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Structural causes of the global financial crisis: a critical assessment of the 'new financial architecture'

James Crotty*

We are in the midst of the worst financial crisis since the Great Depression. This crisis is the latest phase of the evolution of financial markets under the radical financial deregulation process that began in the late 1970s. This evolution has taken the form of cycles in which deregulation accompanied by rapid financial innovation stimulates powerful financial booms that end in crises. Governments respond to crises with bailouts that allow new expansions to begin. As a result, financial markets have become ever larger and financial crises have become more threatening to society, which forces governments to enact ever larger bailouts. This process culminated in the current global financial crisis, which is so deeply rooted that even unprecedented interventions by affected governments have, thus far, failed to contain it. In this paper we analyse the structural flaws in the financial system that helped bring on the current crisis and discuss prospects for financial reform.

Key words: Financial crisis, Causes of financial crisis, Global financial system, Financial deregulation
JEL classifications: G20, G28, E44, E12

1. Introduction

In the aftermath of the financial collapse in the USA that began in 1929, it was almost universally believed that unregulated financial markets are inherently unstable, subject to fraud and manipulation by insiders, and capable of triggering deep economic crises and political and social unrest. To protect the country from these dangers, in the mid 1930s the US government created a strict financial regulatory system that worked effectively through the 1960s. These economic and political events found reflection in the financial market theories of endogenous financial instability created by John Maynard Keynes and Hyman Minsky. Their theories generated a policy perspective supportive of the sharp

Manuscript received 20 March 2009; final version received 30 April 2009.
Address for correspondence: James Crotty, Department of Economics and Political Economy Research Institute (PERI), University of Massachusetts, Amherst MA 01003; email: jrcrotty@comcast.net

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shift from light to tight financial market regulation that took place after the Great Crash. Economic and financial turbulence in the 1970s and early 1980s led to both a paradigm and a policy regime shift. Efficient financial market theory and new classical macro theory replaced the theoretical visions of Keynes and Minsky, and the existing system of tight financial regulation was deconstructed through radical deregulation pushed by financial institutions and justified by efficient financial market theory. These developments facilitated the transition to a new globally-integrated deregulated neoliberal capitalism.[1]

The main thesis of this paper is that, although problems in the US subprime mortgage market triggered the current financial crisis, its deep cause *on the financial side* is to be found in the flawed institutions and practices of the current financial regime, often referred to as the New Financial Architecture (NFA). (While the global crisis clearly has both financial- and real-sector roots, this paper deals primarily with the former.) 'New Financial Architecture' refers to the integration of modern day financial markets with the era's light government regulation. After 1980, accelerated deregulation accompanied by rapid financial innovation stimulated powerful financial booms that always ended in crises. Governments responded with bailouts that allowed new expansions to begin. These in turn ended in crises, which triggered new bailouts. Over time, financial markets grew ever larger relative to the nonfinancial economy, important financial products became more complex, opaque and illiquid, and system-wide leverage exploded. As a result, financial crises became more threatening. This process culminated in the current crisis, which is so severe that it has pushed the global economy to the brink of depression. Fear of financial and economic collapse has induced unprecedented government rescue efforts that have been, to date, unable to end the crisis. In the next section of the paper we present a description of key structural flaws in the financial institutions and practices of the neoliberal era that helped generate the current crisis. This section is taken from a much more detailed analysis of these structural flaws (see Crotty, 2008).

2. Key structural flaws of the new financial architecture

2.1 The NFA is built on a very weak theoretical foundation

The NFA is based on light regulation of commercial banks, even lighter regulation of investment banks and little, if any, regulation of the 'shadow banking system'—hedge and private equity funds and bank-created Special Investment Vehicles (SIVs). Support for lax regulation was reinforced by the central claim of neoclassical financial economics that capital markets price securities correctly with respect to expected risk and return. Buyers and sellers of financial securities were, it was argued, able to make optimal decisions that led to risk being held only by those capable of managing it. The celebratory narrative associated with the NFA states that relatively free financial markets minimise the possibility of financial crises and the need for government bailouts (see Volcker, 2008, for a summary of this narrative). Crotty (2008) explains that this theoretical cornerstone of the NFA is based on patently unrealistic assumptions and has no convincing empirical support. Thus, the 'scientific' foundation of the NFA is shockingly weak and its celebratory narrative is a fairy tale.

[1] See Crotty (2002) for an explanation of the historical economic and political processes through which the neoliberal regime came to replace Golden Age institutions and practices.

2.2 The NFA has widespread perverse incentives that create excessive risk, exacerbate booms and generate crises

The current financial system is riddled with perverse incentives that induce key personnel in virtually all important financial institutions—including commercial and investment banks, hedge and private equity funds, insurance companies and mutual and pension funds—to take excessive risk when financial markets are buoyant.[1] For example, the growth of mortgage securitisation generated fee income—to banks and mortgage brokers who sold the loans, investment bankers who packaged the loans into securities, banks and specialist institutions who serviced the securities and ratings agencies who gave them their seal of approval. Since fees do not have to be returned if the securities later suffer large losses, everyone involved had strong incentives to maximise the flow of loans through the system whether or not they were sound. Total fees from home sales and mortgage securitisation from 2003 to 2008 have been estimated at $2 trillion (*Financial Times*, 2008C).

Top investment bank traders and executives receive giant bonuses in years in which risk-taking generates high revenue and profits. Of course, profits and bonuses are maximised in the boom by maximising leverage, which in turn maximises risk. In 2006, Goldman Sachs' bonus pool totaled $16 billion—an average bonus of $650,000 very unequally distributed across Goldman's 25,000 employees. Wall Street's top traders received bonuses of up to $50 million that year. In spite of the investment bank disasters of the second half of 2007, which saw Wall Street investment banks lose over $11 billion, the average bonus fell only 4.7%. In 2008 losses skyrocketed causing the five largest independent investment banks to lose their independence: two failed, one was taken over by a conglomerate, and two became bank holding companies to qualify them for bailout money. Yet Wall Street bonuses were over $18 billion—about what they were in the boom year of 2004 (DiNapoli, 2009). Bonuses at Goldman are expected to average $570,000 in 2009 in the midst of the crisis (*New York Times*, 2009F).

About 700 employees of Merrill Lynch received bonuses in excess of $1 million in 2008 from a total bonus pool of $3.6 billion, in spite of the fact that the firm lost $27 billion. The top four recipients alone received a total of $121 million while the top 14 got $249 million (*Wall Street Journal*, 2009A). Losses reported by Merrill totaled $35.8 billion in 2007 and 2008, enough to wipe out 11 years of earnings previously reported by the company. Yet for the 11-year period from 1997 to 2008, Merrill's board gave its chief executives alone more than $240 million in performance-based compensation (*New York Times*, 2009A).

One of the most egregious examples of perverse incentives can be found in insurance giant AIG's Financial Products unit. This division, which gambled on credit default swaps (CDSs), contributed substantially to AIG's rising profits in the boom. In 2008 the unit lost $40.5 billion. Though the US government owns 80% of AIG's shares and invested $180 billion in the corporation, AIG nevertheless paid the 377 members of the division a total of $220 million in bonuses for 2008, an average of over $500,000 per employee. Seven employees received more than $3 million each (*Wall Street Journal*, 2009C).

These examples show that it is rational for top financial firm operatives to take excessive risk in the bubble even if they understand that their decisions are likely to cause a crash in the intermediate future. Since they do not have to return their bubble-year bonuses when the inevitable crisis occurs and since they continue to receive substantial bonuses even in the crisis, they have a powerful incentive to pursue high-risk, high-leverage strategies.

[1] An analysis of the effects of perverse incentives in different market segments is presented in Crotty, 2008.

Credit rating agencies were also infected by perverse incentives. Under Basle I rules, banks were required to hold 8% of core or tier-one capital against their total risk-weighted assets. Since ratings agencies determined the risk weights on many assets, they strongly influenced bank capital requirements. Under Basle II rules banks only needed a modest sliver of capital to support triple-A securities. High ratings thus meant less required capital, higher leverage, higher profit and higher bonuses. Moreover, important financial institutions are not permitted to hold assets with less than an AAA rating from one of the major rating companies. There was thus a strong demand for high ratings. Ratings agencies are paid by the investment banks whose products they rate. Their profits therefore depend on whether they keep these banks happy. In 2005, more than 40% of Moody's revenue came from rating securitised debt such as mortgage backed securities (MBSs) and collateralised debt obligations (CDOs). If one agency gave realistic assessments of the high risk associated with these securities while others did not, that firm would see its profit plummet. Thus, it made sense for investment banks to shop their securities around, looking for the agency that would give them the highest ratings, and it made sense for agencies to provide excessively optimistic ratings.[1] The recent global financial boom and crisis might not have occurred if perverse incentives had not induced credit rating agencies to give absurdly high ratings to illiquid, non-transparent, structured financial products such as MBSs, CDOs and collateralized loan obligations.[2]

Reregulation of financial markets will not be effective unless it substantially reduces the perverse incentives that pervade the system.

2.3 Innovation created important financial products so complex and opaque they could not be priced correctly; they therefore lost liquidity when the boom ended

Financial innovation has proceeded to the point where important structured financial products are so complex that they are inherently non-transparent. They cannot be priced correctly, are not sold on markets and are illiquid. According to the Securities Industry and Financial Markets Association (SIFMA), there was $7.4 trillion worth of MBSs outstanding in the first quarter of 2008, more than double the amount outstanding in 2001. Over $500 billion dollars in CDOs were issued in both 2006 and 2007, up from $157 billion as recently as 2004 (SIFMA website). The explosion of these securities created large profits at giant financial institutions, but also destroyed the transparency necessary for any semblance of market efficiency. Indeed, the value of securities not sold on markets may exceed the value of securities that are. Eighty percent of the world's $680 trillion worth of derivatives are sold over-the-counter in private deals negotiated between an investment bank and one or more customers. Thus, the claim that competitive capital markets price risk optimally, which is the foundation of the NFA, does not apply *even in principle* to these securities.

A mortgage-backed CDO converts the cash flows from the mortgages in its domain into tranches or slices that have different risk characteristics. Banks sell the tranches to investors. Several thousand mortgages may go into a single MBS and as many as 150 MBSs can be packaged into a single CDO. A CDO squared is a CDO created by using other

[1] Ratings agencies also gave large investment banks like Lehman and Merrill Lynch solid investment grade ratings that allowed them to borrow cheaply. 'It's almost as if the higher the rating of a financial institution, the more likely it was to contribute to financial catastrophe. In pursuit of their own short-term earnings, [ratings agencies] did exactly the opposite of what they were meant to do: rather than expose financial risk they systematically disguised it' (Lewis and Einhorn, 2009).

[2] 'As late as April 5, 2007, one analyst at a major rating firm said their ratings model didn't capture "half" of a deal's risk...' (*Wall Street Journal*, 2009B).

CDO tranches as collateral. Higher power CDOs are particularly difficult to value because many mortgages appear in more than one of the underlying CDOs. To understand the inherent non-transparency of a CDO, consider the conclusion of a textbook discussion of CDO price determination:

> Even with a mathematical approach to handling correlation, the complexity of calculating the expected default payment, which is what is needed to arrive at a CDO price, grows exponentially with an increasing number of reference assets [the original mortgages]. . . . As it turns out, it is hard to derive a generalized model or formula that handles this complex calculation while still being practical to use. (Chacko *et al.*, 2006, p. 226)

The relation between the value of a CDO and the value of its mortgages is complex and nonlinear. Significant changes in the value of underlying mortgages induce large and *unpredictable* movements in CDO values. Ratings agencies and the investment banks that create these securities rely on extremely complicated simulation models to price them. It can take a powerful computer several days to determine the price of a CDO. These models are unreliable and easily manipulated statistical black boxes. Given perverse incentives, it is not surprising that market insiders refer to the process through which CDOs are marked or priced as marking to 'magic' or to 'myth'. New York University's Nouriel Roubini observed that CDOs 'were new, exotic, complex, illiquid, marked-to-model rather than marked-to-market and misrated by the rating agencies. Who could then ever be able to correctly price or value a CDO cubed?' (Roubini, 2008).

Demand for CDOs was strong in the boom because buyers could borrow money cheaply, returns were high and the products carried top ratings. But when the housing boom ended and defaults increased, the fact that no one knew what these securities were worth caused demand and liquidity to evaporate and prices to plummet. The celebratory narrative of the NFA had assured investors this could not happen. Efficient market theory asserts that liquidity will always be available to support security prices. Charles Goodhart, former member of the Bank of England's Monetary Policy Committee, noted that the theory assured investors 'that you can always obtain funding to hold assets . . . and that the . . . short-term wholesale market, the interbank markets, the asset-backed commercial paper market and so on, would always be open and you would always have access to them' (Goodhart, 2009). Yet when the crisis hit, CDOs could be sold, if at all, only at an enormous loss. It is estimated that by February 2009, almost half of all the CDOs ever issued had defaulted (*Financial Times*, 2009B). Defaults led to a 32% drop in the value of triple A rated CDOs composed of super-safe senior tranches and a 95% loss on triple A rated CDOs composed of mezzanine tranches (*Financial Times*, 2007A).

Gillian Tett, senior capital market analyst for the *Financial Times*, contrasted the myth and the reality of the effects of complex financial innovation in this era:

> Innovation became so intense that it outran the comprehension of most ordinary bankers—not to mention regulators. As a result, not only is the financial system plagued with losses on a scale that nobody foresaw, but the pillars of faith on which this new financial capitalism were built have all but collapsed. (Tett, 2009)

2.4 The claim that commercial banks distributed almost all risky assets to capital markets and hedged whatever risk remained was false

The conventional view was that banks were not risky because, in contrast to the previous era when they held the loans they made, they now sold their loans to capital markets

through securitisation in the new 'originate and distribute' banking model. Moreover, it was believed that banks hedged whatever risk remained through CDSs. Both these propositions turned out to be false. Banks kept risky products such as MBSs and CDOs for five reasons, none of which were considered in the NFA narrative about efficient capital markets.

First, to reduce moral hazard and convince potential investors that these securities were safe, banks often had to retain the riskiest part—the so-called 'toxic waste'.

Second, CDOs were especially attractive assets for banks to keep since they could be held off-balance-sheet *with no capital reserve requirements*, a development discussed below.

Third, the rate of flow of these securities through banks was so great and the time lapse between a bank's receipt of a mortgage and the sale of the MBS or CDO of which it was a part was sufficiently long that at every point in time banks held or 'warehoused' substantial quantities of these securities. When demand for MBSs and CDOs collapsed, banks were left holding huge amounts of mortgages and mortgage-backed products they could not sell. Global CDO issuance fell from $177 billion in the first quarter of 2007 to less than $20 billion one year later, a drop of 84%. The collapse in the price of these products is the main source of the massive bank losses that are the driving force of the crisis.

Merrill Lynch was one of the two largest underwriters of CDOs in the 3 years leading up to the crisis. While Merrill Lynch had only $3.4 billion in CDO origination in 2003, in 2006 it posted $44 billion in CDO deals. Merrill's rainmakers became addicted to the fees that flowed from financing CDOs, which reached $700 million in 2006.

Fortune Magazine described the end game of this process:

> Merrill apparently made a pivotal—and reckless—decision. It bought big swaths of the AAA paper itself, loading the debt onto its own books.... The amounts were staggering. By the end of June, Merrill held $41 billion in subprime CDOs and subprime mortgage bonds. Since the average deal is between $1 billion and $1.5 billion, and the AAA debt is around 80% of each deal, Merrill must have been buying nearly all the top-rated debt from dozens of CDOs.... *Merrill's $41 billion exposure to subprime paper was more than its entire shareholders' equity of $38 billion.* That this huge position went unhedged astonishes everyone on Wall Street... (*Fortune Magazine*, 2007, emphasis added).[1]

The piling up of risky assets on bank balance sheets was stimulated in part by inept regulation. Under Basle I rules, capital requirements for loans were much higher than they were for assets that banks declared were being held for trading and thus would presumably not be on the books for long.[2] This provided a strong incentive for banks to stockpile AAA-rated CDO tranches in their trading accounts. Yet these assets banks were longer-term, illiquid, risky assets whose price could plummet in a crisis. UBS reported losses of more than $10 billion in CDO trances in their trading book in 2008, for which the bank had set aside zero capital (Tett, 2008A).

Fourth, when banks found the safest or 'super senior' tranches of mortgage backed securities hard to sell because their yield was relatively low, they kept them themselves so that they could sustain the high rate of CDO sales that kept bonuses rising. In a comment about this practice that reflects both the power of perverse incentives and the destructive dimensions of financial market competition, Citigroup CEO Charles Prince said in July

[1] The collapse of Merrill Lynch resulted in the firing of chief executive Stan O'Neill. This episode demonstrates the power of perverse incentives: O'Neill received exit pay of $161 million for his part in destroying the firm.

[2] Regulators simply accepted bankers' assurance that they would sell these assets quickly: they did not check whether in fact this was true.

2007: 'When the music stops, in terms of liquidity, things will be complicated. But as long as the music is playing, you've got to get up and dance. We're still dancing' (*Financial Times*, 2007C).

Fifth, given banks' incentive to generate high profits and bonuses through high risk, they purposely kept some of the riskiest products they created.

In 2007, the Bank of England called attention to the fact that large global banks were not slimming down as the 'originate-and-distribute model' predicted they would. Rather, on-balance-sheet assets had exploded from $10 trillion in 2000 to $23 trillion in 2006. The main cause of this asset growth was the incredible rise in bank holdings of MBSs and CDOs, the kinds of securities that banks were supposed to sell rather than hold in the narrative of the NFA. In April 2009, the International Monetary Fund (IMF) estimated potential losses in 2007–2010 from US-originated credit assets held by banks and others at $2.7 trillion (IMF, 2009, p. 27). Richardson and Roubini 'suggest that total losses on loans made by U.S. banks and the fall in the market value of the assets they are holding will reach about $3.6 trillion. The U.S. banking sector is exposed to half that figure, or $1.8 trillion' (Richardson and Roubini, 2009).

Claims that banks hedged most risk through CDSs were equally shaky. Credit default swaps are derivatives that allow one party to insure against loss from loan defaults by paying insurance fees to another party. However, since the value of credit default swaps hit $62 trillion in December 2007, while the maximum value of debt that might conceivably be insured through these derivatives was $5 trillion, it was evident that massive speculation by banks and others was taking place. Fitch Ratings reported that 58% of banks that buy and sell credit derivatives acknowledged that 'trading' or gambling is their 'dominant' motivation for operating in this market, whereas less than 30% said that 'hedging/credit risk management' was their primary motive. This 'confirms the transition of credit derivatives from a hedging vehicle to primarily another trading asset class' (*FitchRatings*, 2007, p. 9). Eric Dinallo, the insurance superintendent for New York State, said that 80% of the estimated $62 trillion in CDSs outstanding in 2008 were speculative (*New York Times*, 2009D).

By 2007 the CDS market had turned into a gambling casino that eventually helped destroy insurance giant AIG and investment banks Bear Stearns and Lehman Brothers. As of February 2009 AIG alone had suffered losses of over $60 billion on CDS contracts (Haldane, 2009, p. 14.) No regulator objected when AIG guaranteed $440 billion worth of shaky securities *with no capital set aside to protect against loss* apparently because both the securities and AIG were triple A rated. The bonus-drenched 'geniuses at A.I.G. who wrote the insurance were willing to bet more than double their company's value that defaults would not become problematic' (*New York Times*, 2009C). A major reason that the government invested $180 billion to save AIG was to provide protection against losses that large US and foreign institutions would have incurred from their contracts with AIG had the company folded. Goldman Sachs received $12.9 billion and Merrill Lynch $7 billion, while 20 European banks received a total of $59 billion of US taxpayer money (*New York Times*, 2009E). This reflects moral hazard of the highest order. Firms like Goldman could gamble with confidence on risky CDOs only because they bought insurance from risk-laden AIG, who they knew was drastically under-capitalised. When they lost their bet on AIG, the public was forced to pay the bill because former Goldman Chief Executive Henry Paulson, acting in his capacity as Secretary of the Treasury, decided to rescue AIG even though he had previously let Lehman Brothers default (Paulson had to have known that Goldman would receive billions of dollars as the result of his decision). Though CDO prices had plunged, the government inexplicably paid banks their full face value. The

regulators thus allowed the dominant financial firms and their top bonus recipients to engage in publicly subsidised win–win gambles.

Securitisation and the rise of CDSs did raise big-bank profits for many years, but they eventually created huge losses that more than wiped out the cumulative gains made over the long boom. As early as December 2007, Citigroup had 'lost more money than it made from financial instruments based on U.S. subprime mortgages...' (*Bloomberg*, 2007).

2.5 Regulators allowed banks to hold assets off balance sheet with no capital required to support them

In the late 1990s, banks were allowed to hold risky securities off their balance sheets in SIVs with no capital required to support them. The regulatory system thus induced banks to move as much of their assets off-balance-sheet as possible. When the demand for risky financial products cooled off in mid 2007, bank-created off-balance-sheet SIVs became the buyer of last resort for the ocean of new MBSs and CDOs emanating from investment banks. At the end of 2007, J.P. Morgan Chase & Co. and Citigroup each had nearly $1 trillion in assets held off their books in special securitisation vehicles. For Citigroup this represented about half the bank's overall assets. (*Wall Street Journal*, 2008).[1]

SIVs were supposed to be stand-alone institutions that paid service fees to the originating banks, but to which the originating banks had no obligations or commitments. They borrowed short-term in the commercial paper market and used this money to buy long-term, illiquid but highly profitable securities such as CDOs—a very dangerous game. To enable this commercial paper to receive AAA ratings and thus low interest rates, originating banks had to provide their SIVs with guaranteed lines of credit. This made the banks vulnerable to problems experienced by their supposedly independent SIVs.

When problems in the housing market triggered a wave of subprime defaults, the value of MBSs and CDOs collapsed. This triggered a mass exodus from the asset-backed commercial paper market. US asset-backed commercial paper outstanding fell from $1.2 trillion in July 2007 to $840 billion by the year's end. With the disappearance of their major source of funding, banks were forced to move these damaged assets to their balance sheets. In late July 2008 analysts at Citigroup forecast that up to $5 trillion worth of assets might be forced back on to bank balance sheets (*Financial Times*, 2008B). Contrary to the assumed transparency of financial markets, until SIVs began to collapse very few experienced financial market professionals knew they existed. '"In spite of more than 30 years in the business, I was unaware of the extent of banks' off-balance-sheet vehicles such as SIVs" Anthony Bolton, president of investments at Fidelity International, recently observed' (Tett, 2009).

The combination of bank write downs on assets held on-balance-sheet combined with devalued SIV assets that had to be moved back onto balance sheets severely eroded bank capital. This in turn forced banks to try to lower their risk by raising interest rates and cutting loans to other financial institutions and to households and nonfinancial businesses.

2.6 Regulators allowed giant banks to measure their own risk and set their own capital requirements. Given perverse incentives, this inevitably led to excessive risk-taking

Deregulation allowed financial conglomerates to become so large and complex that neither insiders nor outsiders could accurately evaluate their risk. The Bank for International

[1] SIVs contributed to the non-transparency of financial markets. 'The largest Citigroup SIV is Centauri Corp., which had $21 billion in outstanding debt as of February 2007... There is no mention of Centauri in its 2006 annual filing with the Securities and Exchange Commission' (*Wall Street Journal*, 2007C).

Settlement told national regulators to allow banks to evaluate their own risk—and thus set their own capital requirements—through a statistical exercise based on historical data called Value at Risk (VAR). Government officials thus ceded to banks, as they had to ratings agencies, crucial aspects of regulatory power. VAR is an estimate of the highest possible loss in the value of a portfolio of securities over a fixed time interval with a specific statistical confidence level. The standard exercise calculates VAR under negative conditions likely to occur less than 5% of the time.

There are four fundamental flaws in this mode of risk assessment. First, there is no time period in which historical data can be used to generate a reliable estimate of current risk. If firms use data from the past year or less, as is standard practice, then during boom periods such as 2003 to mid 2007 VAR exercises will show that risk is minimal because defaults and capital losses on securities are low. Banks thus need to set aside only a small amount of capital against estimated risk, which allows them to aggressively expand leverage, which in turn accelerates security price increases. The chairman of the UK's Financial Services Authority said that VAR 'fails to allow for the fact that historically low volatility may actually be an indication of irrationally low risk-aversion and therefore increased systemic risk' (*Financial Time*s, 2009A). On the other hand, if data from past decades are used, the existence of past crises will raise estimated risk, but financial markets will have undergone such fundamental change that these estimates will bear no relation whatever to current risk.

Second, VAR models assume that security prices are generated by a normal distribution. In a normal distribution the likelihood that an observation many standard deviations beyond a 95% or even a 99% confidence interval will occur is infinitesimal. In fact, security prices follow a distribution in which the preponderance of observations are 'normal', but every five to ten years observations occur that are so far from the mean that they are virtually incompatible with the assumption of a normal distribution. Examples of this well-known 'fat tail' phenomenon include the precipitous drop in stock prices that took place in August 1987, the global crisis brought on by the collapse of the giant hedge fund Long Term Capital Management, the Asian crisis and the recent global stock market and CDO crash. In August 2007, two large hedge funds managed by Goldman Sachs collapsed, forcing Goldman to inject $3 billion into the funds. To explain why Goldman should not be held responsible for their collapse, chief financial officer David Viniar said 'We were seeing things that were 25 standard deviation moves, several days in a row' (*Financial Times*, 2007B, p. 25). The Director for Financial Stability of the Bank of England noted that, under a normal distribution, 'a 25-sigma event would be expected to occur once every 6×10^{124} lives of the universe' adding, tongue-in-cheek, that when he tried to calculate the probability of such an event occurring several days in a row, 'the lights visibly dimmed over London'. Even a 7.3 standard deviation event should occur only once every 13 billion years (Haldane, 2009, p. 2). Allowing banks to estimate risk and set capital requirements on the assumption that large losses cannot happen left them vulnerable when the crisis erupted.

Third, the asset-price correlation matrix is a key determinant of measured VAR. The lower the correlation among security prices, the lower the portfolio's risk. VAR models assume that future asset price correlations will be similar to those of the recent past. However, in crises the historical correlation matrix loses all relation to actual asset price dynamics. Most prices fall together as investors run for liquidity and safety, and correlations invariably head toward one, as they did in the recent crisis. Again, actual risk is much higher than risk estimates from VAR exercises.

Fourth, the trillions of dollars in assets held off balance sheet were not included in VAR calculations (Blankfein, 2009).

Reliance on VAR helped create the current crisis and left banks with woefully inadequate capital reserves when it broke out. A *Financial Times* editorial observed that 'risk management models ... were catastrophic' (*Financial Times*, 2008D). The *Financial Time*'s Gillian Tett concluded that 'it was sheer madness for financiers ever to have relied so heavily on these VAR models during the first seven years of this decade' (Tett, 2008B). VAR-determined capital requirement are just one of many possible examples of totally ineffective regulatory processes within the NFA. Financial markets were not just lightly regulated, such regulation as did exist was often 'phantom' regulation—ineffective by design.

The problems involved in risk management through VAR were apparent to everyone who understood even the outline of the procedure; you do not need specialist knowledge to spot them. I explained the problems associated with VAR in Crotty, 2007, a paper written in 2006, well before the crisis developed. Yet only a few influential financial observers warned against the futility of standard risk management practices prior to the crisis because VAR-based risk assessment maximised bonuses. No one wanted to kill the goose that was laying golden eggs.

Frank Partnoy did call attention to the flaws in VAR prior to the crisis:

> VAR was dangerous. It gave firms a false sense of complacency, because it ignored certain risks and relied heavily on past price movements. In some markets, VAR actually increased risk, because every trader assessed risk in the same flawed way. In other markets, traders [using different VAR models] calculated VAR measures that varied 'by 14 times or more.' ... LTMC's VAR models had predicted that the fund's maximum daily loss would be in the tens of millions of dollars, and that it would not have collapsed in the lifetime of several billion universes. (Partnoy, 2003, p. 263)

2.7 Heavy reliance on complex financial products in a tightly integrated global financial system created channels of contagion that raised systemic risk

It was claimed that in the NFA, complex derivatives would allow the risk associated with securities to be divided into its component parts, such as interest rate and counter-party risk. Investors could buy only those risk segments they felt comfortable holding. And rather than concentrate in banks as in the 'Golden Age' financial system, it was argued, risk would be lightly sprinkled on agents all across the globe. Since markets price risk correctly, no one would be fooled into holding excessive risk, so systemic risk would be minimised. Then New York Fed Chairman, and current Secretary of the Treasury, Timothy Geithner stated in 2006: 'In the financial system we have today, with less risk concentrated in banks, the probability of systemic financial crises may be lower than in traditional bank-centered financial systems' (Geithner, 2008). In 2006 the IMF proclaimed that the dispersion of credit risk 'has helped to make the banking and overall financial system more resilient' (Tett, 2009).

There are major flaws in this argument. As *Financial Times* columnist Martin Wolf put it: 'The proposition that sophisticated modern finance was able to transfer risk to those best able to manage it has failed. The paradigm is, instead, that risk has been transferred to those least able to understand it' (Wolf, 2009). First, and perhaps most important, it implicitly assumed that the NFA would not generate more total risk than the previous tightly-regulated bank-based regime, but only spread a given system-wide risk across more

investors. However, *the degree of system-wide risk associated with any financial regime is endogenous.* The effect of regime change on systemic risk depends on the amount of real and financial risk it creates and the way it disperses that risk, factors strongly affected by the mode of regulation. The structure of the NFA inevitably created excessive risk.

Second, derivatives can be used to speculate as well as to hedge. In the boom, hedging via derivatives is relatively inexpensive, but financial institutions guided by perverse incentives do not want to accept the deductions from profit and the bonus pool that full hedging entails. 'Why financial institutions don't hedge risk more adequately is no mystery. It . . . costs money and cuts into returns—and, of course, their fees' (*Wall Street Journal*, 2007A). Conversely, after serious trouble hits financial markets, agents would like to hedge risk, but the cost becomes prohibitive. For example, to insure $10 million of Citigroup debt against default for 5 years through CDSs cost about $15,000 a year in May 2007, but $190,000 in February 2008. Moreover, a rise in the cost of hedging can occur quickly and unexpectedly. The cost of insuring Countrywide debt rose from $75,000 in early July 2007 to $230,000 one month later; it then jumped by $120,000 in just one day (*Wall Street Journal*, 2007B). By January 2008, the cost of insuring Countrywide's debt was $3 million up front and $500,000 annually.

Ironically, while the ability to hedge via derivatives can make an individual investor safer, it can simultaneously make the system riskier. For example, hedging often involves dynamic derivative trading strategies that rely on liquid continuous markets with low to moderate transactions costs. A typical dynamic hedge involves shorting the risky asset held and investing in a risk-free asset. The hedge adjusts whenever the asset price, interest rate or volatility changes, which they do continuously. Every time the asset price declines or volatility increases, the risky asset must be sold; this is what makes the hedge 'dynamic'. When problems hit, price falls and volatility rises. Institutions with dynamic hedges must sell their risky assets, which accelerates the rate of price decrease, which in turn forces more hedged-asset sales. If many investors have made similar dynamic hedges and are selling, liquidity dries up and prices can free-fall.

Consider the role played by AIG in the exploding CDS market. Many institutions used CDSs to hedge against a loss in the value of their CDOs (one reason banks bought CDS protection is that it lowered their capital requirements). Insurers such as AIG piled up immense commitments to pay in the event of defaults or capital losses with little capital to back these commitments. When losses hit security markets AIG could not pay off its contracts; it became insolvent.[1] Had the government not put $180 billion into AIG, many large financial institutions around the world would have failed. Ultimately, CDSs made the system more fragile because they facilitated excessive risk-taking.

Third, the narrative insists that derivatives unbundle risk, dividing it into simpler segments. But in fact, sophisticated derivatives such as CDOs re-bundle risk in the most complicated and non-transparent ways: this is what financial engineering and structured derivative products do.[2] These derivatives also add substantial 'embedded' leverage to the underlying or primitive products to enhance investor profits. Das explains how layers of unseen leverage added to derivative products by investment bankers sold to Orange County California caused unforeseen catastrophic losses: 'Greenspan had been right—risk

[1] 'AIG, due to its high credit rating, did not have to post collateral until it was downgraded. At that point, the collateral calls were so massive that they effectively made the insurance giant insolvent' (*Financial Times*, 2009D).

[2] See Bookstabber (2007) and Das (2006) for concrete examples of the risk- and complexity-augmenting properties of structured financial products.

had truly been unbundled. We had packaged it right back up and shoved it down the eager throats of the wealthy taxpayers of Orange County' (Das, 2006, p. 50).

Fourth, the celebratory NFA narrative applauded globalisation of financial markets because it created channels of risk dispersion. But securitisation and funding via tightly integrated global capital markets simultaneously created channels of contagion in which a crisis that originated in one product in one location (US subprime mortgages) quickly spread to other products (US prime mortgages, MBSs, CDOs, home equity loans, loans to residential construction companies, credit cards, auto loans, monoline insurance and auction rate securities) and throughout the world. The complexity of the networks linking markets together created immense fragility in the system: 'Complexity adds to the danger that any one part of the hyper-financial system can bring down the whole' (*Financial Times*, 2008A).

The President of the German Central Bank acknowledged that:

> New and complex instruments to transfer credit risks in combination with large banks engaging in an 'originate and distribute' business model have amplified the consequences of the undeniable excesses in the US mortgage market ... In the end, the new instruments of credit risk-transfer distributed fear instead of risk. (Weber, 2008)

2.8 The NFA facilitated the growth of dangerously high system-wide leverage

As noted, structural flaws in the NFA created dangerous leverage throughout the financial system. Annual borrowing by US financial institutions as a percent of gross domestic product (GDP) jumped from 6.9% in 1997 to 12.8% a decade later.

From 1975 to 2003, the US Securities and Exchange Commission (SEC) limited investment bank leverage to 12 times capital. However, in 2004, under pressure from Goldman Sachs chairman and later Treasury Secretary Henry Paulson, it raised the acceptable leverage ratio to 40 times capital and made compliance voluntary (*Wall Street Watch*, 2009, p. 17). This allowed large investment banks to generate asset-to-equity ratios in the mid to upper 30s just before the crisis, with at least half of their borrowing in the form of overnight repos, money that could flee at the first hint of trouble.[1] With leverage rates this high, any serious fall in asset prices would trigger a dangerous deleveraging dynamic.

Commercial banks appeared to be adequately capitalised, but only because they overestimated the value of on-balance-sheet assets while holding a high percentage of their most vulnerable assets hidden off-balance-sheet. In fact, they were excessively leveraged, as the crisis revealed. Many European banks had leverage ratios of 50 or more before the crisis (Goodhart, 2009), while Citibank's and Bank of America's ratios were even higher (Ferguson, 2008). By the end of 2008 many large banks had seen their equity position evaporate to the brink of insolvency and beyond. Only massive government bailouts kept these 'zombie banks' alive.

Rising leverage was facilitated in part by the easy money policies of the Fed. To avoid a deep financial crisis following the collapse of the late 1990s stock market and internet booms, the Fed began to cut short-term interest rates in late 2000 and continued to hold them at record lows through to mid-2004. Financial firms were thus able to borrow cheaply, which, under different circumstances, might have fueled a boom in productive

[1] Half of the spectacular rise in investment bank's return on equity in the four years leading up to the crisis was generated by higher leverage rather than smart investing, efficient innovation or even boom-induced capital gains on trading assets.

capital investment. However, given perverse incentives in financial markets, the spectacular returns to financial risk-taking, and a sluggish real economy in which growth was sustained primarily through the impact of rising debt and financial wealth on aggregate demand, the additional funds were mostly used for speculative financial investment.

Increased leverage helped push the size of financial markets to unsustainable heights relative to the real economy. By 2007 the global financial system had become, to use Hyman Minsky's famous phrase, 'financially fragile'. The term is usually applied to a cycle phase, but in this case the condition had become secular. Any serious deterioration in the cash flows required to sustain security prices could have triggered a dangerous de-leveraging process. Falling housing prices and rising mortgage defaults provided that trigger. By January 2009, housing prices had declined by almost 28% according to the Case–Shiller index and mortgage default rates rose steadily. Structured financial security price declines were stunning. One reason was that: 'The leverage used to put [CDOs] together can amplify losses [in the downturn]. For example, a 4 percent loss in a mortgage backed security held by collateralized debt obligations can turn into almost a 40% loss to the holder of the CDO itself' (*New York Times*, 2007). New York Fed Chairman Timothy Geithner expressed concern about the destructive power of reverse leverage in May 2007: 'As market participants move to protect themselves against further losses, by selling positions, requiring more margin, hedging against further declines, the shock is amplified and the brake becomes the accelerator' (Geithner, 2008).

The downward spiral was exacerbated by the role ratings agencies played in the regulatory system. Facing a wave of criticism for having led investors astray in the boom with overly optimistic ratings, agencies belatedly shifted assets to higher-risk categories in the crisis. A small rating downgrade can lead to a large increase in required capital; the relation is not linear. Banks therefore had to come up with more capital to support their assets. Banks were thus forced to sell assets into a collapsing market. Meanwhile, margin calls forced borrowers to sell securities. The de-leveraging process froze credit markets. Since modern nonfinancial business and household sectors run on credit, the shrinking availability and rising cost of borrowing led to a slowdown in economic growth that in turn worsened the global financial crisis. The NFA had finally brought the global economy to the edge of the abyss.

3. Conclusion

The past quarter century of deregulation and the globalisation of financial markets, combined with the rapid pace of financial innovation and the moral hazard caused by frequent government bailouts helped create conditions that led to this devastating financial crisis. The severity of the global financial crisis and the global economic recession that accompanied it demonstrate the utter bankruptcy of the deregulated global neoliberal financial system and the market fundamentalism it reflects. Many of its most influential supporters, including Alan Greenspan, have recanted. Senior *Financial Times* columnist Martin Wolf recently wrote: 'The era of financial liberalisation has ended' (Wolf, 2009).

Several decades of deregulation and innovation grossly inflated the size of financial markets relative to the real economy. The value of all financial assets in the US grew from four times GDP in 1980 to ten times GDP in 2007. In 1981 household debt was 48% of GDP, while in 2007 it was 100%. Private sector debt was 123% of GDP in 1981 and 290% by late 2008. The financial sector has been in a leveraging frenzy: its debt rose from 22% of GDP in 1981 to 117% in late 2008. The share of corporate profits generated in the

financial sector rose from 10% in the early 1980s to 40% in 2006, while its share of the stock market's value grew from 6% to 23%.

The scope and severity of the current crisis is a clear signal that the growth trajectory of financial markets in recent decades is unsustainable and must be reversed. It is not possible for the value of financial assets to remain so large relative to the real economy because the real economy cannot consistently generate the cash flows required to sustain such inflated financial claims. It is not economically efficient to have such large proportions of income and human and material resources captured by the financial sector.[1] Financial markets must be forced to shrink substantially relative to nonfinancial sectors, a process already initiated by the crisis, and the nontransparent, illiquid, complex securities that helped cause the financial collapse must be marginalised or banned.

Governments thus face a daunting challenge: they have to stop the financial collapse in the short run to prevent a global depression, while orchestrating a major overhaul and contraction of financial markets over the longer run. The US economy is especially vulnerable because growth over the past few decades has been driven largely by rising household spending on consumption and residential investment. Consumption as a percent of GDP was 63% in 1980, 67% in 1998 and 70% in 2008. Since real wages were stagnant and real family income growth was slow, rising household spending was increasingly driven by the combined effects of rising debt and the increase in household wealth created by stock market and housing booms. Household debt was 48% of GDP in 1985, about where it had been in 1965. But it grew to 66% by 1998, then accelerated to over 100% by late 2008.

This dynamic process has reversed direction in the crisis. The saving rate is rising rapidly as households repay debt and attempt to rebuild wealth to create a cushion against job and income loss. Meanwhile, wealth is evaporating. Stock and residential housing values in the US have dropped by more than a combined $15 trillion, a 24% decline from the 2007 peak of $64 trillion.[2] According to Robert Solow, as a result of these developments 'we are looking at a potential drop in consumer spending of something like $650 billion a year', which is far larger than the annual impact of President Obama's fiscal stimulus package (Solow, 2009). Falling wealth along with deteriorating labour market conditions and declining business investment spending have caused aggregate demand to collapse. Governments have been wise to use public funds as a partial counterweight to the impact of falling private spending on aggregate demand. Indeed, more needs to be done in this regard. It was also sensible to use public money to slow the rate of financial collapse, though the US government in particular has been spectacularly inefficient in its financial intervention policies.

Nevertheless, in the longer run the financial system must shrink by a substantial amount. The IMF argues that 'immediate, short-run policies and actions taken need to be consistent with the long-run vision of a viable financial system ... and that the viable financial sector of the future will be less leveraged and therefore smaller relative to the rest of the economy' (IMF, 2009, pp. 5–6). *The Economist* insists that:

> The financial-services industry is condemned to suffer a horrible contraction.... It is hard to believe that financial services create enough value to command such pre-eminence in the economy. (*The Economist*, 2009)

[1] A study of the career choices of Harvard undergraduates found that the share entering banking and finance rose from less than 4% in the late 1960s to 23% in recent years (*New York Times*, 2009B).

[2] Global financial assets have declined in value by $50 trillion (*Financial Times*, 2009C).

To force financial markets to play a more limited but more productive and less dangerous role in the economy, we need a combination of aggressive financial regulation coordinated across national markets as well as nationalisation of financial institutions where appropriate. The goals of the new regulatory regime should be to create a much smaller financial system that: (i) performs the basic productive services the real economy requires to function efficiently, as it did in the Golden Age; and (ii) sharply curtails, if not eliminates, exotic and highly leveraged gambling casino activities of the kind that led to the current crisis. Policies to achieve both objectives are presented and discussed in Crotty and Epstein (2009).

For such a transition to be effective, two difficult tasks must be accomplished. Efficient financial theory must be replaced as the guide to policy making by the more realistic theories associated with Keynes and Minsky, and domination of financial policy making by the Lords of Finance must end.

The design and implementation of the changes needed in financial markets is a political as much as an economic challenge. Unfortunately, most elected officials responsible for overseeing US financial markets have been strongly influenced by efficient market ideology and corrupted by campaign contributions and other emoluments lavished on them by financial corporations. Between 1998 and 2008, the financial sector spent $1.7 billion in federal election campaign contributions and $3.4 billion to lobby federal officials (*Wall Street Watch*, 2009, p. 17). Moreover, powerful appointed officials in the Treasury Department, the SEC, the Federal Reserve System and other agencies responsible for financial market oversight are often former employees of large financial institutions who return to their firms or lobby for them after their time in office ends. Their material interests are best served by letting financial corporations do as they please in a lightly regulated environment. We have, in the main, appointed foxes to guard our financial chickens.

Unfortunately, the people President Obama has selected to guide his administration's financial rescue and reregulation programmes are almost uniquely unqualified to accomplish the dual objectives of down-sizing financial markets and eliminating dangerous securities. Chief economic advisor Lawrence Summers is a former Treasury Secretary who in 1999 supported the repeal of the 1930s legislation that separated investment and commercial banking, thereby legalising the creation of giant financial conglomerates and dramatically increasing the share of the industry that was 'too big to fail'. Uniting commercial bank deposit and loan operations with investment banks and hedge and private equity funds was dangerous, yet Summers applauded Congress for refusing to regulate 'a system for the 21st century [that] will better enable American companies to compete in the new economy' (Labaton, 1999). When Congress considered regulating financial derivatives trading, including CDSs, Summers told Congress that consideration of such legislation 'cast a shadow of regulatory uncertainty over an otherwise thriving market' (*Wall Street Watch*, 2009, p. 44).[1] Current Treasury Secretary Geithner and Summers were both protégés of Robert Rubin, a former chairman of Goldman Sachs and former Treasury Secretary, and currently an influential advisor to President Obama. The proposal to regulate financial derivatives 'was quashed by opposition from [Clinton's] Treasury Secretary Robert Rubin...' (*Wall Street Watch*, 2009, p. 17).

[1] In 2008 Summers received $5.2 million for part-time service as an advisor to a hedge fund, and was paid $2.7 million for speaking appearances, including at banks such as Citigroup, Goldman Sachs and JP Morgan. Revelation of these facts 'threatened to undermine public trust in the administration's economic plans' (*Financial Times*, 2009E).

As president of the New York Federal Reserve Bank, Geithner had responsibility for seeing that giant financial conglomerates such as Citigroup avoided excessive risk, a task at which he failed miserably. He neither restrained their risk-taking nor warned the public that they had become excessively risky. 'Mr. Geithner's five years as president of the New York Fed [was] an era of unbridled and ultimately disastrous risk-taking by the financial industry' in which he 'forged unusually close relationships with executives of Wall Street's giant financial institutions' (Becker and Morgenson, 2009). Geithner also bears substantial responsibility for the inefficiency of the financial rescue operations undertaken to date. For example, much of the Troubled Asset Relief Program in effect used taxpayer money to finance bonuses for top bank employees and dividends for shareholders with no positive impact on financial market performance.

Between 1998 and 2008 Rubin was a top official at Citigroup, where he received a cumulative $150 million in compensation. His main impact on bank policy was to push for the kind of aggressive risk taking that crashed the firm. Rubin 'believed that Citigroup was falling behind rivals like Morgan Stanley and Goldman, and he pushed to bulk up the bank's high-growth fixed-income trading, including the CDO business' (*New York Times*, 2008).

The President has, in other words, put the task of shrinking and tightly regulating financial markets in the hands of advisors who do not believe in strong regulation and have spent their entire careers opposing it. This may explain why he has yet to take, or even express support for, the kinds of effective government intervention required to end the financial crisis without recreating the conditions that caused it. His strategy seems to be to spend whatever public funds are necessary to restore profitability to financial markets as currently constituted, and only then to consider new regulation. But if financial markets become healthy again, the political pressure to reregulate will have vanished. Nobel Laureate Paul Krugman accurately assessed the situation:

> At every stage, Geithner *et al.* have made it clear that they still have faith in the people who created the financial crisis—that they believe that all we have is a liquidity crisis that can be undone with a bit of financial engineering, that 'governments do a bad job of running banks' (as opposed, presumably, to the wonderful job the private bankers have done), that financial bailouts and guarantees should come with no strings attached. This was bad analysis, bad policy, and terrible politics. This administration, elected on the promise of change, has already managed, in an astonishingly short time, to create the impression that it's owned by the wheeler-dealers. (Krugman, 2009)

Until this administration adopts a radical change of course in its financial market policies, US and global financial markets are likely to remain fatally structurally flawed.[1]

Bibliography

Becker, J. and Morgenson, G. 2009. Geithner, as Member and Overseer, Forged Ties to Finance Club, *New York Times*, 27 April

Blankfein, L. 2009. Do not destroy the essential catalyst of risk, *Financial Times*, 8 February

Bloomberg. 2007. Citi's losses 'greatly exceeded' profits for subprime, 4 December

Bookstabber, R. 2007. *A Demon of Our Own Design: Markets, Hedge Funds, and the Perils of Financial Innovation*, Hoboken, New Jersey, John Wiley & Sons

Chacko, G., Sjoman, A., Motohashi, H. and Dessain, V. 2006. *Credit Derivatives*, Philadelphia, Wharton School

[1] It is possible, but not likely, that Europe will act independently of the USA and aggressively reregulate their financial markets.

Crotty, J. 2002. Trading state-led prosperity for market-led stagnation: from the Golden Age to global neoliberalism, pp. 21–41 in Dymski, G. and Isenberg, D. (eds), *Seeking Shelter on the Pacific Rim: Financial Globalization, Social Change, and the Housing Market*, Armonk, NY, M.E. Sharpe, Inc

Crotty, J. 2007. 'If Financial Market Competition is so Intense, Why are Financial Firm Profits so High? Reflections on the Current 'Golden Age' of Finance', Political Economy Research Institute (PERI) Working Paper no. 134, April, available at www.peri.umass.edu

Crotty, J. 2008. 'Structural Causes of the Global Financial Crisis: A Critical Assessment of the New Financial Architecture', Political Economy Research Institute (PERI) Working Paper no. 180, *available at www.peri.umass.edu*

Crotty, J. 2009. Profound structural flaws in the U.S. financial system helped cause the current global financial crisis, *Political and Economic Weekly*, vol. XLIV, no. 13, 127–35

Crotty, J. and Epstein, G. 2009. Avoiding another meltdown, *Challenge*, vol. 52, no. 1, 5–26

Das, S. 2006. *Traders Guns and Money: Knowns and Unknowns in the Dazzling World of Derivatives*, Harlow, Prentice Hall

DiNapoli, T. 2009. Wall Street Bonuses Fall 44% in 2008, *Office of the New York State Comptroller*, January 28

Ferguson, N. 2008. The age of obligation, *Financial Times*, 19 December

Financial Times. 2007A. Time to expose those CDOs, 26 February

Financial Times. 2007B. Goldman pays the price of being big, 14 August, p. 25

Financial Times. 2007C. A bruising game of musical chairs, 15 November

Financial Times. 2008A. Editorial: The start of the great unwinding, 25 January

Financial Times. 2008B. Rule changes could hit balance sheets, 21 July

Financial Times. 2008C. The fatal banker's fall, 1 October

Financial Times. 2008D. The year the god of finance failed, 26 December

Financial Times. 2009A. Insight: Risk needs a human touch but models hold the whip hand, 22 January

Financial Times. 2009B. Half of all CDOs of ABS failed, 10 February

Financial Times. 2009C. Plunging assets cost global economy $50,000 bn, report says, 9 March

Financial Times. 2009D. Worries remain even after CDS cleanup, 11 March

Financial Times. 2009E. Summers criticized over Wall Street links, 6 April

FitchRatings. 2007. 'CDx Survey: Market Volumes Continue Growing While New Concerns Emerge', July 16, 1–16, available at www.fitchratings.com

Fortune Magazine. 2007. The subprime mortgage crisis keeps getting worse—and claiming more victims, 17 November

Geithner, T. 2008. Comments by New York Fed President Timothy Geithner, *Wall Street Journal*, 30 May

Goodhart, C. 2009. 'Financial Crisis and the Future of the Financial System', speech to 100th BRE Bank-CASE seminar, Warsaw, Poland, 22 January, available at http://www.case.com.pl/plik–24052990.pdf

Haldane, A. 2009. 'Why Banks Failed the Stress Test', speech at Marcus-Evans Conference on Stress-Testing, 13 February

IMF. 2009. 'Global Financial Stability Report', April

Krugman, P. 2009. AIG, *New York Times* Blog, 20 March

Labaton, S. 1999. Congress passes wide-ranging bill easing bank laws, *New York Times*, 15 November

Lewis, M. and Einhorn, D. 2009. The end of the financial world as we know it, *New York Times*, 4 January

New York Times. 2007. How reverse leverage in structured financial instruments works, 29 July

New York Times. 2008. The Reckoning: Citigroup pays for a rush to risk, 23 November

New York Times. 2009A. After losses, a move to reclaim executives' pay, 22 February

New York Times. 2009B. Wall St. pay is cyclical: guess where we are now, 5 February

New York Times. 2009B. Fair game A.I.G., 8 March

New York Times. 2009C. Editorial: Following the A.I.G. money, 15 March

New York Times. 2009D. Editorial: The gift that keeps on giving, 17 March

New York Times. 2009E. After an off year, Wall Street pay is bouncing back, 26 April

Partnoy, F. 2003. *Infectious Greed*, New York, Times Books

Richardson, M. and Roubini, N. 2009. Nationalize the banks! We're all Swedes now, *Washington Post*, 15 February
Roubini, N. 2008. 'How will financial institutions make money now that the securitization food chain is broken?', available at http://www.rgemonitor.com/blog/roubini/, 19 May
Solow, R. 2009. How to understand the disaster, *New York Review of Books*, 14 May
Tett, G. 2008A. Battered banks face regulators' harder line on trading books, *Financial Times*, 3 June
Tett, G. 2008B. Insight: Volatility returns with a vengeance, *Financial Times*, 27 October
Tett, G. 2009. Lost through destructive creation, *Financial Times*, 10 March
The Economist. 2009. Greed and Fear, 24 January
Volker, P. 2008. Speech to the Economic Club of New York, 8 April, available at econclubny.org/files/Transcript_Volcker_April_2008.pdf
Wall Street Journal. 2007A. Macquarie's liquidity risk, 2 August
Wall Street Journal. 2007B. Reversal in fortune, 11 August
Wall Street Journal. 2007C. Conduit risks are hovering over Citigroup, 5 September
Wall Street Journal. 2008. FASB signals stricter rules for banks' loan vehicles, 2 May
Wall Street Journal. 2009A. Merrill gave $1 million each to 700 of its staff, 12 February
Wall Street Journal. 2009B. Ten questions for those fixing the financial mess, 10 March
Wall Street Journal. 2009C. AIG faces growing wrath over payments, 16 March
Wall Street Watch. 2009. Sold out: how Wall Street and Washington betrayed America, March, available at http://www.wallstreetwatch.org/reports/sold_out.pdf
Weber, A. 2008. Speech at the London School of Economics, 6 June
Wolf, M. 2009. Seeds of its own destruction, *Financial Times*, 8 March