at IKB Deutsche Industriebank. Wells Fargo (WF) takes a $1.4 bn charge on home mortgages. The Fed extends $8 bn in short-term loans until early 2008.

2007 November 28: The Libor in 2-month euros is the highest since May 2001.

2007 December 4: Moody's downgrades the safest tranche in GSAMP-2006-S5 from Baa to a "below investment level" credit rating.

2007 December 5: Calyon of France borrows $2 bn from the Fed, providing $16 bn in collateral.

2007 December 11: In the monthly Fed OMC meeting, Janet Yellen, president of the San Francisco Fed, allows that, "At the time of our last meeting, I held out hope that the financial turmoil would gradually ebb and the economy might escape without serious damage. Subsequent developments have severely shaken that belief. The possibilities of a credit crunch developing and of the economy slipping into a recession seem all too real." But the Fed's own staff still forecast that the economy will avoid a recession.

2007 December 12: There is joint central bank action to ease the liquidity squeeze around the developed world.

2007 December 18: The U.K. government guarantees all Northern Rock's debts and commits more than $110 bn, after Northern Rock's share price falls to below a twelfth of its value in five months.

2008: Pay per worker in the U.S. financial sector as a percentage of average U.S. compensation reached 181% in 2007, after averaging around 100 percent from 1948 to 1983.

2008: AIG suffered write-downs of nearly $8 bn by the end of 2007; in Q1 and Q2, 2008, it will lose another $9.5 bn in write-downs.

2008 January 1: Cyprus and Malta join the eurozone

2008 January 3: Warren Buffett starts his own bond-insurance company, Berkshire Hathaway Assurance, given the incumbent monolines' distress. In February BHA tries to take over $800 bn in municipal bonds guaranteed by the monolines MBIA, Anbac, and FGIC.

2008 January 9: An emergency meeting of the Fed's OMC concludes that "substantial additional policy easing in the near future might well be necessary."

2008 January 10: The CEO of BS, Jimmy Cayne (Purdue drop-out), leaves after $1.9 bn in mortgage write-downs.

2008 January 11: BofA announces that it will buy Countrywide (the largest mortgage lender in the U.S.) for $4 bn (one-eighth of Countrywide's value seven months ago), to take effect in July. Countrywide's chief, Angelo Mozilo, will agree to forgo $37.5 million in severance pay, consulting fees and perquisites such as use of the company jet, and will settle a civil fraud suit in October 2010. Countrywide was regulated by the OTS.

2008 January 15: Hypo Real Estate writes down $570 million on CDOs.

2008 January 17: Citi reports a $9.8 bn Q4 2007 loss, after write-downs of $18.1 bn on CDOs.

2008 January 19: CRA Finch downgrades monoline insurer Ambac.

2008 January 21: In an emergency meeting, the Fed's OMC cuts the benchmark rate 75 bp to 3.5%.

2008 January 28: Larry Summers in the *FT*: "Good policy is art as much as science, depending as it does on market psychology as well as the underlying realities."

2008 January 28: In a conference call with AIG, GS executives argued that GS should be paid more than the $2 bn AIG had already paid to cover losses the bank said it might suffer, while AIG wanted some of its money back ($1.56 bn), arguing that GS had inflated its potential losses. Nothing is resolved, although GS will get another $5 bn before the AIG bailout in September, and billions more afterwards, at 100% of par.

2008 January 30: After a regular meeting, the FOMC cuts the policy rate by 50 bp to 3%, having cut 75 bp to 3.5% only eight days ago, down from 5.25% in August 2007.

2008 January: The Australian Prudential Regulation Authority (APRA) raises concerns about treatment of CDOs by the National Australia Bank (NAB).

2008 February 6: BHP's formal offer for Rio Tinto is rejected.

2008 February 10: The spread between high-yield commercial paper and U.S. Treasuries exceeds 700 bp.

2008 February 13: IKB Deutsche Industriebank is bailed out for the third time, with a $2.2 bn package.

2008 February 14: AIG writes down $4.9 bn of CDO-related swaps (five times more than its estimate two months ago); AIG has $62 bn exposure to CDOs with some SP content. Joseph Cassano resigns as head of AIG FP, having received at least $280 million in compensation (including $34 million in final bonuses and a $1 million a month six-month retainer until AIG's bailout).

2008 February 14: Before Congress, Ben Bernanke (Fed chair) and Henry M. Paulson (Treasury Secretary) continue to predict that the U.S. economy will avoid recession.

2008 February 17: Northern Rock is nationalised after two unsuccessful bids to take it over.

2008 March: In response to February's events, C.K. Lee (LSE MSc '98), head of the OTS's Complex and International Organizations (CIO) group (for regulating AIG, inter alia), sends AIG a request for a "corrective action plan" in 30 days, but Lee moves to OTS Dallas, and the CIO group is disbanded; AIG misses the deadline.

2008 March 5: Thornburg Mortgage and Carlyle Capital, two big housing finance firms, are on the brink of collapse.

2008 March 7: The Fed offers up to $200 bn in loans for Wall Street firms, expanding a safety net once restricted to commercial banks.

2008 March 8: The Bank of Canada cuts its overnight rate by 50 bp to 3.5%.

2008 March 10: Investment bank BS' press release is headed BEAR STEARNS DENIES LIQUIDITY RUMORS. Its share are trading above $60.

2008 March 10: In an emergency meeting, Ben Bernanke tells the FOMC, "We live in a very special time." The Fed doubles the Wall Street safety net to $400 bn and begins to pump dollars into foreign markets through "swap" agreements with other central banks.

2008 March 11: The Fed adds a new bailout vehicle, the Term Securities Lending Facility (TSLF), a new lending facility that allows banks to borrow up to 28 days instead of normal overnight limits; up to $200 bn.

2008 March 12: Carlyle Capital, a mortgage-backed fund, 15% owned by executives of the private-equity firm Carlyle Group, defaults on $16.6 bn of debt; geared up to 32 times in order to buy AAA paper, it will wind itself up, its liabilities larger than its assets.

2008 March 13: No buyers for AAA commercial paper in the U.S.

2008 March 14: The Fed begins to engineer the rescue of BS by JPM.

2008 March 14: LB secures a 3-year facility of $2 bn; it apparently has $64 bn of unencumbered assets. (But see the March 2010 Valukas report findings.) *The Economist* quotes anon.: "If Lehman Brothers goes, there are no sacred cows."

2008 March 16: ML has $1 trillion in assets and $30 bn in equity; GS has $1.1 trillion and $40 bn, respectively. There are about $45 trillion of CDSs outstanding globally.

2008 March 16: U.S. Treasury Secretary Hank Paulson says, "We've got strong financial institutions... Our markets are the envy of the world. They're resilient, they're... innovative, they're flexible. I think we move very quickly to address situations in this country, and, as I said, our financial institutions are strong."

2008 March 16: BS, having run afoul of its lending-capital ratios, is bought by JPM Chase at a heavily discounted price of $2 per share; its shares had been $170 at the beginning of 2007. BS had a gross debt ratio of about 33:1 prior to its demise, and about $10 trillion in CDSs and interest-rate swaps. Its clients had withdrawn $17 bn in the last two days. Less than a week ago, some said that BS enough liquid assets and borrowing capacity to survive for two years. The NY Fed lends $30 bn to JPM.

2008 March 16: Counterparty risk as reflected in CD premiums—BS 750 bp, LB 470 bp, ML 320 bp, and GS 230 bp.

2008 March 16: The Fed cuts the discount rate 25 bp to 3.25% and opens the Primary Debt Credit Facility (PDCF) allowing investment banks overnight funding, effectively removing any limits on the amounts it will lend to Wall Street.

2008 March 17: JPM Chase's market capitalisation rises by $14 bn the day after buying BS for $2 a share. Jamie Dimon (Harvard MBA '82), CEO of JPM Chase, sits on the board of directors of the Fed of New York, which, along with the Treasury, brokered the deal.

2008 March 18: BS' shares trade at $6.51.

2008 March 18: The Fed cuts its target rate by 75 bp (to 2.25%, down 200 bp in two months), and offers extended (28-day) loans to all bond dealers. Timothy Geitner, chief of the N.Y. Fed, says he wants the Fed to act as lender of last resort, but he doesn't want to bail out all of Wall Street. William Dudley, the bank overseer at the N.Y. Fed, says, "In my view, an old-fashioned bank run is what really led to BS's demise."

2008 March 17−21: U.S. financial stocks rally by 11%; there is a rally in investment-grade bonds.

2008 March 24: JPM Chase raises its bid for BS fivefold to $10, but is no longer liable for $30 bn of BS' least liquid assets (almost 40% of BS's assets), now assumed by the Fed. The Fed has also supplied BS with $30 bn of secret loans to keep the company from failing before the deal closes, through a program set up to provide emergency funding to brokerage firms.

2008 March 25: Iceland's interest rate rises to 15% after a 22% drop in the krona. The Central Bank of Iceland negotiates a new line of credit for $500 million with the BIS, but forgets to extend it in late April, and so loses it.

2008 March 25: Spread-betting firm IG-Index doubles (from 5% to 10%) its margin for bank stocks; for four banks (Alliance & Leicester, Anglo Irish, Bradford & Bingley, and LB) its margin is 20%.

2008 March 25: *The Economist* reports that U.S. farmers are having trouble hedging wheat prices because of excessive margin requirements.

2008 April 2: UBS has lost $38 bn betting on U.S. mortgage-backed assets, "mezzanine" CDOs, after taking the AAA credit ratings as correct and assuming liquidity.

2008 April 3: At the end of 2007 Northern Rock owed the U.K. tax-payer $53.5 bn.

2008 April 6: George Soros declares that he is "short U.S. and European stocks, U.S. ten-year government bonds, and the U.S. dollar; and long Chinese and Indian stocks and non-U.S. commodities."

2008 April 8: U.K. housing prices fell 2.5% in March.

2008 April 8: Paul Volcker (Harvard MA '51), Fed Chairman 1979−1987, in an address to the Economic Club of NY, observes, "Simply stated, the bright new financial system—for all its talented participants, for all its rich rewards—has failed the test of the marketplace."

2008 April 10: Eight months before the National Bureau of Economic Research (NBER) gives its official imprimatur, *The Economist* declares that the U.S. is in recession. The NBER will announce in early December 2008 that the U.S. has been in recession since December 2007.

2008 April 15: Moody's downgrades the safest tranche in GSAMP-2006-S5 yet again to "junk" rating; by December, it will no longer be traded.

2008 April 17: The ISDA reports that OTC derivatives at the end of 2007 totalled $455 trillion globally, of which $62 trillion were CDSs. Global nominal Gross Domestic Product (GDP) was estimated at $54.5 trillion in 2007. (In December 2008, the derivatives market will be $531 trillion, up from $106 trillion in 2002.)

2008 April 17: In 1989 financial stocks were 8.8% by value of the S&P 500; by Q1 2007 this had grown to 22.3%. The average profit margin of U.S. finance companies over the past 60 years has been 40%. From a 10% share of corporate profits in the early 1980s, the U.S. financial services industry's share was 40% in 2007. In the early 1980s, U.S. financial assets were worth about 450% of GDP; in 2007, about 1000%.

2008 April 17: U.K. banks RBS and Bradford & Bingley are trading at a market cap of between 3 and 4% of their deposits. U.S. banks are priced at between 15 and 30% of their deposits.

2008 April 21: The BofE announces its "Special Liquidity Scheme" of $100 bn to allow banks to swap their AB securities for more liquid Treasury Bills as a means of reducing counterparty risk in interbank landing.

2008 April 22: RBS announces the largest rights issue in U.K. history to raise $24 bn in new capital to offset a write-down of $12 bn resulting from bad investments and the earlier purchase of ABN-Amro. RBS has core capital equal to 4.5% of its assets.

2008 April 24: LB reports a net profit of $489 million in Q1 2008; ML and Citi lost a combined $7.1 bn in Q1 2008.

2008 April 24: The Iceland krona has fallen 30% against the euro in four months, and Icelandic banks cannot borrow from other banks.

2008 April 30: The Fed cuts rates another 25 bp to 2%, indicating that this should suffice.

2008 April: A Barclays employee tells a NY Fed official that "we know that we're not posting um, an honest" rate for Libor determination; we just want to "fit in with the rest of the crowd."

2008 May 29: The *Wall Street Journal* (*WSJ*) releases a controversial study suggesting that banks might have understated borrowing costs they reported for Libor during the 2008 credit crunch.

2008 June 1: NY Fed chief Timothy Geithner writes privately to Mervyn King (Cambridge '69), Governor of the BofE, urging improved credibility and integrity of the Libor determination by "eliminating [the] incentive to misreport" by banks, such as lowballing, by "randomly selecting a subset" of responding banks. Two days later, in an email to deputy BofE governor Paul Tucker (Trinity College, Cambridge, BA, '80), the chief executive of the BBA, Angela Knight (Bristol, BSc), will write that "changes are being made to incorporate the views of the Fed."

2008 June 2: Wachovia, the fourth-largest U.S. bank by deposits, replaces its CEO, Ken Thompson (Wake Forest MBA '75), after losing $707 million in Q1.

2008 June 5: S&P downgrades monoline bond insurers AMBAC and MBIA from AAA to AA.

2008 June 9: LB announces a Q2 loss of $2.8 bn, far higher than analysts had expected; will seek to raise $6 bn in fresh capital from investors.

2008 June 15: AIG, the world's largest insurer, replaces its CEO, Martin Sullivan (no degrees), after $13 bn losses in Q4 2007 and Q1 2008; it announces plans to raise $20 bn in fresh capital.

2008 June 25: The FOMC lets rates stand at 2%.

2008 June: The BBA "will obviously have to remove the references to us and Fed," a Bank of England official says in an email, referring to changes in the Libor rate-setting process.

2008 July: The Bank for International Settlements estimates that the notional value of outstanding CDSs is $45.9 trillion.

2008 July 3: Apparently concerned about rising inflation, the ECB raises its bid rate by 25 bp to 4.25%.

2008 July 8: The U.S. SEC finds significant weaknesses in ratings practices of the three major credit rating agencies, and the need for remedial action by the firms to provide meaningful ratings and the necessary levels of disclosure to investors.

2008 July 11: The U.S. Treasury general council emails that the Fed has "plenty of legal authority to provide liquidity to LB."

2008 July 11: IndyMac bank collapses, with assets of $32 bn and deposits of $19 bn, the fourth largest bank failure in U.S. history; it was regulated by the OTS. Eight other banks have failed in 2008 and the U.S. Federal Deposit Insurance Corp. (FDIC) has 117 banks on its "problem list" in Q2 2008, up 30% in three months. Wachovia's share price has fallen by three-quarters in six months.

2008 July 13: The share prices of Fannie Mae and Freddie Mac are less than one sixth their values of a year ago. The Fed extends its safety net to include the two entities.

2008 July 15: William C. Dudley (PhD UC Berkeley '82) of the NY Fed outlines a plan to take $60 bn of assets off the LB balance sheet.

2008 July 17: The Commonwealth Bank of Australia borrows $75 million from the U.S. Federal Reserve's discount window, and a further $25 million on November 12.

2008 July 17: ML announces a $4.9 bn loss for Q2, after write-downs of $9.7 bn, bringing total charges since mid-2007 to more than $41 bn.

2008 July 21: The SEC bans "naked" short selling of the stocks of mortgage finance companies Fannie Mae and Freddie Mac and 17 large investment banks until August 12th.

2008 July 24: In an emergency meeting, the FOMC expands both its domestic and international lending programs. Members decry the OTS's actions on IndyMac without informing the Fed.

2008 July 26: The U.S. FHA will guarantee up to $300 bn refinanced mortgages. The Federal debt limit is raised to $10.6 trillion.

2008 July 28: ML writes down a further $4.4 bn, selling $30.6 bn of CDOs at 22% of par.

2008 July 30: President Bush signs the *Federal Housing Finance Regulatory Reform Act*, which merges the Federal Housing Finance Board and the Office of Federal Housing Enterprise Oversight, creating the Federal Housing Finance Agency (FHFA), with the power to place GSEs into receivership or conservatorship.

2008 July: Since May, the NAB has written down AUD$1.011 bn against its CDOs.

2008 August 5: At its regular meeting, the FOMC holds rates steady. Some members want to raise rates to attack inflation.

2008 August 9: Large European banks report falls in earnings of between 28% and 63% one year after the start of the credit crunch.

2008 August 18: GS's equity research department publishes an in-depth report on AIG, advising its clients to avoid the stock. AIG shares immediately fall 6%.

2008 August 21: ABC Learning's shares are placed in a trading halt; the Australian company is the world's largest private provider of childcare services, with a market capitalisation reaching A$2.5 bn in March 2006.

2008 September 7: The U.S. government announces that the GSEs, Fannie Mae and

Freddie Mac, have been placed under the "conservatorship" of the FHFA, and commits to provide up to $100 bn to each company to cover any future shortfalls in capital. The CEOs of both companies are replaced, and dividend payments to current shareholders eliminated. The two hold or guarantee $5 trillion, about half of all U.S. mortgages.

2008 September 8: Washington Mutual, the sixth-largest U.S. bank, replaces its CEO, Kerry Killinger (Iowa MBA '71).

2008 September 10: LB says that it will spin off a majority of its remaining commercial real estate holdings into a new public company. LB also confirms plans to sell a majority of its investment management division in a move expected to generate $3 bn. It also announces an expected loss of $3.9 bn ($5.92 a share) in Q3, after $5.6 bn in write-downs. Korean Development Bank decides against buying a stake in LB.

2008 September 12: The heads of Wall Street firms gather at the New York Fed to look for ways to end the LB crisis. The U.S. Treasury secretary tells the participants that no government money can be used in any rescue.

2008 September 13: Attempts are made to arrange a Barclays purchase of LB, but fail the next day.

2008 September 15: LB, with $613 bn of debt including $160 bn of unsecured bonds, files for bankruptcy protection; its major assets are later sold to Barclays, Nomura, Bain Capital, and Hellman & Friedman; those holding its commercial paper (bonds) will receive about 10% of par. It will be revealed in March 2010 that LB had used "Repo 105" to "shed" debt of about $39 bn, $49 bn, and $50 bn from its balance sheet in the previous three quarters, respectively.

2008 September 15: ML to be bought by BofA for $50 bn, half its early 2007 value, after posting losses of more than $17 bn over the past year; BofA had earlier decided against buying LB. The deal includes a confidential agreement to authorize bonuses to be paid to ML employees for 2008 that "do not exceed $5.8 bn," before ML's results can be known—in the end it loses $27 bn. BofA has $14.4 bn and ML $8.1 bn in emergency Fed loans. In two weeks, BofA's loans will reach $25 bn and ML's will exceed $60 bn, helping the deal survive.

2008 September 15: AIG's credit rating is downgraded, from AA to A, forcing it to post $14.5 bn in collateral. Its shares fall 61% to $4.76.

2008 September 16: Losses from the LB default result in the Reserve Management Co.'s Primary Fund, the oldest U.S. money-market fund, "breaking the buck"—going into the red.

2008 September 16: At its regular meeting, the FOMC holds rates steady at 2%. Most Fed officials believe the economy is growing and fret about rising inflation. There is debate about having let LB fail. Eric Rosengren (UW Madison PhD '86), head of the Boston Fed, says the crisis is not just about Wall Street anymore. Ben Bernanke tells the FOMC that there are problems in Europe and elsewhere, suggesting the creation of "swap" lines, enabling foreign banks to borrow dollars from the Fed. Janet Yellen reports cutbacks on discretionary spending in

California, including elective dentistry and country club memberships.

2008 September 16: AIG is bailed out by the Fed, with an $85 bn infusion. The government takes 79.9% of the company, whose share price has recently fallen to 5% of its level 18 months ago. The Fed also replaces chief Robert Willumstad (Adelphi BA) with Edward Liddy (George Washington MBA ’72).

2008 September 16: GS reports a 70% drop in Q3 profits.

2008 September 18: At 3am in New York, the Fed announces a big expansion of swap lines with the ECB, and the central banks of Switzerland, Japan, Canada, and Britain. Ben Bernanke warns that the economy is on the verge of collapsing.

2008 September 18: Lloyds buys HBOS, with 20% of the mortgage market, Britain’s largest mortgage lender, for £12.2 bn.

2008 September 18: The U.S. Treasury announces a three-page, $700 bn proposal to buy toxic assets from U.S. banks. It requires congressional approval.

2008 September 18: The Fed, the BofE, the Bank of Japan and other central banks promise up to $180 bn to boost liquidity.

2008 September 19: The U.S. SEC prohibits “naked” short selling of 799 financial stocks until October 4th, following a British ban of the day before.

2008 September 19: The U.S. Treasury announces that, for a fee, it will guarantee eligible money-market mutual funds.

2008 September 21: The two surviving major investment banks, GS and MS, convert to bank holding companies, to receive bank oversight and support from the Fed. GS sells $5 bn shares to Warren Buffett’s Berkshire Hathaway and raises $5bn more on the equity markets.

2008 September 21: The Australian government regulator temporarily bans short selling of any stocks, following a ban on “naked” short selling on September 19.

2008 September 24: The Fed establishes new swap lines with the Reserve Bank of Australia (RBA) and the central banks of Norway, Sweden, and Denmark.

2008 September 25: The U.S. SEC abolishes the 2004 “Consolidated Supervised Entities” program, which relaxed the minimum capital requirements for securities firms and investment banks.

2008 September 25: Washington Mutual Bank is placed in receivership, after a ten-day bank run of $16.7 bn; it is partly sold to JPM Chase for $1.9 bn. It was regulated by OTS.

2008 September 28: The Benelux governments jointly nationalise the large financial company, Fortis, at €11.2 bn.

2008 September 29: At an emergency meeting, the Fed extends the international swaps program through April 2009, and raises its ceiling from $290 bn to $620 bn.

2008 September 29: The House rejects U.S. Treasury’s $700 bn proposal. The S&P 500 plunges almost 9% (over $1 trillion). The Libor shoots up to 6.88%.

2008 September 29: U.K. bank Bradford & Bingley is nationalised at $80 bn and partly sold off, after its unsuccessful June rights issue.

2008 September 29: Mitsubishi UFJ Financial Group pays $9 bn for a 25% stake in MS.

2008 September 29: MS will take $107 bn in Fed loans this month, enough to pay off one-tenth of U.S. delinquent mortgages. Its peak borrowing occurs today.

2008 September 30: Icelandic bank Glitnir is nationalised at $1 bn. The other two largest Icelandic banks follow on October 7 (Landsbank) and October 9 (Kaupthing). The banks' total liabilities are ten times the country's GDP; the stock market falls by 90%, along with the krona.

2008 September 30: Ireland guarantees all deposits and most debt liabilities of its banks. Irish 10-year bonds yields are at 4.590%.

2008 October 3: Following the Senate, the House passes a revised and amended version of the U.S. Treasury $700 bn proposal to create the Troubled Asset Relief Program (TARP). Bank deposits of up to $250,000 are guaranteed, previously $100,000.

2008 October 3: WF wins the battle against Citi to buy the failed Wachovia Bank, for about $15 bn. Later attempts to block the deal are unsuccessful. The Fed has channelled $50 bn in secret loans to Wachovia through two emergency-financing programs to prevent its collapse before the takeover.

2008 October 3: The TED spread is up to 330 bp (from 20 bp in early 2007).

2008 October 4: The Irish government announces that it will guarantee all deposits ($575 bn) in six Irish banks. The German government follows suit a day later. The EU responds similarly two days after that.

2008 October 5: Richard S. Fuld Jr. (NYU MBA '73), LB's CEO, testifies before a congressional panel that while he takes full responsibility for the debacle, he believes all his decisions "were both prudent and appropriate" given the information at the time. On November 10, Fuld will sell his half share in a Florida mansion ($13.75 million in March 2004) to his wife, Kathleen, for $100. Mrs Fuld is a Vice Chairman, The Museum of Modern Art.

2008 October 5: Hypo Real Estate is bailed out with a €50 bn credit guarantee from the German government.

2008 October 6: Countrywide Financial, the mortgage lender acquired by BofA, will settle fraud complaints in 11 states by cutting the amount borrowers owe and their interest rates at a cost of $8.4 bn.

2008 October 7: HBOS and Lloyd's have lost almost 40% of their market value.

2008 October 7: The Fed will buy commercial paper under the new Commercial Paper Funding Facility, thus extending short-term loans to non-banking companies for the first time.

2008 October 7: In front of the congressional Committee on Oversight and Government Reform, Lynn Turner (Nebraska MA '77), former chief accountant at the SEC, reveals that the SEC's Office of Risk Management was cut back to a single employee.

2008 October 7: In an emergency meeting, the FOMC, in coordination with other central banks, cuts rates by 50 bp to 1.5%, to announce this at 7am tomorrow.

2008 October 8: The U.K. government policy for bailing out the financial system is announced. The Treasury will infuse $64 bn of new capital into RBS, Lloyds TSB, and HBOS, with the government taking equity stakes in any banks bailed out.

2008 October 8: The Fed creates a second bailout facility for AIG, worth $38 bn.

2008 October 8: William Isaac (Ohio State Law ’69), former chair of the FDIC, argues that the SEC’s FAS 157 requirement that banks “mark to market” their assets has destroyed $500 bn of bank capital, “a major issue in the credit crunch.”

2008 October 11: Fred Goodwin (Glasgow Law), CEO of RBS since 2000, announces he will retire on January 31, 2009.

2008 October 11: The Fed removes caps on its swap lines with the ECB and the central banks of Switzerland, Japan, and Britain.

2008 October 12: The Australian government announces guarantees on bank deposits of up to A$1 million, and wholesale funding guarantees. New Zealand also guarantees its bank deposits.

2008 October 13: The U.S. government outlines a three-part rescue package involving the Treasury and the FDIC of at least $250 bn. It may also involve direct recapitalisation of banks, as the CEOs of nine large U.S. banks hear. The DJIA jumps 936 points, or 11%, its largest one-day gains since the 1930s.

2008 October 14: The Australian government announces an emergency A$10.4 bn ($7.3 bn) stimulus package to guard the economy from a global slowdown, with one-time payments to help boost consumer confidence.

2008 October 15: The ECB significantly relaxes the criteria for the collateral put up in exchange for central-bank loans, which in time will allow the credit extended to their banks by the central banks of Italy, Spain, Greece, Portugal, and Ireland to increase tenfold from 2007 to 2012.

2008 October 15: The Baltic Dry Index (a proxy for world shipping) has fallen 85% from its May record high. Spot iron-ore prices have fallen to half in ten months, along with other metals prices. Oil prices continue to fall.

2008 October 16: The Swiss government bails out UBS and Credit Suisse, by taking a 10% stake in each and forcing them to increase their capital bases.

2008 October 17: A day after the Swiss government rescues UBS, Switzerland’s largest bank (more than three times larger than LB), the U.S. Department of Justice Tax Division, which has been investigating UBS since the middle of 2008, announces that without UBS disclosing the names of U.S. tax evaders holding UBS accounts there will be no settlement.

2008 October 23: Credit markets revive. The Libor falls to 4.96%, the lowest since LB’s collapse. The TED spread also narrows after the Fed makes $540 bn available to buy assets from money-market funds. The ECB has lent European banks $1 trillion.

2008 October 23: Alan Greenspan admits in front of a congressional hearing that he was “partially” responsible by not advocating regulation of derivatives; he confesses to being “shocked” to find a “flaw” in his ideology that banks could be trusted to be “self-interested” in serving their shareholders.

2008 October 27: The Japanese Financial Services Agency bans “naked” short selling from November 4 to March 31. Mitsubishi UFJ Financial Group (Japan’s largest bank) needs $10.6 bn to cover its dwindling capital after the Nikkei plunges.

2008 October 27: The IMF bails out Hungary and Ukraine.

2008 October 28: The BofE estimates the amount of so-called toxic debt that has been lost by global financial institutions during the credit crisis as £1.8 trillion ($2.8 trillion), yet total bank writedowns by the end of 2008 will only be about $583 bn and total capital raised about $435 bn.

2008 October 29: At its regular meeting, the FOMC cuts the U.S. cash rate by 50 bp to 1%, down from 5.25% in mid 2007. It also authorizes a new round of swaps with New Zealand, Brazil, South Korea, Mexico, and Singapore.of $30 bn each, but rejects applications from other nations. Citing “falling home prices, an economy in recession, and collapsing confidence,” Janet Yellen argues for “as much stimulus” as possible as soon as possible.

2008 October 31: The Japanese lower their policy rate 20 bp to 0.3% and announce a fiscal stimulus of $51 bn.

2008 November: AIG FP has $2.7 trillion worth of swap contracts and positions; nearly 50,000 outstanding trades (some lasting up to 70 years) with 2,000 counterparty firms.

2008 November 1: The IMF introduces a new short-term lending facility for emerging economies facing temporary liquidity problems.

2008 November 4: Allco Financial Group chooses to go into voluntary administration, after its share price had fallen by 99% in less than 18 months. Allco was part of the consortium that unsuccessfully tried to take over Qantas over in May 2007.

2008 November 5: The RBA lowers the cash rate by 75 bp to 5.25%, following an October cut of 100 bp and a September cut of 25 bp.

2008 November 6: The BofE cuts the benchmark rate by 150 bp to 3%, the sixth cut since late 2007, when the rate was 5.75%. The ECB cuts its rate by 50 bp to 3.25%, its second cut since July, when the rate was 4.25%.

2008 November 6: Australia’s ABC Learning is forced into the hands of the receivers and administrators after the auditors refused to sign off its accounts.

2008 November 7: Ford and G.M. announce Q3 losses of $3 bn and $4.2 bn, respectively.

2008 November 8: ML advises the Irish government that Ango Irish Bank and Allied Irish Bank will each require €5.6 bn in new capital. (Anglo will go bust after €30 bn; Allied will require €21 bn and will be almost 100% state-owned in 2014, by which time the collapsed banks will have cost the state €64 bn.)

2008 November 9: China announces a fiscal stimulus of almost $600 bn.

2008 November 10: The U.S. Treasury announces a new rescue package for AIG, bringing the total cost to $150 bn.

2008 November 12: The U.S. Treasury announces it will use the $700 bn TARP to recapitalise banks and other financial institutions, rather than buying their toxic mortgage-backed assets.

2008 November 14: The 2008 G-20 Washington Summit on Financial Markets and the World Economy takes place over two days; achieves general agreement on how to cooperate in key areas to strengthen economic growth, deal with the 2008 GFC, and lay the foundation for reform to avoid similar crises in the future.

2008 November 18: Executives of Ford, General Motors, and Chrysler request access to TARP for federal loans.

2008 November 18: In Congressional testimony, U.S. Treasury Secretary Hank Paulson says, "There was no authority, there was no law that would have let us save LB."

2008 November 19: The Swiss government proposes a $5 bn bailout of UBS, which has written off over $45 bn, as well as assuming up to $60 bn of toxic assets, and taking a 9.3% stake in the bank.

2008 November 20: The benchmark CDS Index, which shows the cost of insuring firms against default, has almost doubled to 284 bp, from 152 bp prior to LB's demise.

2008 November 23: The U.S. government bails out Citi for an additional $20 bn (following the TARP's earlier cash injection of $25 bn), using a loss-sharing agreement with the Treasury's TARP. The bailout could cost taxpayers up to $306 bn after guaranteeing mortgage assets, as well.

2008 November 25: BHP withdraws its hostile bid for Rio Tinto, citing Rio's high level of debt ($45 bn) after the Alcan purchase, inter alia.

2008 November 25: The Fed will buy up to $100 bn in debt issued by Fannie Mae and Freddie Mac, and up to $500 bn in the two companies' securities, seeking to halt the collapse of the housing finance system.

2008 November 25: The New York Fed creates Maiden Lane III, a holding company, to buy (up to $35 bn of) AIG FP's mortgage-related securities from its counterparties to free it to terminate its CDSs. (AIG states that $74 bn in CDS arrangements should be ended.) It also creates Maiden Lane II to use $1 bn from AIG and up to $22.5 bn from the Fed to help AIG shut down its securities lending operations.

2008 November 25: The Fed announces the creation of the Term Asset-Backed Securities Loan Facility (TALF), a joint venture with the U.S. Treasury designed to increase credit availability by supporting the issuance of ABSs collateralised by student loans, auto loans, credit card loans, and loans guaranteed by the Small Business Administration (SBA). The Fed of New York will lend up to $200 bn, later increased to $1 trillion, on a non-recourse basis, and the Treasury will provide $20 bn of credit protection from the TARP.

2008 November 26: The *NYT* estimates that the total value of guarantees, investments, and loans given by the U.S. government since the beginning of the financial crisis has reached $7.8 trillion—as an insurer (guarantees made to investors and depositors against default): $3.1 trillion committed ($97 bn spent); as an investor (stakes taken in big financial companies in exchange for cash): $3.0 trillion committed ($649 bn spent); as a lender (low-interest loans made to large financial institutions): $1.7 trillion committed ($617 bn spent). This total does not include $5 trillion in guarantees made by Fannie Mae and Freddie Mac and apparently on the government balance sheet since September 7th. (See later estimate on April 30, 2009, below.)

2008 November 26: BofA CEO Kenneth D. Lewis writes to shareholders that he heads “one of the strongest and most stable banks in the world.” He doesn’t say that BofA owes the U.S. Fed $86 bn today.

2008 November 27: China cuts rates by 108 bp.

2008 December: In three months the Fed has more than doubled its balance sheet, from $942 bn to over $2.2 trillion.

2008 December: NAB has borrowed $4.5 bn from the Fed’s discount window; a Westpac-owned U.S. entity has borrowed $1 bn, pledging more than $3.3 bn in collateral.

2008 December 2: The RBA lowers the cash rate by 100 bp to 4.25%. Australian inflation is at 5% in late October. The Australian dollar has fallen 28% against the U.S. dollar since end-July.

2008 December 3: Babcock & Brown’s shares trade at A25¢, down from A$35.18 17 months before. (On March 13, 2009, the firm enters liquidation.)

2008 December 5: The Australian government announces a A$2 bn special fund, established by leading Australian banks, to provide liquidity to car dealers and their financiers, following the exit of GMAC Finance and GE Money from Australian wholesale and retail car financing, announced on October 24th.

2008 December 5: From a high of $147/bbl five months ago, the world price of oil drops to $41/bbl and will continue to fall.

2008 December 8: The U.S. Fed commits $1.2 trillion to bail out the banks.

2008 December 8: ML chief John Thain asks for a 2008 bonus of $10 million or more, but is turned down after the request is leaked to the *WSJ*. In October he was asking for $30 million.

2008 December 9: Rates on three-month U.S. Treasury bills turn negative for the first time. The same day, the U.S. sells $30 billion of four-week bills at a zero percent rate.

2008 December 10: The Fed’s loans to foreign central banks peak at $580 bn.

2008 December 11: On a tip from his sons, the FBI arrests Bernard Madoff (Hofstra BA ’60), former Chairman of the NASDAQ stock market, who is charged with fraud relating to what Madoff himself has characterised as “basically, a giant Ponzi [pyramid] scheme” of up to $50 bn in cash and securities. (On March 12, 2009, Madoff pleads guilty; he claims to have had nearly $65 bn in 4,800 client accounts at the end of November; prosecutors are seeking more than $170 bn in forfeiture.)

2008 December 11: The NBER announces that the U.S. economy has been in recession since December 2007.

2008 December 11: The House refuses to pass President Bush's car industry bailout bill.

2008 December 11: Robert Pickel (N.Y.U. Law '84), chief of the ISDA, strongly defends the use of OTC derivatives including CDSs.

2008 December 16: At its regular meeting, the FOMC cuts its target for the overnight federal funds rate to a range of zero to 0.25%, the lowest ever. Ben Benanke acknowledges that buying assets—so-called quantitative easing—will probably be controversial.

2008 December 19: The Belgian government falls, following its botched attempt to bail out the failed Belgo-Dutch bank, Fortis.

2008 December 19: President Bush bails out G.M. and Chrysler, with an emergency loan from the TARP of $13.4 bn now, and another $4 bn in February.

2008 December 22: Toyota announces an annual loss (for the year to end next March) for the first time in 70 years. The net loss will be announced (on 2009/05/08) as ¥437 bn ($4.4 bn), including a loss of ¥766 bn ($7.7 bn) for the first three months of 2009.

2008 December 23: The SEC takes steps to allow British firm LCH.Clearnet to act as a central clearinghouse for transactions involving CDSs.

2008 December 23: The CIT Group wins court approval to convert to a bank holding company. The U.S. government bails out CIT by investing $2.33 bn in the firm.

2008 December 30: The SEC decides not to suspend FAS 157 mark-to-market accounting.

2008 December: The BBA changes the Libor rate-setting process.

2009 January: At end-December 2008, China's foreign reserves (minus its holdings of gold) stood at $1.946 trillion, and was mainly bonds issued by the U.S. Treasury and by Fannie Mae and Freddie Mac.

2009 January: There is nearly $1 trillion of U.S. consumer credit-card debt, an average balance of $11,212; the percentage of charge-offs will rise to 10.66% in Q2, 2010.

2009 January 1: Slovakia joins the eurozone

2009 January 2: The world oil price bottoms at $34.57/bbl.

2009 January 8: The BofE cuts interest rates to 1.5%, an all-time low (since 1694).

2009 January 14: In Q4 2008 China's exports (in dollar terms) fell by 13%, and were 3% lower than a year ago, but its imports for 2008 fell by 21%, resulting in a record Q4 trade surplus of $457 bn annualised, 50% higher than Q4 2007.

2009 January 14: Six days before Citi's central bank loans peak at $99.5 bn, the N.Y. Fed gives its CEO Vikram Pandit (Columbia PhD '86) a report declaring its financial strength to be "superficial," bolstered largely by its $45 bn of Treasury funds.

2009 January 14: S&P cuts Greek debt to A− from A, citing the country's weakening finances as the global economy slows. Greek 10-year bond yields will rise to 5.43% the next day.

2009 January 15: Despite earlier assurances, Ford Credit pulls out of retail car financing in Australia, joining GMAC Finance and GE Money.

2009 January 15: The Irish government announces the full nationalisation of Anglo Irish Bank, the country's third-largest lender.

2009 January 15: U.S. foreclosures rose 81% in 2008, affecting 2.3 million households; December filings were up 41% from a year ago.

2009 January 16: Citi reports a Q4 loss of $8.29 bn, and 2008 loss of $18.72 bn. The company plans to split into two: Citicorp for the core banking, and a second business for non-core assets, eventually to be sold.

2009 January 16: The head of a bank with $300 million in TARP money (Whitney National Bank in New Orleans) says, "Make more loans? We're not going to change our business model or our credit policies to accommodate the needs of the public sector as they see it to have us make more loans."

2009 January 19: The U.K. government announces new measures to bolster the country's leading banks, to augment the measures of last October 8th, including an increase in its stake in RBS to 70%.

2009 January 20: The French government agrees to provide another $13.6 billion of capital to its biggest lenders.

2009 January 23: ML chief John Thain resigns after spending $1.22 million of campany cash on refurbishing his office (including a $1,405 trashcan), and accelerating a payout of $3.6 bn in executive bonuses before BofA took over at the end of December (696 executives received bonuses of $1 million or more). ML lost $21.5 bn in Q4, and BofA will receive $20 bn in TARP money in addition to the $25 bn promised on October 14; $118 bn of risky assets will be guaranteed as well. The U.S. government becomes the Bank's largest shareholder, with about 6%.

2009 January 28: The IMF cuts its forecast of 2009 world economic growth to 0.5% (−2.0% for advanced economies and +3.3% for developing), down from a forecast of 2.2% (−0.3% and +5.1%) last November. Its estimate of total losses for banks and other financial services companies is now $2.2 trillion, up from $1.4 trillion last October.

2009 January 28: The New York State comptroller estimates that total bonuses in the N.Y. securities industry fell 44% to $18.4 bn, down from $32.9 bn in 2007, but still the sixth highest on record, just below 2004, in real terms. He also estimates that the brokerage units of N.Y. financial companies lost more than $35 bn in 2008, triple their losses in 2007.

2009 January 31: In London, the Chinese premier, Wen Jiabao (Beijing Institute of Geology MEng '68), says, "Whether we will buy more U.S. Treasury bonds, and if so by how much—we should take that decision in accordance with China's own need and also our aim to keep the security of our foreign reserves and the value of them," raising new concerns about China's commitment to continue purchasing U.S. government debt.

2009 February 3: At a gathering in Kuwait City, Justin Lin (Chicago PhD '86), the World

Bank's chief economist, estimates that losses in global equity markets are now $30 to $35 trillion, and that real estate markets have lost an equal amount. "To sum them up, total losses are about $60 trillion, which is about the size of the global GDP."

2009 February 17: In an interview with the *FT,* Alan Greenspan says, "It may be necessary to temporarily nationalise some banks in order to facilitate a swift and orderly restructuring. I understand that once in a hundred years this is what you do."

2009 February 17: President Obama (Harvard Law '91) signs his $789 bn stimulus bill into law, the *American Recovery and Reinvestment Act.*

2009 February 26: Founded in 1727, at the end of 2007 RBS was the world's largest bank by assets (£1.9 trillion) and fifth-largest bank by market valuation; in 2008 it lost £24.1 bn ($34.4 bn), the biggest loss in U.K. corporate history.

2009 February 26: Fannie Mae reports a Q4 2008 loss of $25.2 bn, bringing its full-year loss to $58.7 bn.

2009 February 27: The U.S. government agrees to become the biggest single shareholder in Citi, with a stake of up to 36%, in a partial nationalisation. This brings the amount of rescue funding to $70 bn (plus $306 bn in guarantees). The market value of Citi (with some $1,600 bn in assets and operations in 130 countries) is less than $9 bn. Its shares fall 30%.

2009 February 28: In his annual letter to shareholders, Warren Buffett argues that the danger of derivatives is not merely the difficulty in assessing their value, rather it is the "web of mutual dependence" they create and the long periods of entanglement: "Participants seeking to dodge troubles face the same problem as someone seeking to avoid venereal disease. It's not just whom you sleep with, but also whom they are sleeping with."

2009 March: The U.S. Fed has committed $7.77 trillion (in guarantees and lending limits) to rescue the financial system, more than half the value of U.S. GDP.

2009 March: One indicator of the U.S. credit crunch is commercial paper outstanding (CPO): Q3 2008 nominal GDP grew by 3.8%, but CPO fell by more than 25% (from $2.19 trillion to $1.58 trillion), and at end-February 2009 is $1.46 trillion. Asset-backed CPO fell by more than 40% (from a high of $1.21 trillion in mid-2007 to $725 bn), and at end-February is $671 bn. Unsecured financial CPO is $588 bn, from a high of $1,050 bn at end-2007.

2009 March 2: Former head of the RBA, Ian MacFarlane (Monash MEc '71), argues that there are two reasons why Australia's big four banks are listed amongst the eleven soundest in the world by S&P (AA or better): the "four pillars" policy acted to reduce takeover competition among the banks, which reduced their propensity to take excessive risks to escape being taken over; and there was a savings shortfall in Australia, a net international borrower,—unlike Europe and Japan—which kept the four banks out of the U.S. SP mortgage market.

2009 March 2: After substantial writedowns on its commercial MBSs, AIG reports a $61.7 bn Q4 2008 loss, the largest in U.S. corporate history, which pushes its total net loss for the year to $99.3 bn. In the third rescue in five months, the U.S. government will take a controlling stake in AIG's Asian operations and its global life insurance business, as well as $8.5 bn-worth of bonds backed by cash flow from the U.S. life insurance unit. In return, the government will forgive most or all of the $38 bn lent to AIG, reduce the interest rate on future loans, and provide a $30 bn standby credit line from the TARP to cover further losses. This brings to $180 bn the amount of taxpayers' cash infusions that AIG has received, and counting. The government's stake remains at just below 80% of the company.

2009 March 5: The BofE cuts interest rates by 50 bp to 0.5%, and the ECB cuts rates by 50 bp to 1.5%. The BofE will spend £75 bn ($105 bn) of newly created money ("quantitative easing") to buy nearly a third of outstanding 5- to 25-year government bonds, or gilts. The 3-month U.S.-dollar Libor has fallen to 1.28%, from 4.8% last September.

2009 March 5: Angry Fed Chairman Ben Bernanke, appearing at a Senate budget hearing, says that AIG strayed from its core insurance business and took unmonitored and unnecessary risks through its Financial Products (FP) unit, which wrote billions of dollars in exotic derivative contracts (including CDSs) that faltered and nearly destroyed AIG. AIG FP's activities were unregulated (see 2000/12/21), a gap in the system.

2009 March 5: Shares in Citi briefly fall to $0.97, from a high of $57.00 at the end of 2006.

2009 March 9: The Asian Development Bank (ADB) warns that the falls in the worldwide value of "financial assets" (stock market valuations and bonds supported by mortgages and other assets, but not financial derivatives) might have reached more than $50 trillion, a year's global economic output. "Asia has been hit disproportionately hard."

2009 March 11: Writing in the *WSJ*, Alan Greenspan states, "Given the decoupling of monetary policy from long-term mortgage rates, accelerating the path of monetary tightening that the Fed pursued in 2004-2005 could not have 'prevented' the housing bubble."

2009 March 12: The global economy is on track for its worst recession since the 1930s, with output likely to shrink by 1−2% this year, World Bank President Robert Zoellick (Harvard Law & MPA '81) tells the London *Daily Mail*.

2009 March 15: Between 16 September and 31 December 2008, AIG paid $49.5 bn from bailout funds to CDS and securities-lending counterparties: GS $12.9 bn, Société Général $11.5 bn, DB $11.5bn, Barclays $8.5 bn, ML $6.8 bn, BofA $5.2 bn, UBS $5 bn, BNP Paribas $5 bn.

2009 March 15: After receiving more than $170 bn in taxpayer bailout money, AIG pays out about $165 million to AIG FP executives in bonuses and "retention pay," under contracts signed before last year's bailouts, including a single payout of $6.5 million. This is in addition to $121 million in previously scheduled bonuses for AIG's senior executives, including $9.6 million to the top 50 executives. AIG FP is being wound down.

2009 March 18: Acting director of the OTS, Scott Polakoff (Southern Methodist MA '92), admits to a House hearing that OTS had the authority, resources, and expertise to have stopped AIG FP's CDS and securities lending commitments in 2004, but didn't, which was a mistake. (But see the March 2007 GAO report on OTS's lack of insurance expertise.)

2009 March 18: The Fed announces that it will pump an extra $1 trillion into the mortgage market (by buying government-guaranteed mortgage-backed securities, $750 bn, and longer-term bonds, $300 bn), using "quantitative easing," in addition to the $500 bn of such securities it is already buying.

2009 March 19: The IMF predicts that the world economy will shrink by up to 1% in 2009; G7 countries will contract by as much as 3.5%; Japan is forecast to contract by 5%.

2009 March 23: U.S. Treasurer Tim Geithner announces a "public-private partnership" for private investors to buy up to $1 trillion of banks' toxic assets, with government help: co-investment by the Treasury, cheap, non-recourse loans from the Fed, and debt guarantees from the FDIC. The investors face a good up side, but not much down side. The Treasury will expand the TALF as part of the package by accepting legacy debt: toxic debt as collateral from borrowers, as well as AAA−rated commercial real-estate bonds.

2009 March 31: Caja de Ahorros Castilla-La Mancha is the first Spanish bank to be bailed out, with government loan guarantees of up to €9 bn ($11.8 bn).

2009 April: Ben Bernanke says that the Fed provides emergency loans only to "sound institutions," even as its internal assessments describe Citi as "marginal."

2009 April 2: The FASB eases mark-to-market fair valuation rule 157 for U.S. financial institutions, allowing upwards revaluation of some bank assets.

2009 April 4: The U.S. Congressional Budget Office estimates that the net cost of using the TARP's full $700 bn will total $356 bn, just over 50¢ in the dollar.

2009 April 6: Dick Parsons (Albany Law '71), chair of Citigroup, says, "Besides banks, there was reduced regulatory oversight, loans to unqualified borrowers were encouraged and people took out mortgages or home-equity loans they couldn't afford."

2009 April 21: The IMF revises upwards its estimate of financial institutions' total writedowns on loans and other assets to $4.1 trillion, including total writedowns on U.S. assets of $2.7 trillion (up from its January estimate of $2.1 trillion, and almost double its October 2008 estimate), by the end of 2010. Banks will bear about two-thirds of the losses, with insurance companies, pension funds, hedge funds, and others taking the rest.

2009 April 22: In its quarterly "World Economic Outlook" (lead author Jörg Decressin, Harvard PhD '93), the IMF revises down its January forecast and says that the world economy will contract by 1.3% in 2009, instead of growing by 0.5%. Advanced economies will contract by 3.8% this year, they say, and global trade will plunge by 11% this year, after growth of 3.3% in 2008.

2009 April 30: The *NYT* notes that beyond the $700 bn TARP bailout (used to prop up banks and car companies), the U.S. government has created an array of other programs to provide support to the financial system, with commitments of about $12.2 trillion and expenditure of $2.5 trillion, with more than $10 bn in dividends and fees collected. As investor, the government has committed $9.0 trillion and spent $1.6 trillion; as insurer, $1.7 trillion and $330 bn; and as lender, $1.4 trillion and $528 bn.

2009 May 5: The Libor falls below 1%.

2009 May 7: Stephen Friedman (Columbia Law ’62) resigns as Chairman of the NY Fed as a result of a perceived conflict of interest of his purchases of 52,600 GS shares while serving as a GS board member and supposedly responsible for oversight of GS.

2009 May 8: Subsequent to “stress tests,” ten of the largest U.S. banks are ordered to raise a total of $75 bn in extra capital: BofA $34.9 bn, Wells Fargo $13.7 bn, Citi $5.5 bn on top of the $52.5 bn it plans to acquire by letting the U.S. Treasury become its biggest single shareholder. The rest are given a clean bill of health.

2009 May 13: Treasury chief Timothy Geithner proposes that OTC derivatives trades take place on exchanges, with all major dealers subject to federal oversight. This would include CDSs, which have cost U.S. taxpayers $182 bn so far to bail out AIG, inter alia. Geithner is supported by SEC chief Mary Schapiro (George Washington Law ’80), ISDA chief Robert Pickel, and Tim Ryan (American University Law ’73), chief of the Securities Industry and Financial Markets Association (SIFMA).

2009 May 21: A day after Alan Greenspan warns that the global financial crisis is far from over and that U.S. banks must raise “large” amounts of capital before recovery can begin, the FDIC shuts down Florida’s BankUnited, the FDIC’s second-costliest bank collapse (at $4.9 bn) of the crisis, after IndyMac (almost $11 bn). Both BankUnited and IndyMac were regulated by the OTS.

2009 June 9: Ten U.S. banks (including JPM Chase $25 bn, GS $10 bn, MS $10 bn) are allowed to repay a total of $68 bn of bailout funds from the TARP to the Treasury. But BofA, Citi (both $45 bn), WF ($25 bn), and others continue under government supervision.

2009 July: Japan’s export have fallen by 35.7% over the past twelve months, Germany’s by 22.3%.

2009 July 10: Larry Summers in the *FT*: “I think I always had the sense that our regulatory system was about the protection of individual institutions, and the important problems are often about the protection of the system. I was very worried in the 1990s about predatory lending, about systemic risk, about the stability of Fannie and Freddie. But the political constellation at that time didn’t offer a chance really to do more than report and warn about it. It’s a different world today. As Keynes famously said, ‘When the facts change, I change my mind.’”

2009 July 14: GS announces a record Q2 profit of $3.44 bn, and sets aside $11.36 bn for employee compensation and benefits through the first half of 2009.

2009 July 16: JPM Chase announces a Q2 profit of $2.7 bn.

2009 July 17: Mervyn King, Governor of the BofE, at the Lord Mayor's Banquet: "If some banks are thought to be too big to fail, then ... they are too big." Moreover, "the size of the [U.K.] banking system was, as a proportion of GDP, five times that of the U.S."

2009 July 20: After failing to obtain a second bailout, the CIT Group has borrowed $3 bn from its bond holders, averting what would have been the fifth-largest bankruptcy in the U.S.

2009 July 31: Nine banks that combined had losses of nearly $100 bn received $175 bn in U.S. government aid money, but as yet have repaid only $50 bn, paid out nearly $33 bn in bonuses in 2008, including more than $1 million to each of nearly 5,000 employees.

2009 August: Of the 31 banks that failed and were seized by U.S. bank regulators between January 2007 and July 2009, loans and leases were roughly three-quarters of their balance sheets, and trading assets played no role. (Laux & Leuz 2009).

2009 August 13: *The Economist* estimates that U.S. taxpayers have equity of about $160 bn in AIG, Fannie Mae and Freddie Mac, which is "likely" to rise to $300 bn. With other types of help, such as loans, the total exposure could reach $800 bn, or 3% of GDP. In 2012, the bailouts will have cost taxpayers about $185 bn, but the by 2013 the two will have become highly profitable.

2009 August 25: President Obama nominates Ben Bernanke for a second term as Fed chairman.

2009 August 27: The FDIC reports that the number of distressed banks has risen to the highest level in fifteen years (416), up from 171 six months ago.

2009 September 18: The Fed proposes a tough set of pay guidelines for big U.S. financial firms that would reduce the incentives for traders and executives to take on too much risk. Despite not requiring congressional approval, and despite the report of the Special Master for TARP Executive Compensation, ten months later the set will still not be announced, much less implemented.

2009 September 24: In Pittsbugh, the G20 leaders agree that by 2013 "All standardized OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate."

2009 September 25: In the U.S. the value of guarantees and bailouts approaches 80% of GDP, some $12 trillion.

2009 October 15: "If [banks] are too big to fail, they're too big," says Alan Greenspan to an audience at the Council on Foreign Relations in New York.

2009 October 20: The new Greek government says that its deficit will balloon to 12.5% of GDP in 2009, more than double the previous government's forecast. Yield on Greek 10-year bonds is 4.58%.

2009 October 26: The former head of the Greek National Statistics Service says his body "holds no responsibility" for the revision of deficit figures since 2008.

2009 November 7: The U.S. October "broader" unemployment rate (the "U-6") is at least 17.4%, the highest for at least forty (perhaps seventy) years, with six unemployed for each vacancy.

2009 November 8: In an article in the London *Sunday Times Magazine* on Goldman Sachs and its CEO, Lloyd Blankfein (Harvard Law '78): "Call him a fat cat who mocks the public. Call him wicked. Call him what you will. He is, he says, just a banker 'doing God's work.'"

2009 November 13: A letter to members of the U.S. Congress from the Financial Services Forum, a lobby group of the CEOs of 20 of the world's largest financial firms, argues the virtues of bigger banks: breaking them up would cause "long-term damage to the U.S. economy."

2009 November 17: "Certainly, our industry is responsible for things. We're a leader in our industry, and we participated in things that were clearly wrong and we have reasons to regret and apologize for."—Lloyd Blankfein, chairman and CEO, Goldman Sachs.

2009 December 8: At the Future of Finance Initiative, a conference organised in England by the *WSJ*, Paul Volcker, chairman of President Obama's Economic Recovery Advisory Board, states that the biggest innovation in the financial industry over the past 20 years has been the Automated Teller Machine. "I wish someone would give me one shred of neutral evidence that financial innovation has led to economic growth—one shred of evidence," he says. Saying that financial services in the U.S. has increased its share of value added from 2% to 6.5%, he asks the bankers present, "Is that a reflection of your financial innovation, or just a reflection of what you're paid?"

2009 December 16: S&P cuts Greece to BBB+ from A−, three steps above junk.

2010 January 4: At the annual meeting of the American Economic Association, Atlanta, Ben Bernanke argues that it was poor execution of regulation (and insufficient attention to systematic stability instead of institutions' stabilities), not lax monetary policy, that mainly led to the housing bubble and the financial crisis.

2010 January 13: The first public hearings occur of the U.S. Congressional Financial Crisis Inquiry Commission, modelled on the Pecora Commission of the 1930s that recommended creation of the SEC and the Glass-Steagall Act of 1933, designed to prevent the formation of banks too big to fail. The ten-member panel includes Brooksley Born, former head of the CFTC, who had warned in 1998 of the risks of derivatives trading and argued to Congress that such trading should be subject to greater regulation.

2010 January 13: In an interview in *The New Yorker*, Eugene Fama says that the financial system collapse, the "so-called credit crisis," was predated by a worldwide fall in real estate prices, a "big recession, people couldn't make their mortgage payments." Bubbles "have to be predictable phenomena."

2010 January 28: The U.S. Senate confirms Ben Bernanke for his second term as Fed chairman, but it was a battle.

2010 February 2: The Greek government announces an austerity package to reduce its deficit to 3% of GDP in 2012.

2010 February 8: 91% of the AAA subprime Residential MBS securities issued in 2007, and 93% of those issued in 2006, have since been downgraded to junk status. 97% of the AAA Option ARM securities issued in 2006 and 2007 are now in junk status. Option ARMs allow borrowers to pick from several types of payments each month, including a "minimum payment" that results in a growing, rather than declining, loan balance.

2010 February 15: The Greek finance minister says, "we are basically trying to change the course of the Titanic. People think we are in a terrible mess. And we are."

2010 March 12: The Valukas report on the collapse of LB, sponsored by the U.S. bankruptcy court, reveals LB's accounting shenanigans in its final months, such as the Repo 105 device, first used in 2001, that allowed LB to shift about $50 bn off its balance sheet when necessary, thus misleading investors about its leverage.

2010 March 26: In a letter to shareholders, JPM Chase CEO, Jamie Dimon, says that his bank used the Fed's Term Auction Facility (TAF) "at the request of the Federal Reserve to help motivate others to use the system." He doesn't say that JPM's total TAF borrowings were almost twice its cash holdings or that its peak borrowing of $48 bn on February 26, 2009, came more than a year after the TAF's creation.

2010 March 27: The former Fed chairman, Alan Greenspan, calls the financial crisis "a once-in-a-century event" whose consequences have proved far more devastating than had been widely expected. "We all misjudged the risks involved. Everybody missed it—academia, the Federal Reserve, all regulators."

2010 April 8: Greece's 10-year bond yield reaches 7.4%, pushing the spread on German bonds to a euro-era high of 442 bp.

2010 April 14: Jamie Dimon, CEO of JPM Chase, says that the cost to his company of forcing OTC derivative trading through a public exchange, "could be $700 million to a couple billion dollars."

2010 April 16: The SEC files suit against GS, claiming the bank created and sold a synthetic CDO, Abacus 2007-AC1, that was secretly intended to fail. European banks IKB Deutsche Industriebank and ABM Amro (now owned by the RBS) and others lost over $1 bn in this deal, it's alleged. (RBS lost $840.1 million.) From 2004 to 2008 GS issued 25 Abacus deals, worth $10.9 bn, seven of which went to AIG. Shares of GS close down 13%, destroying $10 bn of the company's value.

2010 April 16: The IMF estimates that "Net of amounts recovered so far [the 30 months to December 2009], the fiscal cost of direct support has averaged 2.7% of GDP [$862 bn] for advanced G-20 countries. In those most affected, however, unrecovered costs are on the order of 4−5% of GDP. Amounts pledged, including guarantees and other contingent liabilities, averaged 25% of GDP during the crisis. Furthermore, reflecting to a large extent the effect of the crisis, government debt in advanced G-20 countries is projected to rise by almost 40 percentage points of GDP during 2008−2015."

2010 April 20: Earnings for GS rose 91% in the first quarter of 2010, to \$3.46 bn or \$5.59 a share, up from \$1.81 bn or \$3.39 a share in the same period last year. Revenue increased 36%, to \$12.78 bn, up from \$9.42 bn in the quarter a year before.

2010 April 22: The EU revises Greece's 2009 budget deficit to 13.6% of GDP, higher than the government's previous forecast of 12.9%. Ireland overtakes Greece as the EU nation with the largest deficit with its shortfall revised to 14.3%. (The Maastricht limit is 3%.) Moody's cuts Greece one level to A3.

2010 April 27: S&P becomes first rating company to cut Greece to junk, and downgrades Portugal to A−.

2010 April: The median U.S. home price was \$173,100 in April, down 25% from July 2006, according to the NAR.

2010 May 3: The U.S. Treasury estimates that the housing downturn, financial market crisis, and job losses were major setbacks for U.S. households: net household wealth fell by about \$17 trillion, or 26%, from its peak of \$66 trillion in Q2 2007 through the middle of 2009.

2010 May 5: Protests in Athens against the government's austerity plans turn violent and three people are killed when they become trapped in a bank set ablaze by demonstrators.

2010 May 6: The Greek Parliament approves deficit cuts. Greek 10-year bond yields will reach 12% the next day.

2010 May 6: In a sign of market instability, the "flash crash" on U.S. stock markets leads to the DJIA to fall nearly 1,000 points before recouping much of the loss. The major market indexes dropped by over 9% (including a roughly 7% decline over 15 minutes). The cause or trigger remains unclear, but some have argued that retention of the uptick rule (abandoned on 6 July 2007) would have prevented the turbulence. Its catalyst will later be traced to trading in E-Mini S&P 500 futures.

2010 May 7: The VIX (the Chicago Board Options Exchange Volatility Index) closes at 40.95 (its highest since April 2009), having risen over 20% in one day, and doubled over the past four days.

2010 May 10: European governments and the IMF agree to make available up to €750 bn in loans to check the spread of the Greek debt crisis. The ECB says it will buy government and private debt. The meeting gives birth to the European Financial Stability Facility (EFSF), the region's temporary bailout mechanism, with initial capital of €440 bn.

2010 May 10: In testimony before the U.S. Financial Crisis Inquiry, Alan Schwartz (Duke, '72), erstwhile CEO of BS, says, "I ... believe that we took all the appropriate steps that we could to try to survive the storm that was breaking upon us."

2010 May 10: The VIX logs its largest ever one-day percentage decline, tumbling nearly 30%. It is the first time the index has risen more than 20% in one trading day and then declined more than 20% in the next session.

2010 May 18: Germany bans "naked" short selling and "naked" CDSs of eurozone government bonds; the ban will also apply to shares of ten German banks and insurers until 31 March 2011.

2010 June 16: Jean-Claude Trichet (École nationale d'administration, '71), head of the ECB, in an interview with *La Repubblica*, "the idea that austerity measures could trigger stagnation is incorrect." Instead, "confidence is the key factor today."

2010 June 18: Alan Greenspan, in a *WSJ* op-ed piece, argues that the lack of rises in inflation and long-term interest rates, despite the surge in the U.S. federal debt from $5.5 trillion in late 2008 to $8.6 trillion now, is "regrettable, because it is fostering a sense of complacency that can have dire consequences."

2010 July 13: In its first ever sovereign risk assessment, Beijing-based Dagong Global Credit Rating Co. gives the U.S.A. a rating of AA, below China's of AA+. (Only Norway, Australia, Denmark, Luxembourg, Switzerland, and New Zealand have AAA ratings.)

2010 July 15: GS will pay $550 million and reform its business practices to settle SEC charges that it misled investors in a SP mortgage product (a synthetic CDO) just as the U.S. housing market was starting to collapse. Their employee, "Fab" Tourre, will be found guilty in August 2013.

2010 July 21: President Obama signs into law the Dodds-Frank *Wall Street Reform and Consumer Protection Act*, that creates a new consumer financial-protection bureau; that empowers regulators to dismantle any failing financial firm, not just banks, and pushes more of the clean-up costs onto the industry, rather than the taxpayer. Securitisers will have to retain more of the risk. Banks' proprietary trading and their investment in hedge funds and private equity will be limited. Derivatives markets will be regulated.

2010 August 24: The U.S. NAR reports "existing home" sales of 3.8 million in July (annualized), a 26% drop over a year, and down from a record high of 7.25 million in September 2005.

2010 September 30: The Irish budget deficit will rise to 32% of GDP (increasing public debt to 99% of GDP) as a result of providing fresh capital for its ailing banks (Anglo Irish, Allied Irish, and others). Yesterday, the yield on its ten-year government bonds was 470 bp above that of Germany. (The Maastricht limits are 3% p.a. and 60% of GDP, respectively.)

2010 October 1: The U.S. Financial Stability Oversight Council, made up of the Treasury, the Fed, the FDIC, and other financial regulators, meets for the first time. With the power to force teetering banks to close, it is chaired by Treasury chief Geithner.

2010 October 5: The IMF's *Global Financial Stability Report* states that the total value of crisis-related bank writedowns between 2007 and 2010 is $2.2 trillion. Banks will continue to be pressured: nearly $4 trillion of bank debt must be rolled over in the next 24 months.

2010 October 15: Angelo Mozilo, erstwhile CEO of Countrywide Finance, agrees to pay $67.5 million to settle a civil fraud case with the U.S. SEC.

2010 October 20: Delivering the 2010 Glauber Lecture at Harvard, “Ending Too Big To Fail,” Sheila Blair (Kansas Law ’78), chair of the U.S. FDIC, states that about 6.3 million mortgages have entered foreclosure since the recession started; at least 15 million people remain unemployed.

2010 November 3: The U.S. Fed announces “QE2,” in which it intends to buy $600 bn of longer-term Treasury bonds by the end of Q2, 2011, as well as reinvesting $250 bn to $300 bn over the same period.

2010 November 9: The Chinese CRA, Dagong, downgrades the local and long-term sovereign credit rating of the U.S.A. from AA to A+.

2010 November 19: In a letter to the Irish government, Jean-Claude Trichet, president of the ECB, states that the ECB will only extend more emergency funding to Irish banks — to prevent their collapse — if “the Irish government shall send a request for financial support” to the eurozone finance ministers.

2010 November 21: Dublin applies for a bailout, a €67 bn package from the IMF, the EC, and the ECB. Moreover, bowing to the ECB demands, the Irish government starts fiscal consolidation and structural reform, recapitalising and restructuring the banks, and guaranteeing repayment of the Emergency Liquidity Assistance (ELA). This will lead to several years of economic austerity, tax rises, pay cuts, and public spending cuts, at a cost to Irish taxpayers of €64 bn.

2011 January: The U.S. Financial Crisis Inquiry Commission reports that “from 1997 to 2008, the U.S. financial sector expended $2.7 bn in reported federal lobbying expenses; individuals and political action committees in the sector made more that $1 bn in campaign contributions.”

2011 January: Employees at the six biggest banks earned twice the average for all U.S. workers in 2010, an average of $126,342, up almost 20% from 2005, compared with less than 15% for the average worker. Average pay at the banks in 2010 was about the same as in 2007, before the bailouts.

2011 January 1: Estonia joins the eurozone

2011 January 6: BofA agrees to pay $2.6 bn to buy back mortgages it had improperly sold to Fannie Mae and Freddie Mac during the housing bubble.

2011 March 11: The EU summit agrees to expand the powers of EFSF to allow it to buy debt in primary markets and tap its full €440 bn in firepower.

2011 March 18: The *WSJ* publishes a second article on the possible rate-rigging of Libor, but the BBA denies the possibility.

2011 May 9: S&P cuts Greece two levels to B from BB− and threatens further cuts.

2011 May 13: The EU publishes new debt and deficit forecasts and predicts that Ireland, Portugal, and Greece will all have debt of more than their total GDP in 2011. (The Maastricht limit is 60%.)

2011 June 13: S&P cuts Greece to CCC, the lowest rating for any country it reviews in the world.

2011 July 21: The EU summit passes a second bailout package for Greece and agrees to expand the powers of the EFSF. Bankers agree to take losses (a “haircut”) of 21%

on the net present value of their Greek bond holdings.

2011 August 5: S&P downgrade long-term U.S. federal debt from AAA to AA+, an unprecedented move.

2011 September: Larry Summers is quoted in Susskind (2011): “One of the reasons that inequality has probably gone up in our society is that people are being treated closer to the way that they’re supposed to be treated.”

2011 September 2: Inspectors from the EU, the ECB, and the IMF suspend Greece’s fifth review after finding delays in the implementation of the medium-term fiscal plan and structural economic reforms. Spain adds a budget-discipline amendment to its constitution, the second change in its 30-year history.

2011 September 6: The Swiss National Bank sets minimum exchange rate at CHF 1.20 per euro.

2011 September 30: Total assets held by the six biggest U.S. banks have increased 39% to $9.5 trillion, from $6.8 trillion on the same day in 2006.

2011 October 27: EU leaders agree to leverage the EU’s temporary bailout fund to boost its firepower to €1 trillion, force private investors to accept a 50% haircut on Greek bonds, push European banks to raise €106 bn in new capital, and extend a new aid package worth €130 bn for Greece.

2011 October 30: MF Global, becomes the eighth-largest U.S. bankruptcy ($1.6 bn missing). It mixed customer funds and used them for its own account for at least several days before the bankruptcy and transferred funds outside the country.

2011 October 31: The Greek prime minister stuns EU politicians and Greek lawmakers by calling a referendum on the second bailout agreement.

2011 November 1: Bourses worldwide plunge on concerns that an unsuccessful referendum will push Greece into a disorderly default. The yield on Greece’s 2-year bonds rises to a record 84.7%.

2011 November 2: The EU cuts off aid payments to Greece and says that Greece must decide soon whether it wants to stay in the eurozone The ultimatum is at odds with the Maastricht Treaty’s assertion that monetary union is “irrevocable.”

2011 November 3: Greek prime minister Papandreou backs down on the euro referendum.

2011 November 3: Delivering the inaugural BBC Today Business Lecture, Barclays CEO Bob Diamond (Connecticut MBA ’76) says, “Culture is difficult to define ... but for me the evidence of culture is how people behave when no one is watching.”

2011 December 9: Ten-year bond yields: Greek 32%, Italian 6.47%, Spanish 5.77%, and German 2.07%.

2012 January 13: S&P downgrades the following nine eurozone countries’ sovereign-debt ratings: France and Austria down one from AAA to AA+, Malta down one from A to A−, Slovenia down one from AA− to A+, Slovakia down one from A+ to A, Cyprus down two from BBB to BB+, Italy down two from A to BBB+, Portugal down two from BBB− to BB (junk), Spain down two from AA− to A.

2012 February 1: Awarded in 2004 for "services to banking," the knighthood of Fred Goodwin, erstwhile CEO of RBS, is "cancelled and annulled."

2012 February 9: Five big U.S. banks (BofA, WF, JPM Chase, Citi, and Ally Financial) accused of abusive mortgage practices agree to a $25 bn government settlement.

2012 February 13: In a letter to the Fed, JPM Chase argues against the proposed Volcker Rule, that would restrict government-backed banks' ability to conduct proprietary trading, arguing that the proposal would restrict its efforts to rein in risk-taking and would harm the firm's ability to compete against foreign rivals that did not face the same restrictions.

2012 February 27: S&P cuts Greece's credit rating to "selective default." On May 2, it will revert to CCC.

2012 April 12: Asked about the very large position in CDSs in corporate bonds held by Bruno Iksil, the so-called "London Whale," Jamie Dimon, CEO of JPM Chase, says, "It's a complete tempest in a teapot."

2012 April: Estimates of the ratios of Gross Government Debt to GDP—Greece 153%, Italy 123%, Ireland 113%, Portugal 112%, France 89%, Spain 79%, Germany 79%. The Maastricht limit: 60%.

2012 April: Estimates of the ratios of Bank Assets to GDP—Greece 139%, Italy 156%, Ireland 284%, Portugal 191%, France 218%, Spain 209%, Germany 187%.

2012 May 10: JPM Chase, which emerged from the financial crisis as the U.S.'s biggest bank, will disclose that it has lost up to $6 bn in trading, which stemmed from a hedging strategy that backfired.

2012 May 18: JPM Chase's "London Whale" has built up positions totalling more than $100 bn in asset-backed securities and structured products—the complex, risky bonds at the centre of the GFC in 2008.

2012 May 23: Two months after being stopped from finishing a report on GS' rules on conflict of interest, and a meeting that agreed to issue a "matter requiring attention" warning to GS, Fed of N.Y. bank examiner, Carmen M. Segarra, was terminated, she claims in a lawsuit against the Fed.

2012 June 5: "A fiat currency backed by heterogeneous sovereigns is irremediably fragile," says Martin Wolf in the *FT*. "Before now, I had never really understood how the 1930s could happen. Now I do. All one needs are fragile economies, a rigid monetary regime, intense debate over what must be done, widespread belief that suffering is good, myopic politicians, an inability to co-operate and failure to stay ahead of events."

2012 June 7: "We need more Europe," German Chancellor Angela Merkel (Akademie der Wissenschaften der DDR PhD '86) says on ARD television. "We do not only need a monetary union, but we also need a so-called fiscal union. This means that we also need a common budgetary policy, and we also need a political union."

2012 June 8: "ANGELA MERKEL THINKS WE'RE AT WORK," reads a sign by Ireland supporter Gerry Nolan and his friends from Limerick displayed at the Euro 2012 soccer tournament in Poland and Ukraine.

2012 June 12: ING Bank agrees to pay $619 million to U.S. authorities to settle claims it had transferred billions of dollars in the U.S. for Cuba and Iran.

2012 June 13: Jamie Dimon, CEO of JPM Chase, tells the Senate Banking Committee that he was "dead wrong" to dismiss early news reports of his bank's reckless trading and that he is "sorry" for the resulting losses, estimated at up to $9 bn. He even ventures that too-big-too-fail banks have "negatives," including "you know, greed, arrogance, hubris, lack of attention to detail."

2012 June 15: Rajat K. Gupta (MBA Harvard '73), the retired head of the consulting firm McKinsey & Co. and a former GS board member, is found guilty of conspiracy and securities fraud for leaking boardroom secrets to a billionaire hedge fund manager, Galleon's founder, Raj Rajaratnam.

2012 June 27: Barclays Bank is fined a total of $360 + £59.5 million by the CFTC, the U.S. Justice Department, and U.K. Financial Services Authority (FSA) after it acknowledges efforts between 2005 and 2009 to manipulate the Libor and other benchmarks interest rates to its advantage. These rates are used to determine the costs of $350 trillion in financial products, including credit cards, mortgages, and home loans. Its shares fall 15.5% next day and CEO Bob Diamond, together with other top executives, will forgo his 2012 bonus (his 2011 pay: $9.8 million). He will later agree to forgo an additional bonus of as much as £20 million. Other banks, including HSBC, JPM Chase, Citi, RBS, UBS, and Lloyds, are also under investigation in the rate-rigging scam.

2012 June 29: A Euro summit agrees that funds from the European Stability Mechanism (ESM) can be used to recapitalise troubled banks directly, after creation of a Europe-wide banking supervisory agency, overseen by the ECB. This is the start of a eurozone "banking union," and is a concession by Germany in the face of blocking threats by Italy and Spain. It does not include "euro bonds" for debt sharing, or fiscal integration.

2012 June 29: The FSA forces Britain's four biggest banks, Barclays, HSBC, Lloyds and RBS, to pay compensation (up to £6 bn) to customers they misled about interest-rate hedging derivatives.

2012 July 1: In the wake of the rate-rigging scam, Marcus Agius (Harvard MBA '72), chairman of Barclays, quits; he is also chair of the BBA, which self-regulates the Libor determination. A day later, his CEO Bob Diamond also quits. He was head of Barclays Capital, its investment bank division (which contains the remnants of parts of LB), when his staff were trying to rig the Libor.

2012 July 5: The ECB cuts eurozone interest rates to an all-time low of 0.75% and its deposit rate to zero.

2012 July 23: 10-year U.K. bond yields reach a record low of 1.407%.

2012 July 26: Mario Draghi (MIT PhD '76), head of the ECB, says, "Within our mandate, the ECB is ready to do whatever it takes to preserve the euro."

2012 September 13: The Fed replaces its limited bond-buying program with an open-ended one, tied to labour-market improvements. It estimates that it will buy about $85 bn a month for the next three months.

2012 November 5: An Australian Federal Court finds S&P's liable for issuing an AAA rating for ABM Amro's CPDO product, described by the Court as "grotesquely complicated." The Dutch bank itself had described the product as a "casino strategy" of doubling your bet every time you lose. S&P took its client the bank's model without adjustment

2012 December 10: Standard Chartered bank agrees to pay $327 million to U.S. authorities to settle claims that it had illegally funneled money for Iranian banks and corporations.

2012 December 10: HSBC agrees to pay $1.92 bn to U.S. authorities to settle charges that it transferred billions of dollars for nations under U.S. sanctions, enabled Mexican drug cartels to launder tainted money through the U.S. financial system, and worked closely with Saudi Arabian banks linked to terrorist organizations.

2012 December 11: The U.S. government sells the last of its shares in AIG to realise a profit of $22.7 bn on its commitment of $182.3 bn.

2012 December 12: The Fed introduces numerical guidelines for interest rates: it will keep the federal funds rate near zero until unemployment falls below 6.5% or inflation rises above 2.5%, against its previous objective of 2%.

2012 December 19: UBS agrees to pay a record SFr1.4 bn ($1.5 bn) to U.S., U.K., and Swiss regulators to settle allegations of "pervasive" and "epic" efforts to manipulate Libor and other interbank lending rates as two of its former traders (Tom Hayes and Roger Darin) face the first criminal charges in the scandal and it pleads guilty to fraud.

2013 January 3: Olivier Blanchard (PhD MIT '77), chief economist of the IMF, states that the IMF's models have underestimated the levels of fiscal multipliers of European economies (closer to 1.5 than 0.5) and so underestimated the adverse macro impacts of "fiscal consolidation" or austerity.

2013 January 8: In November, 2012, unemployment in the 17-nation eurozone hit a record high of 11.8%, leaving 18.8 million people without work, 2 million more than a year ago. The eurozone economy shrank in Q2 and Q3 of 2012.

2013 January 9: AIG decides not to join its ex-CEO, Hank Greenberg, in suing the U.S. government over its $182 bn taxpayer-funded bailout.

2013 February 4: U.S. authorities file civil fraud charges against S&P, the largest CRA, accusing the firm of inflating the ratings of mortgage investments. The suit asserts that S&P employees deliberately used their computer models to produce inflated (better) ratings.

2013 February 6: Shares of McGraw-Hill, S&P's parent company, fall 16%, and then another 10% next day, following reports that U.S. prosecutors have sought a penalty from S&P in excess of $1 bn. Moody's shares fall almost as steeply.

2013 February 6: The Justice Dept. forces the Japanese unit of RBS to plead guilty to criminal wrongdoing in rate-rigging; fined $612 million.

2013 February 22: Moody's downgrades UK's government bond rating to Aa1 from Aaa.

2013 February 28: Thirteen U.S. banks (WF, JPM Chase, MS, PNC, Sun Trust, U.S.

Bank, Aurora, BofA, GS, Met Life Bank, Sovereign, HSBC, and Citi) agree to pay $9.3 bn in cash and noncash relief, including loan assistance, to homeowners over alleged foreclosure abuses.

2013 March 27: Cyprus becomes the first country in the eurozone to impose capital controls.

2013 April 30: After three years, plans to launch an independent European CRA (by German consultancy firm Roland Berger) have died through lack of business interest. But two other German firms are in the wings: family-owned Scope Ratings, and the Bertelsmann Foundation's International Non-profit Credit Rating Agency (INCRA).

2013 May 19: The U.S. hits its statutory borrowing limit of about $16.7 trillion today: Treasury can no longer issue new debt to pay the government's bills. It will use "extraordinary measures" to free up about $300 bn in cash, but will run out of cash around October 17. And default?

2013 July 31: A survey for the *NYT* reveals that S&P is "winning business again by offering more favorable ratings" on certain MB securities than its rivals do, as it fights a government lawsuit accusing it of similar action before the GFC.

2013 August 8: Fannie Mae reports a Q2 profit of $10.1 bn and will soon repay $10.2 bn to the U.S. government, to bring the total of repayments to $105 bn since the 2008 bailout, when it received more than $116 bn.

2013 September: The Dallas Fed estimates a cost to the U.S. from the GFC (assuming that output eventually resumes its pre-crisis trend path) of between $6 trillion and $14 trillion, depending on the delay in resumption.

2013 September 14: Five years after the collapse of LB, the statute of limitations in cases involving alleged violations of the securities laws will apply.

2013 September 19: JPM Chase agrees to pay $920 million in penalties to U.S. and U.K. regulators for the "unsafe and unsound practices" that resulted in losses from the "London Whale's" 2012 trading activities that eventually total $6.2 bn. The bank admits wrongdoing.

2013 September 25: British financial firm ICAP is fined $87 million for helping rig Libor.

2013 September 25: Citi agrees to pay $395 million to Freddie Mac to settle claims on mortgages it sold to it (3.7 million sold between 2000 and 2012); in July Citi agreed to pay $968 million to settle similar claims from Fannie Mae.

2013 October 16: The CFTC forces an admission of wrongdoing from JPM Chase in the bank's multimillion-dollar "London Whale" trading loss: the bank recklessly "employed a manipulative device" in the market for swaps, and agrees to pay fine of $100 million (bringing its tally of fines to more than $1 bn). This is the first case by the CFTC of the application of a rule flowing from the 2010 Dodd-Franks Act, which gives the CFTC the same authority as the SEC.

2013 October 29: Dutch bank Rabobank admits to criminal wrongdoing by its employees in Libor rigging, and agrees to pay $1 bn in criminal and civil penalties. Piet Moerland, its CEO, resigns.

2013 November 15: JPM Chase reaches a $4.5 bn settlement with a group of investors over its mortgage sales.

2013 November 19: JPM Chase settles with the U.S. Justice Dept for $13 bn for mortgage fraud.

2013 November 22: Kareem Serageldin, former Credit Suisse Managing Director/Global Head of Stuctured Credit, is sent to prison for 30 months in connection with a scheme to hide $2.65 bn losses in a 2007 MBS trading book.

2013 December 4: The European Union fines a group of banks (Citi, JPM Chase, Deutsche Bank, RBS, and Société Générale) €1.7 bn ($2.3 bn) for colluding to rig the Libor.

2014 January 1: Latvia joins the eurozone.

2014 January 8: JPM Chase settles the Madoff charges for $2 bn, bringing its total legal penalties in the last year to $20 bn.

2014 March 12: Fabrice Tourre (Fabulous Fab), ex-GS trader, must personally pay $825,000 in fines, claw-back (of a bonus), and interest; found guilty of six of seven fraud claims by the SEC. The University of Chicago recently terminated Mr Tourre's contract to teach undergraduates economics as part of his PhD program there.

2014 March 14: The FDIC sues 16 banks (including BofA, Citi, JPM Chase) as well as the BBA trade group, to recover losses that the Libor rate rigging caused to ten US banks that failed during the GFC and were taken over by the FDIC. Four (Barclay's, RBS, UBS, Rabobank) have already paid about $2.6 bn to settle charges of rigging Libor.

2014 March 20: A common system to handle eurozone bank crises is agreed on. States will surrender bank-supervisory power to the ECB; a €55 bn crisis fund.

2014 May 27: At a conference on Inclusive Capitalism in London, Mark Carney (DPhil Oxford '95), Governor of the BofE, says, "Capitalism loses its sense of moderation when the belief in the power of the market enters the realm of faith ... Market fundamentalism — in the form of light-touch regulation, the belief that bubbles cannot be identified and that markets always clear — contributed directly to the financial crisis and the associated erosion of social capital ... [and] there was widespread rigging of benchmarks for personal gain."

2014 June 5: The ECB cuts interest rates to record lows, imposing negative rates on its overnight depositors: banks will have to pay to leave money in the Bank. Mario Draghi hopes this will spur banks into lending more and will stop the eurozone from falling into a deflationary trap. He says the package includes more cheap loans for banks and work for the purchase of "asset-backed securities" (i.e. quantitative easing).

2014 June 30: BNP Paribas will pay $8.9 bn for violating U.S. sanctions, and plead guilty to criminal charges of conspiracy and falsifying records.

2014 July 5: According to *The Economist*, total bank settlements with U.S. authorities: JPM Chase, $23.4 bn (MBS, foreclosures, mortgage repurchases); BofA, $35.6 bn (foreclosures, MBS, mortgage repurchases); BNP Paribas, $8.9 bn (violating sanctions); WF, $5.3 bn (foreclosures); Credit Suisse, $2,6 bn (aiding tax evasion).

2014 July 28: Lloyds Bank will pay over $380 million to settle with the U.S. Justice Dept. on Libor rigging.

2014 July 30: BofA must pay a penalty of $1.27 million and its mid-level mortgage manager, Rebecca Mairone, $1 million after being found guilty last October of civil fraud in the “Hustle” mortgage program which paid little regard for quality. In May 2016, the Appeals Court will quash both judgements.

2014 August 3: Portugal injects almost €5 bn into Banco Espírito Santo to stave off the collapse of the country’s biggest bank following a series of financial scandals.

2014 August 21: BofA agrees to a $16.65 bn deal with federal and state authorities for selling shoddy mortgages before the GFC. The U.S. Justice Dept. says that it has so far recovered nearly $37 bn from the big banks for their role in this activity.

2014 August 27: The SEC announced new requirements for U.S. CRAs, enhancing governance and transparency and protecting against conflicts of interest.

2014 October 21: The EC fines four banks (JPM Chase, RBS, UBS, and CS) about $120 million over two types of cartel behaviour in setting rates.

2014 November: Five banks (JPM Chase, Citi, RBS, UBS, and HSBC) seek to resolve the charges of foreign exchange (FX) market manipulation by agreeing to pay a combined $4.25 bn to settle with financial regulators in the U.S. and the U.K. Barclay’s withdraws over concerns that the deal will not resolve its liabilities.

2014 December 18: The Swiss National Bank introduces negative interest rates of −0.25% on sight deposit account balances at the SNB. Negative interest will be levied on balances exceeding a given exemption threshold. The SNB reaffirms its commitment to the minimum exchange rate of CHF 1.20 per euro.

2015 January 1: Lithuania formally adopts the euro and joins the eurozone.

2015 January 15: The Swiss National Bank discontinues its minimum exchange rate and lowers the interest rate on sight deposit account balances that exceed a given exemption threshold by 0.5 percentage points, to −0.75%. The CHF jumps 15% against the euro; Swatch shares fall by 16%.

2015 January 22: Mario Draghi, head of the ECB, announces a €1.1-trillion program of quantitative easing, to prevent an already depressed eurozone economy (unemployment: 11.5%) from tumbling into a deflationary spiral, until September 2016 at earliest. The euro falls by 2.1% against the dollar.

2015 February 4: Following the election of the Syriza party in Greece on January 25, the ECB announces that it will no longer accept Greek government debt as collateral for loans (0.05% pa), putting pressure on the Greek government to accept the continuing austerity measures necessary to repay its debts. The ECB’s ELA (1.55% pa) remains in place, however. Yields on 10-year Greek bonds rise as much as 61 bp to 10.29% pa.

2015 February 5: According to a report from McKinsey, seven years after the bursting of a global credit bubble resulted in the GFC, debt continues to grow: all major economies now have higher levels of borrowing relative to GDP than they did in 2007. Global debt has grown by $57 trillion to $199 trillion, raising the ratio of debt to GDP by 17 percentage points

2015 February 5: Bloomberg reports that GS and other banks are selling a new product called a "bespoke tranche opportunity," essentially a CDO backed by single-name CDSs, tailored to the investors' wishes.

2015 February 9: U.S. prosecutors have recently informed Barclays, JPM Chase, RBS, and Citi that, in order to settle, they must enter guilty pleas to criminal charges that they manipulated FX prices.

2015 April 21: A futures trader, Navinder Singh Sarao, was arrested in Britain for his alleged involvement in the "flash crash" of 2010 in which the DJIA plunged 600 points in five minutes, by manipulating the market for E-Mini S&P 500 futures on the Chicago Mercantile Exchange, using an automated trading program.

2015 April 23: DB agrees to pay $2.5 bn in penalties for its British subsidiary's actions in Libor rate rigging, and will accept a criminal guilty plea.

2015 May 11: Nomura Holdings and RBS are found guilty of misleading Fannie Mae and Freddie Mac in selling them RMBSs that contained numerous errors and misrepresentations: "The magnitude of falsity, conservatively measured, is enormous," the Federal District Court judge writes. 16 other firms — including GS and BofA — settled, together paying nearly $18 bn in penalties, but avoiding detailed scrutiny. The case was pursued by the FHFA, created in July 2008 to oversee Fannie and Freddie.

2015 May 20: Despite a 2012 non-prosecution agreement, UBS pleads guilty to Libor manipulation, under pressure.

2015 May 20: Five banks (Citi, JPM Chase, Barclays, RBS) plead guilty to colluding to manipulate FX markets from 2007 to 2013, agreeing to pay about $5.6 bn in penalties (in addition to the $4.25 bn that some agreed to pay last November). Citi will pay a record $925 million antitrust penalty. $5 trillion is exchanged daily on the FX markets, which earned the world's 10 largest banks $11.6 bn in 2014.

2015 May 26: DB "overstated" the value of multibillion-dollar portfolio of sophisticated derivatives by $1.5 bn in late 2008 and early 2009, and agrees to pay a $55 million penalty to settle with the SEC. The investigation was aided by two whistle-blowers.

2015 June 4: HSBC will pay a record 40m Swiss francs for allowing money laundering to take place in the bank's Swiss subsidiary.

2015 June 15: In the suit by AIG's ex-CEO, Hank Greenberg, against the U.S. government over the AIG bailout ($185 bn), the judge rules that the Fed acted illegally by demanding a 79.9% equity stake in AIG as a condition of the bailout; but AIG shareholders were saved from bankruptcy by the bailout. He declines to award any damages. Greenberg was seeking $40 bn. Under Dodd-Frank, the Fed is now prohibited from bailing out institutions singly.

2015 June 30: “Interest rates appear to be lower than at any time in the past 5000 years,” according to Andrew Haldane (MA, ’89, Warwick), Chief Economist, BofE, in a speech given at the Open University, Milton Keynes.

2015 July 1: Greece misses a crucial debt payment of €1.5 bn ($1.7 bn) to the IMF, which declares Greece “in arrears,” effectively in default.

2015 July 5: In the Greek referendum, 61.3% voted against what? Austerity?

2015 July 13: Greece and its European creditors announce an agreement that aims to resolve the country’s debt crisis and keep it in the eurozone, but that will require further budgetary belt-tightening. Greece needs to agree on the details of the new aid program before Aug. 20, when the country is scheduled to make a payment of €3.2 bn on bonds held by the ECB.

2015 July 14: The IMF demands debt relief for Greece as a condition for helping with any bailout, in order to obtain debt sustainability. It estimates that €85 bn in additional financial aid is needed.

2015 August 4: Former UBS and Citi yen derivatives trader, Tom Hayes, is sentenced in London to 14 years in jail, the first person to be convicted by a jury of rigging the Libor interest rate, in a scandal that has cost UBS and other banks $17 bn in fines.

2015 August 12: To obtain a €86 bn bailout (its third), Greece must agree to an unprecedented range of changes and reforms: Turn around an expected 1.5% deficit (excluding debt repayments) to 0.25% this financial year (requiring aiming for a 3.5% surplus), laws to safeguard financial stability, measures to promote competition and growth, reforms of public administration and regulatory law.

2015 August 14: Christine Lagarde (LLM University of Paris X-Nanterre), MD of the IMF: “I remain firmly of the view that Greece’s debt has become unsustainable and that Greece cannot restore debt sustainability solely through actions on its own. Thus, it is equally critical for medium and long-term debt sustainability that Greece’s European partners make concrete commitments” to provide significant debt relief.

2015 September 17: The U.S. Fed decides not to raise interest rates above the near-zero 0 to ¼ percent. It has been almost ten years since rates were last raised. Janet Yellen says that the Fed is watching recent concerns and uncertainty about China and emerging markets.

2015 November 4: Switzerland announces that its finance ministry has temporarily shelved plans for reforming its banking secrecy practices.

2015 November 27: Hervé Falciani, a former IT worker with HSBC’s Swiss private bank, is convicted in his absence for the biggest leak in banking history and sentenced to five years in prison by a Swiss court. He had downloaded the details of about 130,000 holders of secret Swiss accounts and given the information to French investigators in December 2008.

2015 November 30: The IMF adds the Chinese renminbi to its group of global reserve currencies, alongside the dollar, euro, yen and pound.

2015 December 16: The Fed OMC raises the benchmark federal funds rate by 25 bp, to between 0.25% and 0.5%, exactly seven years after Ben Bernanke announced the "zero rate policy". The last time the rate rose (to 5.25%) was on 29 June 2006.

2015 December 29: The Portugal central bank unilaterally transfers €2 bn worth of senior bonds from "good bank" Novo Banco to "bad bank" Banco Espirito Santo, now in liquidation, thus imposing losses on some senior bondholders, only hours before tougher EU bail-in rules (the Bank Resolution and Recovery Directive) take effect.

2016 January 15: GS agrees to a civil settlement of $5 bn to resolve claims from its marketing and selling faulty mortgage securities. This is on top of the $3 bn GS paid to the FHFA in 2014 to settle claims with Fannie and Freddie. In 2010 GS paid $550 mn to the SEC for its role in the so-called synthetic CDO called Abacus.

2016 February 11: Jamie Dimon buys shares in JPMC for $26.6 million. The shares will rise 8.3% next day. He now owns 6.75 million shares in the lender he's run since 2005.

2016 March 10: The ECB will increase monthly QE purchases of assets by €20 bn to €80 bn from April. It lowers its deposit rate (for banks) from −0.3% to −0.4%, while cutting its main lending rate to zero. ECB president Draghi says that "we don't anticipate that it will be necessary to reduce rates further," although he made a similar claim in September 2014 (when the deposit rate was cut to −0.2%).

2016 June 22: Citizens of the U.K. vote (51.9% to 48.1%) in a plebiscite to leave the E.U.

2016 July 16: The 2016 bank stress tests by the European Banking Authority (EBA) show that Italy's Banca Monte dei Paschi di Siena (MPS), its third largest bank, is the weakest of 51 banks examined: its capital position has fallen by 14 percentage points since 2014. Italian banks have more than €360 bn of bad debts.

2016 November 9: Citizens of the U.S.A. elect Donald J. Trump as the 45th President.

2016 December 26: ECB tells Monte dei Paschi it needs to raise €8.8 bn to plug a captal shortfall, greater than the bank's previous estimate of €5 bn.

2017 February 3: President Trump signs a directive that calls for rolling back the 2010 Dodd-Frank Act.

2017 March 15: The Fed raises its benchmark interest rate by 25 bp, to a target range of 0.75% to 1%.

2017 April 20: The late John Clarke: "Brexit is a quite complicated political process whereby a lot of the London banks and finance houses relocate to Dublin." *Clarke and Dawe*, "Richard Shinnery, NBN Consultant," on neologisms, ABC-TV. https://www.youtube.com/watch?v=f06H_0eGy2c

On request (email:robert.marks@gmail.com), I can provide references for specific dated events.

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