2008

Structural Causes of the Global Financial Crisis: A Critical Assessment of the 'New Financial Architecture'

James Crotty
University of Massachusetts - Amherst, crotty@econs.umass.edu

DEPARTMENT OF ECONOMICS

Working Paper

Structural Causes of the Global Financial Crisis: A Critical Assessment of the 'New Financial Architecture'

by

James Crotty

Working Paper 2008-14

UNIVERSITY OF MASSACHUSETTS AMHERST

Structural Causes of the Global Financial Crisis:
A Critical Assessment of the 'New Financial Architecture'

James Crotty

University of Massachusetts

Amherst Campus

August 28, 2008

This draft is circulated solely for the purpose of generating comments and criticism. I am grateful to Michael Ash, Tom Bernardin, Gary Dymski, Jerry Epstein, Jerry Friedman, Derek Jaskulski, Iren Levina, Ozgur Orhangazi and Marty Wolfson for helpful comments on a previous draft. I would like to thank the UMASS Economics Department for research support through their Sheridan Scholar program.

Abstract

The main thesis of this paper is that the ultimate cause of the current global financial crisis is to be found in the deeply flawed institutions and practices of what is often referred to as the New Financial Architecture (NFA) – a globally integrated system of giant bank conglomerates and the so-called 'shadow banking system' of investment banks, hedge funds and bank-created Special Investment Vehicles. The institutions are either lightly and badly regulated or not regulated at all, an arrangement defended by and celebrated in the dominant financial economics theoretical paradigm – the theory of efficient capital markets. The NFA has generated a series of ever-bigger financial crises that have been met by larger and larger government bailouts. After a brief review of the historical evolution of the NFA, the paper analyses its structural flaws. The problems discussed in order are: 1) the theoretical foundation of the NFA – the theory of efficient capital markets – is very weak and the celebratory narrative of the NFA accepted by regulators is seriously misleading; 2) widespread perverse incentives embedded in the NFA generated excessive risk-taking throughout financial markets; 3) mortgage-backed securities central to the boom were so complex and nontransparent that they could not possibly be priced correctly; their prices were bound to collapse once the excessive optimism of the boom faded; 4) contrary to the narrative, excessive risk built up in giant banks during the boom; and 5) the NFA generated high leverage and high systemic risk, with channels of contagion that transmitted problems in the US subprime mortgage market around the world. Understanding the profound problems of the NFA is a necessary step toward the creation of a new and improved set of financial institutions and practices likely to achieve core policy objectives such as faster real sector growth with lower inequality.

I. Introduction

The outline of the origin and trajectory of the current financial crisis, clearly the worst financial meltdown since the Great Depression, are well known. A housing market bubble began in the late 1990s and accelerated in the early-mid 2000s. Banks and mortgage brokers pushed mortgage sales because they earned fees in proportion to the volume of mortgages they wrote. Banks earned large fees securitizing mortgages, selling them to capital markets in the form of mortgage backed securities (MBSs) and collateralized debt obligations (CDOs), and servicing them after they were sold. Since, it was generally believed that banks distributed most of these mortgages to capital markets as asset-backed securities, it was expected that little if any bank risk was involved in the process. Institutional investors such as hedge funds and insurance companies demanded these complex, risky products because they were given high – often AAA – ratings by credit ratings agencies, yet they had higher returns than equivalently rated corporate bonds whose yield was constrained by the low interest rates of the era.[1] Demand for high yield products based on mortgages was so great and bank fees so large that banks and brokers began to sell mortgages to those who could not afford them under terms that were bound to trigger large defaults when the housing price bubble evaporated and/or interest rates rose. The whole process was driven by accelerating leverage.

Home sales peaked in late 2005 and home construction spending and housing prices topped out in early 2006. When the subprime mortgage crisis erupted in mid 2007, the entire edifice began to collapse. The crisis began in the US, but since mortgage-based financial products had been dispersed around the world, we soon had a global financial crisis.[2]

The main thesis of this paper is that while the subprime mortgage market triggered the crisis, its deep cause is to be found in the flawed institutions and practices of what is often referred to as the New Financial Architecture (NFA). The term NFA refers to the integration of modern day financial firms and markets with its associated regime of light government regulation. In the next section, we argue that the 'perfect calm' from

[1] Different returns on products with identical risk ratings should have signaled that something was seriously wrong with the way markets priced risk.
[2] See Baker 2008, Dymski 2007 and Wray 2007 for details of this process.

2003 to mid 2007 – low interest rates, loan default rates, risk spreads and security price volatility, along with high profits and rising stock prices - combined with the structures and practices of the NFA to encourage the excesses that caused the current crisis.[3] They stimulated aggressive risk taking (not perceived as risky), pushed some security prices to unsustainable levels, dramatically raised systemic leverage and thus, to use Minsky's phrase, financial fragility (the vulnerability of the financial system to problems that appear anywhere within it), and facilitated the creation of unprecedented financial market complexity and opaqueness. They also led to a secular rise in the size of financial markets relative to the rest of the economy, and created the preconditions for a global financial crisis. Regulators responsible for overseeing financial markets not only failed to prevent the excesses of the boom, but, with some notable exceptions, they assured investors that that the high yields and low risk spreads of the period were permanent, and thus that risk of crisis was minimal.

After a brief review of the historical evolution of the NFA, the paper discusses a series of serious structural flaws therein. The list of flaws in the NFA is not exhaustive, and many of the problems are interrelated. They were chosen to facilitate the presentation of central structural problems that collectively led to the crisis. Each section reveals the inability of the NFA's regulatory regime and the individuals who managed it to restrain the risk-seeking behavior of financial institutions. The problems discussed in order are: 1) the theoretical foundation of the NFA – the theory of efficient capital markets – is very weak and the celebratory narrative based on this foundation is, therefore, seriously misleading; 2) widespread perverse incentives embedded in the NFA generated excessive risk-taking throughout financial markets; 3) complex MBSs and derivative products central to the boom were ticking time bombs[4]: they could not be priced correctly and suffered from illiquidity problems that accelerated the downturn; 4) claims by the narrative notwithstanding, excessive risk built up in giant banks over the period; and 5) the NFA generated high systemic risk. Understanding the profound problems of the NFA

[3] A risk manager at a large global bank described this perfect calm as follows. "We were paid to think about the downsides but it was hard to see where the problems would come from. Four years of falling credit spreads, low interest rates, virtually no defaults in our loan portfolio and historically low volatility levels: it was the most benign risk environment we had seen in twenty years" (The Economist, "Confessions of a risk manager," August 9, 2008).

[4] Satyajit Das, author of numerous texts on financial engineering, explained that: "MBS structures reached levels of complexity second only to derivatives. … Few investors understood them" (2006. p. 283).

is a necessary step toward the creation of a new and improved set of financial institutions and practices likely to achieve core economic policy objectives such as faster real sector growth with lower inequality.

II. The Evolution of the New Financial Architecture

A series of financial crises in the US culminating in the financial collapse of the early 1930s convinced almost everyone that reliance on a lightly regulated 'free market' financial system was a reckless policy that threatened to undermine economic and political stability. The lesson drawn from these experiences was that the US should tightly and permanently monitor and regulate important financial institutions to prevent future system-threatening booms and busts. The regulatory regime put in place in the aftermath of the Great Depression was designed to accomplish these objectives and thereby prevent repetition of the speculative excesses of the late 1920s that led to the failure of thousands of banks in the early 1930s and helped cause the Great Depression. The main task for regulators was to prevent excessive risk-taking by core financial institutions and, in so doing, make serious financial crises less likely.

Under the so-called Glass-Steagall regulatory system put in place in the mid 1930s, investment and commercial banking activities were separated.[5] The segregation of commercial banking and capital markets was intended to prevent the use of bank deposits to finance speculative capital market activity, a practice that helped bring on the crisis of the early 1930s. Regulators closely monitored and tightly controlled commercial bank activity. The new FDIC insured bank depositors against risk of loss, a move that virtually eliminated bank runs for four decades. The new SEC regulated investment banks, though with a very light touch, primarily by forcing them to provide more complete and dependable information about securities to the public. Residential mortgage loans were guaranteed by the Federal Home Loan Bank, which helped accelerate residential construction and made mortgages safe for lenders.

In the Glass-Steagall system commercial banks originated and retained consumer and commercial loans, and thus were motivated to avoid excessively risky loans, and

[5] See Russell 2008 for a more detailed analysis of regulatory change in this era.

provided liquidity to other financial institutions in times of market stress. Their ability to provide adequate liquidity was protected by tight government restrictions on the risk they could take. Banks thus could serve as lender of next-to-last resort to other financial institutions, while the Fed and FDIC were there to be lender of last resort to banks in case of a serious crisis. This system worked well from World War II until the 1970s, facilitating the rapid real sector growth with declining inequality that led this period to be called the 'Golden Age' of modern capitalism. In particular, tight regulation dramatically reduced bank failures and eliminated systemic financial crises.

In the 1970s and 1980s, two developments undercut the efficacy of the Glass-Steagall system.[6] First, US financial markets were buffeted by rising inflation and the Third World debt and Savings and Loan crises. These events created great strains in the system. Second, financial institutions were increasingly successful in evading regulatory constraints, in large part because political commitment to a strong regulatory system had weakened over the decades. This dialectic of financial regulation is an inherent problem in modern state-guided capitalisms. Catastrophic economic and political events often lead to successful attempts to tightly regulate the industries believed by the public to be responsible for their problems. But as time passes, regulated firms have a strong incentive to try to weaken and evade their regulatory restraints. In financial markets, innovation is a major weapon in this game. The US and other advanced capitalist countries were thus confronted with a choice. They could either substantially reform their regulatory systems so financial markets would continue to be restrained from excessive risk taking under the new economic conditions, or they could return to the pre-1930s free-market ideology and undertake radical deregulation. Since there was no strong progressive political movement to defend effective financial regulation, free market ideology won the day. Rejection of strong financial regulation was a hallmark of both the Thatcher and Reagan 'revolutions' in the UK and US, and it soon spread around the globe.

The elimination of the 1930s legislation that segregated commercial banking and the capital markets in 1999 was the culmination of two decades of radical deregulation that created what is often called the 'New Financial Architecture' (NFA). The NFA

[6] A more complete analysis of the process of deregulation would have to incorporate many additional contributing factors and would reach back to the mid-1960s.

replaced the tightly regulated commercial-bank based financial system of the Golden Age with the lightly regulated capital-market based, globally-integrated financial system we have today.

The NFA is founded on the core belief embodied in modern mainstream financial economics that unregulated capital markets are "efficient" in that security prices always correctly reflect their true risk-return dimensions. The canonical neoclassical models of financial markets, such as the Capital Asset Pricing Model (CAPM) and Options Pricing Theory embody a joint hypothesis: 1) they assume that all agents know all information relevant to the pricing of securities – they have 'rational' or correct expectations of the future cash flows that will emanate from all securities; and 2) they assume that competitive markets generate 'optimal' equilibrium security prices created by decisions that maximize agent preference functions. The most important deduction from modern financial markets theory is that markets always price risk correctly as long as governments do not distort financial decision making through regulation. This is the main theoretical foundation that supports the NFA: if agents know the correct price of risk, they cannot be induced to hold more (or less) risk than is optimal for them. Given this conclusion, there is little need for government intervention. Reflecting its foundation, the NFA embodies light regulation of commercial banks, minimal regulation of investment banks, and the virtual non-regulation of increasingly powerful nonbank financial institutions such as hedge and private equity funds and bank-created special investment vehicles (SIVs) discussed below – the so-called "shadow banking system." The NFA's faith in the efficiency and safety of free financial markets thus represents the total rejection of the conventional wisdom that evolved from the series of financial crises that culminated in the financial collapse of early 1930s – that a country must either tightly control its financial markets or suffer from volatile boom-bust financial cycles, excessive growth of financial markets, systemic crises, and, ultimately, massive financial bailouts. Since this conventional wisdom is supported by realistic theories of financial markets, countries reject it at their own peril.

In brief, supporters of the NFA believe it has the following strong points. In the Golden Age, banks made the lion's share of household and commercial loans and kept them on their balance sheets. In the NFA, it is argued, banks still originate loans, but the

marvels of modern financial innovation allow them to bundle large numbers of loans into asset backed securities and sell them via capital markets to institutional and individual investors around the world – the new "originate and distribute" model.[7] Securitization shifts loans from bank balance sheets to capital markets, where they are priced correctly and distributed optimally. This not only lowers banks' risk, it frees up bank capital to create more loans. The celebratory narrative associated with the NFA applauds the incredibly rapid financial innovation in derivative products that has taken place in the past decade and a half because financial institutions and private investors can now easily use derivatives to hedge or insure against risk. Complex derivative products allow risk to be decomposed into its component parts, such as interest rate or counter-party risk. Thus, agents are able to buy only the kinds of risk they are most comfortable holding. Paul Volcker described this vision of the NFA as follows: "The general idea is the inherent risks can be minimized by unpackaging the institutional relationships, separating maturity and credit risks, "slicing and dicing" so that those risks can be shifted to those most willing and capable of absorbing them" (Volcker 2008). Securitization of their loans plus the ability to hedge whatever residual risk remained were supposed to keep banks safe in the new regime. The narrative asserts that because risk is transparent and properly priced, and scattered widely and thinly across tightly integrated global financial markets, systemic risk has been reduced significantly. This in turn implies that there is less need in the new system for large, costly government interventions.[8]

With the elimination of the Glass-Steagall prohibition against the union of commercial and investment banking in 1999, large commercial banks became integrated into giant financial conglomerates that include investment banks and mutual, hedge and private equity funds as well as bank-created SIVs. Though these conglomerates are clearly 'too big to fail,' they are lightly regulated in the NFA for two reasons. First, regulatory agencies are now controlled by people who accept the NFA's celebratory

[7] The phrase "it is argued" is included here because banks in fact held a large volume of risky loans on and off their balance sheets.

[8] In 2005, a group of high-powered Wall Street bankers created the Counterparty Risk Management Policy Group II to evaluate the potential for systemic risk under the NFA. Their report concluded that "innovative products designed to mitigate risk were seen as having reduced the likelihood that a financial cataclysm could put the entire system at risk" (*New York Times*, "What Created This Monster?," March 23, 2008).

narrative and believe that modern financial markets *should* be largely self-regulating. Alan Greenspan, until recently the most important financial market regulator in the world is a disciple of free-market ideologue Ayn Rand. According to the *Wall Street Journal* "Mr. Greenspan says he didn't get heavily involved in regulatory matters in part because his laissez-faire philosophy was often at odds with the goals of the laws Congress had tasked the Fed with enforcing" (*Wall Street Journal*, "Did Greenspan add to subprime woes," June 9, 2007). Second, these conglomerates are thought to be so large and complex that regulators, as outsiders, no longer have the information required to effectively monitor their risk or control their behavior. They are therefore allowed to evaluate their own risk (and thus determine to a substantial degree their own capital requirements) through 'modern' statistical techniques such as value-at-risk (VAR) models discussed below. As George Soros put it:

> Since 1980, regulations have been progressively relaxed until they have practically disappeared. The super-boom got out of hand when the new products became so complicated that the authorities could no longer calculate their risks and started relying on the risk management methods of the banks themselves. (Soros 2008)

Belief in the narrative about the efficiency of financial markets under the NFA permeated global financial markets for the past 25 years. Individual and institutional investors, financial institutions and government regulators were guided by it, and economists and the business press filtered all discussion about financial markets through its lens. In turn, belief in the narrative changed investors' understanding of, and decision-making in, financial markets. The conventional wisdom embedded in the narrative made individual and institutional investors willing to take on what would previously been thought to be excessive risk - in the stock market and internet booms of the second half of the 1990s and in the financial bubble from 2003 to mid 2007. The latter years were a 'perfect calm' in financial markets. Interest rates, risk spreads, volatility and corporate default rates were exceptionally low, and levels of liquidity – even for complex financial products such as mortgage backed securities and collateralized debt obligations not traded in markets – were high, as were corporate profits. The narrative helped create the widespread belief that these conditions were permanent. This led almost everyone to believe that almost all investments – including purchases of high-return, highly

leveraged, complex, potentially illiquid mortgage-backed securities – were relatively safe. As Janet Yellen, President of the San Francisco Federal Reserve Bank noted: "with advances in financial engineering promising to offer higher returns without commensurate increases in risk, the complex securities and derivatives that are involved in the current turmoil may have seemed especially attractive at the time" (Yellen 2008).

The new financial regime began to evolve in the early 1980s. Under its guidance, the growth rate of financial markets increased, accelerating after the early 1990s. There were clear signs in this period that this growth process was troubled. Time and again financial markets driven by speculative excess threatened to break down: World Bank research identified 117 systemic banking crises between the late 1970s and the early 2000s (Caprio and Klingebiel 2003). And time and again they were rescued by Central Bank intervention through monetary policy, and through increasingly large lender of last resort bailouts that the narrative said should not happen. Thus the large financial gains of the boom were private, but losses in the crisis were socialized. These bailouts convinced individual and institutional investors that that gains in the boom would far exceed losses in the bust. This created a classic moral hazard problem that contributed to a secular rise in the absolute and relative size of financial markets, as well to increasing inequality. US credit market debt was 168% of GDP in 1981 and over 350% in 2007. Financial assets were less than five times larger than US GDP in 1980, but over ten times as large in 2007. The notional value of all derivative contracts rose from about three times global GDP in 1999 to over 11 times global GDP in 2007. The notional value of credit default swap derivatives rose from about $6 trillion in December 2004 to $62 trillion three years later. In the US, the share of total corporate profits generated in the financial sector grew from 10% in the early 1980s to 40% in 2006 (*The Economis*t, "What went wrong," March 19, 2008).

Anyone who understood the history of financial markets should have known that these trends were not sustainable. Anyone who understood the weak character of arguments presented by neoclassical economists in defense of perfect capital markets should have been skeptical of the new regime. Anyone who carefully observed the actual institutions and practices of the NFA should have seen that its celebratory narrative was mostly myth. And the fundamental problems with the NFA *were* evident to a small

number of analysts not infected with belief in the ideologically driven narrative.[9] But the influence of the narrative, supported by academics, self-interested financial institutions and the government, blinded the public to the fact that this emperor had no clothes. It took the outbreak of the crisis that began in mid-summer 2007 and continues to this day to force a general recognition that almost every tenet of the narrative was wrong. This has become so universally accepted that even the world's major regulatory bodies now – finally – acknowledge the deep structural flaws of the NFA, though the regulatory reforms they proposed in the aftermath of the outbreak have been superficial.[10] The next section explains these structural flaws in some detail.

III. Structural Flaws in the NFA Created the Crisis

III. 1 The NFA is built on a very weak theoretical foundation[11]

The belief that capital markets are "efficient" and that, therefore, they price risk and return correctly, is a necessary condition for acceptance of the NFA's rejection of serious government regulation of financial markets. This belief is widely accepted in large part because it is supported by modern financial market theory. (It is also strongly supported by key financial market players because it is in their material interest to keep the government out of their business.) This support allows backers of the NFA to claim it has a 'scientific' foundation. However, the evidence provided by financial economics in support of capital market efficiency is surprisingly weak.

To begin with, efficiency is neither a derived nor an observable property of financial markets. It is an assumption or assertion required to construct optimal asset pricing models that conclude that risk and return are properly priced. Eugene Fama, one of the creators of efficient financial market theory, argues that "models of market equilibrium start with the *presumption* that markets are efficient" (FRB Minneapolis, *The Region*, "Interview with Eugene Fama," December 2007, italics added). The assumption is that all agents use all relevant information about securities correctly in the price setting process in financial markets. In neoclassical models, this information is the correct

[9] See, for example, Crotty 2007 for a prescient analysis that concluded that a systemic crisis was likely. Warnings of a coming crisis can also be found on Nouriel Roubini's website.
[10] See, for example, the report on the causes of the crisis by the Financial Stability Forum 2008.
[11] Tom Bernardin provided helpful research assistance for this section.

expectation of the distributions of future cash flows associated with each security – or 'rational' expectations. These are the vaunted knowable future "fundamentals" of the theory. The efficient financial market assumption "is not empirically testable unless some equilibrium model of security returns is specified" (Beaver 1981, p. 28). The canonical models of capital asset pricing insert this assumption into a theory of optimal equilibrium price formation based on agent utility maximization in perfectly competitive markets.[12]

To those not committed to the methods of neoclassical financial economists, their models of optimal asset pricing might be best understood as intellectual exercises in which the theorist asks the question: what is the minimum set of assumptions needed to generate the desired conclusion that capital markets price risk and return correctly. An alternative method of analysis would be to begin with a set of realistic assumptions about financial markets and ask: what theory of the behavior of financial markets can be derived from these assumptions? This is the method associated with the work of Keynes and Minsky. It disappeared from polite discourse in the NFA era, though it sprung to life again when the crisis hit.

The methodological foundation of neoclassical economics is the assertion that the realism of assumptions does not matter in evaluating the validity of the conclusions. Moreover, it is widely believed that economists should privilege theories whose conclusions are consistent with received wisdom. Consider the following comment by William Sharpe in a seminal article on the capital asset pricing model that helped win him the Nobel Prize.

> Needless to say, [the assumptions of the model] are highly restrictive and undoubtedly unrealistic assumptions. However, since the proper test of a theory is not the realism of its assumptions, but the acceptability of its implications, and since these assumptions imply equilibrium conditions which form a major part of classical financial doctrine, it is far from clear that this formulation should be rejected…" (1964, p. 434).

Since classical financial doctrine asserts that competitive financial markets are efficient, the fact that it takes a large number of bizarrely unrealistic assumptions to demonstrate

[12] These models assume that financial markets are never out of equilibrium because they cannot deal with disequilibrium dynamics.

the efficiency of capital markets does not give mainstream financial economists reason to doubt the conclusion.

The proposition that crudely unrealistic assumptions are not inferior to realistic assumptions in theory construction must be distinguished from the more reasonable proposition that some degree of abstraction - or approximation of reality - is necessary in theory building. The latter simply asserts the necessity of using simplifying assumptions because the world is too complex to fully incorporate in theory. The methodological debate, therefore, is not about whether abstraction is necessary, but rather whether or not we should favor theories whose assumptions are not excessively and unnecessarily at odds with the reality we wish to theorize.

Rejection of neoclassical methodology does not imply lack of appreciation for the insights incorporated in canonical theories such as the CAPM. Modern portfolio theory culminated in the CAPM, which formalized the idea that when security prices are not perfectly correlated, diversification of securities in portfolios can reduce risk for a given level of return. It suggests that the price of a security should be strongly influenced by its covariance with the expected future returns of the whole portfolio of securities; it is this covariance rather than the variance of its own returns that is the right measure of its risk in the model. It also formalized the eternal truth that in properly functioning markets you cannot obtain higher returns without accepting higher risk as well - a truth forgotten in all financial bubbles. The problems that infect the NFA arise because financial economists, for methodological or ideological reasons, feel the need to incorporate these useful insights into models of perfect foresight and market optimality - of ‘perfect markets’- and it is this need that requires the embedding of useful insights into a web of unrealistic assumptions that destroys its ability to guide our understanding of financial dynamics.

Space constraints do not permit a detailed discussion of methodology, but two points are important to emphasize. First, as noted, the assumption set used to generate the efficient capital markets conclusion is in stark conflict with the reality of financial markets. Among the core assumptions of efficient market theory are: investors know the true distribution of the future cash flows associated with every security; the degree of agents’ risk aversion is not influenced by financial market outcomes; liquidity is always perfect – agents can sell any asset at its equilibrium price at any time; markets are always

in stable equilibrium; no one ever defaults; and agents can borrow an infinite amount at the risk-free interest rate. Study of the institutions and practices of financial markets demonstrates the extreme gap between these assumptions and real world markets.

Consider the assumption that investors know the true future cash flows associated with all securities or have 'rational' expectations.[13] This is appropriate for situations of 'risk' – as in roulette - where probabilities of outcomes do not change over time. But it is totally inappropriate for conditions of fundamental uncertainty in which the mechanism that generates future outcomes is always changing in ways that can never be known in the present.[14] In mainstream financial theory future cash flow expectations are exogenous – they are not altered by financial agents' decisions, and agents are assumed to be 100 percent confident their expectations are correct. In real world financial markets, agents cannot 'know' the future because it does not yet exist. They have to guess what future conditions will be largely based on some process of extrapolation from the past. Their fallible guesses will influence their decisions and thus affect actual future economic and financial conditions in unpredictable ways. This makes expectations endogenous and creates path dependence and learning processes that the canonical models omit because they do not lead to perfect-market conclusions. In reality, expectations and the degree of confidence investors place in them change over time in pro-cyclical patterns. The longer and more energetic the financial boom, the more optimistic expectations become and the more confidence agents place in their extrapolative expectations-formation process.

---

[13] There are models of efficient financial markets that do not assume that all agents have rational expectations, but these require yet additional unrealistic assumptions to arrive at their desired conclusion. For example, one can posit one set of irrational "noise traders" that form expectations of future security prices through extrapolation even though knowledge of the true distribution is available to them, and a second set that hold rational expectations. The argument is that the first group will make decisions that would lead to inefficient cyclically varying prices, but the second group will engage in arbitrage that forces prices to their fundamental values. (Note that in neoclassical theory there is no justification whatsoever for the introduction of irrational agents; it is completely ad hoc.) However, unless agents can borrow infinite amounts of credit at the 'risk free' interest rate' and can be assured that the fundamentals will not change over time, the first group of "noise traders" will induce rational agents to attempt to profit from trends in prices rather than eliminate them. If a rational agent knows that the fundamental value of a stock is $20, the current price is $25 and the likely price tomorrow because of noise trading is $30, she will buy the stock, accelerating its rise. A refutation of this attempt to preserve the efficiency property by assuming noise trading can be found in chapter 12 of Keynes's *General Theory*. Keynes argued that the market can remain 'irrational' longer than arbitrageurs can remain solvent.

[14] See Crotty 1994 for a detailed analysis of decision making under fundamental or Keynesian uncertainty.

Moreover, in a world of uncertainty, it is reasonable to assume that risk aversion is endogenous and varies with the cycle as well. Investors get both more optimistic and less risk averse as the boom rolls along, which causes system-wide leverage to rise and the pace of the boom to accelerate. When a crisis breaks out, pessimism sets in and risk aversion or liquidity preference spikes, causing investors to sell risky assets and rush into safe assets such as US treasury bills. This destroys liquidity in troubled markets so that assets can only be sold at a large capital loss. This accelerates the rate of price decline. That investor expectations and risk aversion in fact follow such pro-cyclical patterns is empirically demonstrated in a recent paper by two Federal Reserve economists that analyzes University of Michigan survey data (Amromin and Sharpe 2008). If expectations, risk aversion and liquidity are indeed endogenous and pro-cyclical, then mainstream theories that assume they are not will grossly underestimate the need for tight regulation. [15]

Second, mainstream methodology insists that the correct test of the usefulness of a theory is the degree to which its derived hypotheses – not its assumptions - are realistic or consistent with the data. (Why anyone would expect that hypotheses logically deduced from models with starkly unrealistic assumptions should be consistent with data describing reality remains a mystery to me.) Yet the history of empirical tests of the efficient capital market theories fails to come to a widely accepted conclusion about their compatibility with the data. If anything, these tests have been disappointing to supporters of efficient capital markets, which, according to their methodology, should have eroded confidence in the theory.[16] In a survey of empirical tests of hypotheses derived from the

[15] Some mainstream financial economists acknowledge that standard models of risk (as opposed to uncertainty) lose all explanatory power when turmoil hits markets. “The heart of the recent crisis is a rise in uncertainty – that is, a rise in unknown and immeasurable risk rather than the measurable risk that the financial sector specializes in managing.” The rise of uncertainty can in turn be explained by changing market institutions and practices: “Because of the rapid proliferation [of complex structured financial products], market participants cannot refer to a historical record to measure how these financial structures will behave during a time of stress. These two factors, complexity and lack of history, are the preconditions for rampant uncertainty” (Caballero and Krishnamurthy 2008, p. 1)

[16] Mainstream methodology rejects the use of realism of assumptions as a criterion for testing the validity of a theory. Thus, the econometric tests of derived hypotheses must carry the entire burden of defense of derived hypotheses. Since the assumption sets involved here are admittedly unrealistic, one would assume that these tests would have to pass with flying colors in order to sustain support for the theory. Yet in the case of CAPM, mediocre to disappointing empirical tests have not generated skepticism about the validity of the underlying theoretical vision. Perhaps in practice there is no conceivable set of econometrics test that could lead to rejection of the theory. In a review of the methodology of modern financial market theory,

capital asset pricing model, Fama and French 2003 conclude that "despite its seductive simplicity, the CAPM's empirical problems probably invalidate its use in applications" (p. 21).[17] These failures led to a widespread belief among financial economists that the CAPM failed because it defined risk too narrowly. This in turn generated a wealth of econometric studies of models (collectively known as arbitrage pricing models) that add numerous and sundry additional variables to the risk measure of the CAPM. Since, in contrast to the CAPM, arbitrage pricing theory does not explain precisely what these other factors might be, the entire effort smacks of data mining. Once outside the confines of the CAPM model, there is no limit to how many or what kind of variables can be used to generate acceptable econometric results.

There are weaker tests of the theory. One is investigating whether new information is quickly incorporated into existing security prices. These tests have been less disappointing. Another is testing whether institutional investors fail to outperform the market as the theory implies. This assertion has some empirical support, though it is not universally accepted.[18] But this partial empirical success comes at a high price. Since these hypotheses do not depend on the assumption of optimal pricing, but rather are consistent with *any* theory of price determination, testing fails to distinguish between efficient capital market theory and alternative financial market theories such as those created by Keynes and Minsky and Marx.[19] For example, even in a Keynesian theory of security price determination, news that some company had much higher profits than previously expected would be likely to quickly lead to a rise in its stock price. Therefore, these weak tests, like the stronger tests, provide no support for the NFA.

Given the stunning lack of realism of the assumptions of the canonical models of modern finance and the failure to find consistent empirical support for them, it is

---

Findley and Williams have argued that "in an empirical-positivist sense, at best [neoclassical financial market theory's] implications could not be rejected by the available evidence - a test which many opposing models could also pass. It was therefore contended that the basic positivist notion that 'assumptions do not matter if the model works' had been subverted into 'assumptions cannot be criticized so long as the model cannot be shown not to work.'"(1985, p. 1).

[17] They also conclude that it is not clear whether the problem lies in the empirical weakness of the assumption of the efficient use of information or of the assumed model of agent optimization, or both.

[18] For a contrarian view, see Shiller 2005.

[19] A defense of the proposition that Marx's theory of finance is compatible with those of Keynes and Minsky can be found in Crotty 1985. This empirical literature never mentions the fact that the weak tests of the theory fail to distinguish between neoclassical and Keynesian theories of financial markets in large part because their hypotheses are never compared to alternative views.

reasonable to conclude that belief in the narrative of the NFA is without solid theoretical foundation.

III.2 The NFA has widespread perverse incentives that create excessive risk, exacerbate booms and generate crises.

The NFA is riddled with perverse incentives that induce key financial firm personnel to take excessive risk in financial upturns. These individual risks build up over time, creating ever higher leverage and increasing financial fragility. The rise in systemic risk fed by these incentives throughout the 'perfect calm' helped cause the global financial crisis. *Any new regulatory system adequate to its task will have to deal with the micro problem of perverse incentives.*

The celebrated growth of securitization rained down fee income throughout the system – to mortgage brokers who sold the loans, investment bankers who packaged the loans into securities, banks and specialist institutions who serviced the securities, ratings agencies who gave them their seal of approval, and monoline insurance companies who guaranteed holders of such securities against loss through the use of credit default swaps. Since these fees do not have to be returned if the securities later suffer large losses, everyone involved had strong incentives to maximize the flow of loans through the system - whether or not they were sound. *This is the hidden downside of the new 'originate and distribute' model of banking.* Subprime mortgages were especially lucrative because they were packaged into high-yield securities in high demand from investment banks, hedge and pension funds, insurance companies and bank-created SIVs.

The main source of investment bank income has recently shifted from traditional activities such as advising on M&As and bringing IPOs to market to fee income from securitization and trading on their own account. Much of the trading is in mortgage-backed securities, which they create and both sell to others and hold in their own trading accounts. Keep in mind that giant commercial banks are components of conglomerates that include investment banks. For example, Citigroup was one of the biggest players in the mortgage securitization frenzy. The larger the investment bank, the more pronounced the strategy shift. Global M&As were worth $3.8 trillion at their peak in 2006, 11% higher than in the super year of 2000. Goldman Sachs, the number one bank in the M&A

business that year, achieved record profits from this sector in 2006. Yet an astounding 70% of Goldman's total net income came from gambling with the firm's own capital, an unprecedented dependence on this source of income (*The Economist*, "Streets ahead of the rest," December 23, 2006, p. 111). In 2006, even New York Stock Exchange brokers and dealers, a group that includes mostly small firms not involved with securitization as well as giant investment banks, made $21 billion from securities underwriting and $35 billion from trading gains (*Securities Industry Association*, Securities Industry Factbook 2007, p38). The potential risk involved in this part of the business is enormous.

The spectacular profits associated with these high risk strategies triggered equally spectacular compensation gains for the top executives, traders and other 'rainmakers' in the investment banking world. Top traders and executives receive giant bonuses in years in which risk-taking behavior generates high profits. In 2006, Goldman Sachs' bonus pool totaled $16 billion – an average bonus of $650,000 unequally distributed across Goldman's 25,000 employees.[20] Wall Street's top traders received bonuses up to $50 million that year. In spite of the investment bank disasters of the second half of 2007, the average Wall Street bonus fell only 4.7% even as the profits of all New York Stock Exchange members fell by 46%.[21] Overall, the five largest investment banks – Merrill, Goldman Sachs, Morgan Stanley, Lehman Brothers and Bear Stearns – paid out about $66 billion in compensation in 2007, including an estimated $40 billion in bonuses. Despite the profit decline, the bonus figure was higher than the $36 billion in 2006 *(Financial Times*, "Merrill vows to reform bonus," January 18, 2008). The combination of modest bonus declines and a sharp drop in profits caused bonuses as a percent of net revenue for the top seven investment banks to rise from about 45% in 2006 to over 70% in 2007 (New York State Comptroller's Office 2008).

In boom years, investment bank profits and bonuses are maximized by high leverage. Rising leverage was responsible for half the increase in return on investment bank equity in the four years ending in mid 2007. High leverage creates high risk. But since investment banking rainmakers do not have to return their bubble year bonuses

[20] In 2005, Goldman's partners alone, about 1% of the workforce, received 8% of net revenue (Folkman, Froud, Sukhdev, and Williams 2007).
[21] Investment banking bonuses are projected to decline by about 30% in 2008 (*Financial Times*, "Cost of a wrong turn," August 4, 2008).

when the inevitable crisis brought on by excessive risk taking occurs, they have a powerful incentive to continue the high-risk strategies that enriched them over the course of the boom.

The general partners in the booming hedge and private equity fund industries have similarly skewed payoff systems. They typically charge 2 percent of assets managed plus 20 percent of profits. Since high returns both raise profit and help increase the size of assets under management, there are strong reasons to take risk in pursuit of high returns in a boom. The general partners do not have to return their boom-induced fortune in the downturn. Risky strategies are especially attractive in periods when financial asset prices have been rising for some time, because the longer the boom, the more likely it becomes that investors will believe that high-returns chasing is not an excessively risky strategy. In addition, there is an incentive to take risks that are not easily observable to clients – such as in derivatives markets.[22] Keep in mind that investment banks and financial conglomerates have their own hedge and private equity funds. Goldman Sachs Asset Management was reported in 2006 to be one of the world's largest hedge funds, with about $21 billion in capital. Goldman's private equity arm is also one of the world's biggest, involved in $51 billion in private equity deals in 2006 (S&P 2006, pp. 13 and 14).

Mutual fund managers' pay also rises with the size of assets under their control, and assets are maximized in a boom by earning the high returns associated with risky investments. This is an industry susceptible to herd behavior. Contracts to manage large portfolios can be lost by a firm if its returns fall below the industry average for as little as six months. When asset bubbles take hold, institutional investors have a strong incentive to follow others in pursuit of capital gains even at the risk of absorbing losses when the bubble bursts. If many companies are making high returns by investing in bubble-driven assets with very high short-term capital gains, then even managers who are convinced the bubble will deflate in the near future must follow the herd. If they don't, they will show sub-par returns and lose business. If they follow the herd and the bubble bursts, all firms will suffer losses, so no firm will lose its competitive advantage. In their drive to meet or

[22] For example, if you sell insurance against the default of a loan through a credit default swap, the payments you receive are additions to profit, but the contingent loss should the loan default appears nowhere on the balance sheet.

exceed average industry returns, a growing number of mutual funds are investing serious money in private equity and hedge funds. Empirical evidence shows that institutional investors suffer smaller percentage losses in their client base in years in which they achieve below average returns than the percentage gains they earn in years with above average returns (Rajan 2005, p 18). This clearly motivates higher risk taking.

Pension funds and insurance companies also contributed to the buildup of risk in the system. Pension funds are driven to take excessive risk because they face rising payout demands as society moves from a preponderance of young savers to a rising percentage of older dis-savers. Required payouts are actuarially determined. If fund assets are insufficient to achieve the necessary income flows with lower-return safe investments such as Treasury or high-rated corporate bonds, pension funds must increase risk to earn higher returns. This is widely recognized in the financial press. "American pension funds have analysed their liabilities. They need more than 6% to make up the shortfalls in their funds. .. They have to roll the dice to get it" (*The Economist*, "Alpha betting" September 16, 2006, p 84). Insurance companies face similar problems, especially in periods of low interest rates that follow periods of high interest rates, such as 2001 to 2005.[23] Life insurance policies and annuities sold in a high interest era become less profitable if the returns the companies receive on their assets decline substantially over the life of the policy. Insurance companies are thus pressured to seek higher returns even at the cost of higher risk. An IMF report concludes: "To achieve returns similar to those they achieved in the past, many pension funds and insurers have had to increase their exposure to higher-yielding alternative asset classes, including private equity funds" (IMF 2007, p. 12).

Pressured to raise returns, these companies have become major investors in MBSs and CDOs, and in hedge and private equity funds. Moreover, in recent years they entered the growing credit default swap market, where they provide insurance against loan default to banks and other agents. The incidence of corporate defaults hit historic lows in the 'perfect calm,' so sellers of default insurance received an uninterrupted flow of premium payments. Since these payments constitute an addition to revenue and profit but

[23] Institutional investors' incentive to take high risk is generally strongest in periods with low interest rates. When interest rates are high, so is the opportunity cost of investing in a high risk asset instead of a low risk bond, and conversely.

do not increase balance sheet assets, they raise the return on assets and equity without raising perceived risk. It was thus quite tempting to maximize the sale of loan default insurance.[24]

Credit rating agencies that play a crucial role in the NFA 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. High ratings mean less required capital. They therefore facilitate higher leverage, higher profit and higher bonuses, but create higher risk as well. Moreover, important financial institutions are not permitted to hold assets with less than a AAA rating from one of the major rating companies.[25] The *Financial Times* reports that:

> global regulators are re-examining the degree to which their own regulatory frameworks have become dependent on credit ratings. Over the last decade, the regulators have allowed credit ratings to be used to determine the appropriate level of capital that banks need to hold. This pattern has prompted criticism that these ratings have now been "hardwired" into the system. Some observers, including the Financial Stability Forum, have indicated that the official recognition of credit ratings for a variety of securities regulatory purposes may have played a role in encouraging investors' over-reliance on ratings. (*Financial Times*, "Regulators raise fears over 'hardwired' credit ratings," June 12 2008.)

The recent global financial boom and crisis might not have occurred at all if credit rating agencies had been unwilling to give absurdly high ratings to illiquid, non-transparent, structured financial products such as MBSs, CDOs and CLOs (collateralized loan obligations).

---

[24] Long-term performance is not a dominant concern of investment banks, hedge and private equity fund managers and other institutional investors: they have short-run horizons. As a *Wall Street Journal* piece put it: "Hedge-fund managers, buyout artists and bankers get paid for short-term performance. The long-term consequences of their actions are someone else's problem" ("Sketchy loans abound," March 27, 2007, p. C1, p.11)

[25] Frank Partnoy noted how institutional investors facing regulatory constraints on risk taking used ratings agencies to allow them to buy risky high-yield complex products. He asks with reference to constant proportion debt obligations, "financial Frankensteins that the agencies flawed mathematical models said were low risk": "Does anyone believe parties paid for triple A ratings of such instruments because these ratings gave them valuable information? More likely, ratings were valuable because they permitted investors to buy something triple A that paid 20 times the spread of other triple A instruments" (Partnoy 2008).

> Had the securities initially received the risky ratings they now carry, many pension and mutual funds would have barred by their own rules from buying them. Hedge funds and other sophisticated investors might have treated them more cautiously. And some mortgage lenders might have pulled back from making the loans in the first place, without such a ready secondary market for them. (*Wall Street Journal*, "How Ratings Firms' Calls Fueled Subprime Mess," August 15, 2007)

As explained below, these immensely complex products cannot be sold on exchanges because there is no agreed upon way to evaluate their risk. Thus, demand for these products could not have developed as rapidly as it did if ratings agencies had not provided the crucial risk evaluations needed to price them. CDOs could not have been sold to institutional investors such as pension and mutual funds that were prohibited by law from holding risky securities were it not for the central regulatory role given to private credit ratings agencies in the NFA. The fact that the agencies rated 80 percent of CDO tranches AAA, and that regulators and financial analysts acted as if these ratings were as solid as the AAA ratings given to the safest corporate bonds, were necessary conditions for the recent financial boom in mortgage based securities to take place.[26]

Ratings agencies are paid by the investment bank whose product they rate. Their profits therefore depend on whether they keep banks happy.[27] In 2005, more than 40% of Moody's ratings revenue came from rating securitized debt (Knowledge@Wharton, "Regulation-induced Innovation: The Role of the Central Bank in the Subprime Crisis," July 9, 2008). If one agency gave a realistic assessment of the high risk associated with CDOs while others did not, that firm would see its profit and market share plummet. Thus, it made sense for investment banks to shop their CDOs around, looking for the agency that would give them the highest ratings, and it made sense for agencies to provide excessively optimistic ratings.[28] If ratings had been done by government

[26] The *Economist* made the following observation on the deep roots of ratings agencies in the regulatory system. "The Fed has been offering 85% of face value for AAA-rated paper presented at its discount window, even collateralized debt obligations stuffed with subprime mortgages (as long as they are not – yet – impaired). Josh Rosner, a critic of the ratings agencies, thinks it extraordinary that, despite their obvious flaws, they "continue essentially regulate the behavior of even the central bank"" ("Paper losses," August 23, 2007).

[27] "Rating services such as Moody's, Standard & Poor's and Fitch Ratings are typically paid upfront for their assessment of a bond. Later on, if the rating is downgraded, a rating service doesn't have to give back any of those fees" (*Wall Street Journal*, "Deal fees under fire amid mortgage crisis," January 17, 2008).

[28] A report by the Securities and Exchange Commission released in July 2008 concluded that "Credit rating firms put profits ahead of quality controls." "The 10-month examination uncovered poor disclosure

institutions or if agencies were paid by buyers rather than sellers of CDOs, these securities would not have grown so rapidly.

Note that ratings agency compensation practices are procyclical. In the boom, complex products get excessively optimistic ratings that reinforce the boom's momentum. But when the crisis hits, agencies are widely criticized by investors and regulators for rosy ratings that eventuate in large losses. In response, agencies drastically cut ratings, and this reinforces the dynamics of collapse.

Paul Volcker found asymmetric compensation structures to be a major flaw in the NFA.

> Perhaps most insidious of all in discouraging discipline has been pervasive compensation practices. In the name of properly aligning incentives, there are enormous rewards for successful trades and deals and for loan originators. The mantra of aligning incentives seems to be lost in the failure to impose symmetrical losses – or frequently any loss at all - when failures ensue. (Volcker 2008).

Former IMF chief economist Raghuram Rajan's overview of the risk-creating effects of the financial system's compensation structure is worth considering at length.

> The surest way to make profits in finance is to take on risk, which is why their paymasters attempt to limit the risk they take through risk management. But as the cycle grows old without risks showing up, and as the Goldman Sachs of the world make enormous profits and bonuses by taking precisely the kind of risks that the risk manager says the banker should not take, the risk manager loses credibility and power. … Moreover, there are so many ways of making money while seemingly not taking risk. For instance, a manager can enter the credit derivative market to sell guarantees against a company defaulting. Essentially, he will collect a steady premium in ordinary times from that premium income [and] will look like a genius, making money for nothing and returns for free. With very small probability, however, the company will default, forcing the guarantor to pay out a large amount. The investment managers are thus selling disaster insurance or, equivalently, taking on …"tail" risks, which produce a positive return most of the time as compensation for a rare very negative return. Indeed, this could generate similar behavior to that of the bureaucratic fund manager. I buy the AAA tranche of a CDO, not because I am confused by the rating, but because I am selling a deep, out of the money put option, which will give me a steady return most of the time, but default with serious adverse consequences occasionally. By the time it defaults, I have hopefully made my money and am enjoying my own

---

practices, a lack of policies and procedures guiding the analysis of mortgage-related debt, and insufficient attention paid to managing conflicts of interest, the report said" (*Wall Street Journal*, "SEC says Debt-Rating Firms Sacrificed Quality for Profit," July 9, 2008).

> private beach in the Bahamas. A number of managers including Stan O Neill of Merrill Lynch did generate higher returns for their firms for some time, but alas we now realize it was hidden risk. Of course, his parting compensation [of $161 million] did nothing to dissuade the rest of the flock from following his example in the future. The broader point I am making is that we need to think about incentives of financial market participants as an important factor in the current crisis. (Rajan 2008)[29]

III.3 Innovation created important financial products so complex and opaque they could not be priced correctly and therefore lost liquidity when the perfect calm ended.

Financial innovation has proceeded to the point where important structured financial products such as MBSs and CDOs are so complex and so opaque that they are *inherently* non-transparent. As such, they cannot be traded on standard competitive financial markets, but are sold instead through negotiation between the originating investment bank and a small number of customers – "over the counter" (OTC). 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 complex MBSs and derivative products created large profits at giant banks

[29] As economist Brad DeLong put it, high-risk investment strategies that fail to take in account disastrous events unlikely to happen in any given year but likely to take place at some point in the intermediate future will do better for financial rainmakers most of the time, than those that those that do take them into account. In the following quote a 'black swan' (or tail event) is a disastrous event that takes place every so often but is not easily predicted. In my view, the data suggest that events likely to send markets into a tailspin occur more frequently than DeLong suggests in his example.

> Your strategy may have, say a 25% chance of going bust in the next decade, but that's OK for a fund manager -- because a 75% chance of being lucky enough to run the table and pocket enormous sums of cash and be considered a prince of Wall St is a good bet. And then even when the black swan event does happen, you've probably already pocketed a lot of cash and you really won't be blamed anyway, since plenty of others will be in similar straits and many of your customers will accept the explanation that your strategy was perfectly sound but that nobody could have been expected to predict the financial equivalent of being struck on the head by an asteroid.… The highest rewards and the greatest glory go to those managers who bring in the highest returns during 'normal' times at the expense of leaving their funds exposed to black swans." ("Grasping Reality with Both Hands: Brad Delong's Semi-Daily Journal," August 17, 2007).

and other financial institutions, but also destroyed the transparency necessary for any semblance of market efficiency.[30]

For some time after a new derivative product is introduced, it has a niche market with high profit margins. Eventually many products become standardized and can be sold by any large bank. These 'commoditized' or 'plain vanilla' products end up being exchange traded, with transparent bid and asked prices available in real time on the Bloomberg website. Exchange traded derivatives are sold in a highly competitive market, with low profit margins. Thus, banks had a strong incentive to create products so complex that they could not be sold on exchanges at all.[31] Eighty percent of derivatives are now sold over-the-counter in non-transparent private deals. Such agreements are characterized by asymmetric information and unequal bargaining power that allows banks to generate high profit margins. Das argues that "In the OTC market, dealers…ensure that the clients do not know the true price of what is traded. *The lack of transparency lies at the heart of derivative profitability*. You deny the client access to up-to-date prices, use complicated structures that are hard for them to price, and sometimes just rely on their self-delusion" (2006, p. 126, emphasis added).[32] The need for investment banks to create ever more complex derivative products is a key driver of financial bubbles.

Consider the CDO. A mortgage backed CDO converts the cash flows from the mortgages in its domain into tranches or slices with different risk characteristics, and sells the tranches to investors. Several thousand mortgages may go into a single MBS and as

---

[30] They also made the investment banks that that originated and warehoused them non-transparent. "Bear Stearns' failure to sense the early tremors was especially glaring. In 2006, it was rated as the best risk manager among United States brokerage firms by Euromoney, a respected trade publication" (*New York Times*, "How Missed Signs Contributed to a Mortgage Meltdown," August 19, 2007).

[31] "The desire to maintain a large stable of products that are not commoditized is one reason the pace of innovation is so rapid. "The half-life of most innovation-driven [products] is just three or four years" (Bookstabber 2007, p. 251).

[32] A recent *Financial Times* article on counterparty risk in the CDS market stressed the importance of high profit margins in OTC transactions.

> One alternative at least for some of the most liquid or regularly traded types of credit derivative indices contracts could be exchange-based trading, but that would almost certainly see profit margins collapse at a time when many of the largest dealers in the market are nursing losses from the implosion of the credit bubble. Mr. Yelvington [a research analyst] says that if OTC derivatives went on to an exchange, huge amounts of bid-ask spread - the difference between the prices at which people buy and sell contracts - would dry up in a heartbeat. (*Financial Times*, A clearer picture set to emerge of state of troubled derivatives," July 31, 2008)

many as 150 MBSs can be packaged into a single CDO. A CDO squared or CDO2 is a CDO created by using other CDO tranches as collateral. A CDO3 uses tranches of CDOs and CDO2s. Higher power CDOs are particularly difficult vehicles to model due to the possible repetition of mortgage exposures in the underlying CDOs. Synthetic CDOs use credit default swaps (or other credit instruments) as their collateral.[33] In the early 2000s, synthetic CDOs became the dominant form of CDO issuance, possibly because the demand for CDOs was rising faster than the supply of mortgages.[34] A textbook on credit derivatives explains a part of the price calculation process as follows.

> The expected default payment is calculated by looking at the number of default references and loss at default for each tranche, given a certain [historical] correlation between the underlying reference assets. The correlation is mathematically handled through a Cholesky composition and the actual loss distribution is arrived at by running a number [10,000 to 100,000] of so-called Monte Carlo simulations, which generate a random number of defaults (as defined by the Merton model) in the underlying assets. (Chacko, Sjoman, Motohashi and Dessain 2006, p. 227)

The authors caution that:

> 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. (p. 226)

The risk associated with mortgage-backed CDOs cannot possibly be priced correctly because no financial firm has the time, the incentive or the ability to evaluate the risk associated with each of the tens of thousands of mortgages that may be contained in a CDO. Even if firms had such information they could not use it to model with confidence the appropriate price for the CDO under all plausible future conditions because the relation between the value of a CDO and the value of the mortgages is

[33] See Chacko, Sjoman, Motohashi and Dessain 2006 for an explanation of the intricacies of CDOs.

[34] "Between late 2003 and the middle of last year analysts estimate that between $1,000bn and $1,500bn worth of these deals were sold (*Financial Times*, "Plummeting values of synthetic CDOs demand action, August 19, 2008). The article notes that these securities may have lost 50 percent of their value in the crisis, but "The bespoke and private nature of the synthetic CDO business makes it near impossible to dig up solid figures for the asset class as a whole."

complex and nonlinear. This means that small changes in the value of mortgages may not disrupt the price of the CDO too much, but bigger changes will induce large and unpredictable movements in CDO values. The noted 'quant' Richard Bookstabber notes that many derivatives have "conditional and nonlinear payoffs. When a market dislocation arises, it is difficult to know how the prices of these instruments will react" (2007, p. 255).[35] The complexity of the relation "grows exponentially with the number of reference assets." And no one knows the true probability of possible future conditions anyway. Ratings agencies and the investment banks who create these securities cannot do due diligence on tens of thousands of mortgages. Instead, they rely on simulation models to assess the risk of CDOs and their tranches, but these models are unreliable and easily manipulated. They are 'black boxes': data is fed in and millions of lines of computer code spit out a rating.

> Black boxes…make it difficult to identify the variables that drive the rating; they stay little about the stability of such ratings; and they allow the agencies to change their methodologies without letting anyone know they have done it (they just need to modify a few lines of code). In summary, black boxes leave everyone in the dark. (*Financial Times*, How to avoid a ratings fiasco: just say NO to black boxes," July 9, 2008).[36]

In addition, because CDOs do not have a long history, there is inadequate historical data available on which to assess their current risk. It should come as no surprise that market operatives referred to the process through which investment banks and ratings agencies priced or marked CDOs as marking to 'magic' or to 'myth.'[37]

Many highly regarded financial analysts called attention to the inherent inability to price CDOs properly, but very few did so before the outbreak of crisis. Richard Bookstabber complained that:

---

[35] "Highly rated CDO tranches only run into trouble when a large number of loans start defaulting, but fail spectacularly if that happens…" (*Wall Street Journal*, "How Street Rode The Risk Ledge and Fell Over, August 7, 2007).

[36] This article was reflecting on the news that Moody's had been giving several complex derivative products excessively high ratings – "off by several notches - due to a mistake in code writing. Moody's failed to acknowledge its mistake.

[37] When they are sold, there is no dissemination of the sale price. "The asset-backed debt market has no centralized network for disclosing prices" (Bloomberg, Subprime seizure solution may be found in hospital bill," December 4, 2007). The article also quotes the owner of an investment fund on the complexity issue: "I wouldn't loan my brother money if he hands me a bag and says 'Don't look in there, but trust me, it's really valuable."

> The accelerated pace of financial innovation and the ever-proliferating complication of modern financial instruments seem to defy the ability even of the products' designers to fathom what is going on. And the new instruments are often thinly traded if at all, so values are guessed by simulation or calculation, not in the market. Sophisticated investors are left poorly informed about the risks they are baring; unsophisticated have not a clue. (Bookstabber 2007a)[38]

New York University's Nouriel Roubini considered the CDO market to be profoundly inefficient, and argued further that the narrative was totally misleading in its claim that the more complex products contributed to economic welfare.

> [S]omehow greedy and clueless investors searching for yield bought tranches of instruments – CDO or CDO cubed – that 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? And for all the talk about the benefits of financial innovation what was the social value of a CDO cubed? There was indeed zero social value in this type of financial innovation that is closer to a con game than to a financial product of any use. (Roubini 2008)

Raghuram Rajan summed the whole process up nicely.

> The original mortgage had been bundled into a pool, and then securities of different seniority sold against it, with the equity tranche bearing the first loss. This is a reasonable process, allowing risk to be split into tranches so that those with more risk appetite can hold riskier pieces. However, the financial engineers were not content to stop here. They created more complicated pools, bundling the securities sold by the mortgage pools into securities pools, and selling tranched claims against them. [A large number of] sub-prime mortgages were converted into a large number of AAA bonds and sundry lesser quality securities. Then those lesser quality securities were pooled and further securities issued against them to get more AAA bonds. Thus were born the CDO, the CDO squared and so on. Over …80 percent [were] rated AAA. What were the buyers thinking you may ask? Well, many were arm's length buyers who simply did not have the capacity to delve deeper. Moreover, many were insurance companies and pension funds that had fixed obligations. In this era of low interest rates, they were really desperate for higher risk-adjusted yields to meet their looming obligations. The highly rated tranches were exactly what they wanted, especially if the AAA tranche of the CDO paid 40 basis points above corporate AAAs. They did not investigate the details of the underlying collateral, even if they could get the information or knew how to, for the rating was guarantee enough – many

[38] Veteran financial analyst Frank Veneroso observed that "In the end the final product was unfathomable. There was no way you could look into it and assess any fundamental value. Its price depended entirely on the models and the ratings of the fee earning operators of the wondrous alchemical structured finance sausage machine" (Veneroso 2007).

investors were effectively corporate bureaucrats, and no one ever got fired for buying US AAA. (Rajan, Raghuram G. 2008."AView of the Liquidity Crisis." Speech given in Chicago (February). http://faculty.chicagogsb.edu/raghuram.rajan/research/A%20view%20of%20the%20liquidity%20crisis.pdf).

The importance of the inherent illiquidity of these products to the dynamics of modern financial markets cannot be over emphasized. They cannot and do not trade on markets.[39] Indeed, the value of securities not sold on markets may exceed the value of market-traded securities.[40] *Thus, the crucial claim in support of the NFA that deep competitive capital markets price risk optimally does not apply even in principle to more than half of today's securities by value.*

All canonical financial market models have to assume perfect liquidity - that securities can always be sold immediately at their 'fundamental' or equilibrium value. Without this assumption, the risk attached to securities is unknown – it all depends on the degree of market liquidity at the time of sale. Yet the key financial products that drove the boom and led to the crisis are structurally illiquid in the sense most agents will only buy them in a speculative bubble when expectations are high and risk aversion low because no one knows their 'correct' price. In the upswing that ended in mid 2007 market liquidity was largely provided by institutions such as hedge funds, investment banks and SIVs, entities that operated on high and rising leverage, much of it short term. But this source of liquidity was speculative, unstable and ephemeral – guaranteed to recede as soon as the bubble burst, and to evaporate completely once a crisis triggered an inevitable process of reverse leverage. In a crisis, liquidity provided this way is not like the liquidity provided by commercial banks backed by the Fed and the FDIC in the previous regulatory regime. It can evaporate in the blink of an eye. When its creditors deserted

[39] One recent development in this shift toward non-public trading is the growth of "dark pools of liquidity," the emergence of trading platforms where huge blocks of equity trades are made in private, outside the view of, and therefore the pricing dynamics in, pubic stock markets. The "point of dark pools [is] to provide anonymous block trading capabilities without impacting on the public price of a particular stock" and they are estimated to be responsible for 12% of all stock sales (*Financial Times*, "Exchanges moot greater links with dark pools of liquidity," June 24, 2008).

[40] See (*Wall Street Journal*, "US investors face an age of murky pricing, October 12, 2007). In this article, a Goldman Sachs analyst is quoted as saying that "way less than half" of all securities trade on exchanges with readily available price information. The article shows that a subset of securities that do not trade on markets (that does not include derivates) have an estimated value almost 50 percent higher than the market value of the Wilshire 5000 total market index.

Bear Stearns, the investment bank's cash holdings fell from more than $12 billion to $2 billion in a single day. Claudio Borio from the Bank for International Settlements called attention to "The wide margin of error or the uncertainty that can surround the valuations of instruments for which a liquid underlying market does not exist (or may evaporate in times of stress)" (Borio, 2008, p. 15).

Consider the following example of the process of CDO valuation in an illiquid market and compare it to the narrative's assertion that all traded securities are transparent, have a knowable fundamental value and always trade at or near that value in liquid markets.

> When Wachovia Corp. took onto its books this summer a risky slug of a CDO with a $600,000 underlying value, it initially marked the value at $297,000 to reflect the meltdown in the CDO market, according to one person familiar with the matter. When Wachovia tried to sell the position, which was difficult because of its small size, it reduced the mark even more, to $138,000, this person says. Yet in an email to a potential buyer on Sept. 5, a Wachovia salesman indicated that the bank was willing to sell the position for $30,000 -- just five cents on the dollar. "The head of the group just told me they will hit a 5 cent bid just to move it," the email said. (*Wall Street Journal*, "US investors face an age of murky pricing" October 12, 2007).

The fact that all the big players know how illiquid these markets can quickly become creates a collective action problem. John Gapper of the *Financial Times* described it this way.

> Banking in the 21st century…invites disaster for the industry as a whole because, when every bank tries to pull out of a fragile market at the same time – a phenomenon that occurs as soon as the first one breaks for the exit – some of them will get stuck. When everyone turns from buyer to seller, liquidity evaporates. This rush for the door this year left banks unable to value, let alone to trade, structured credit products. (Gapper 2007)

In the 'perfect calm,' with optimistic credit ratings provided by agencies paid to be optimistic, the yields on these mortgage-backed securities grossly under estimated the probability of capital loss. *It was the under-pricing of their risk that helped create the rising demand for these products*. Indeed, one of the most egregious flaws of modern financial market theory, and thus of the NFA, is its denial of a central fact that emerges from the study of financial cycles: risk is *always* under-priced in a bubble (as revealed by

the crisis) and *always* over-priced in heat of the crisis and its immediate aftermath (as revealed by the subsequent upswing).[41]

When the crisis hit these markets, liquidity dried up. CDOs could be sold, if at all, only at an enormous loss. Facing a wave of criticism for having led investors astray with overly optimistic rating in the boom, rating agencies belatedly slashed ratings for these products, exacerbating the problem. Since these securities were often purchased with borrowed funds, losses triggered margin calls, which forced the sale of safer assets because they were the only ones the market would accept. This spread the crisis across market segments. Since no one knew how much these assets were worth or who held them, credit dried up everywhere. Note that since banks are obligated to value their securities at their estimated current value, bank capital evaporated along with the price of these securities. In response, banks tightly restricted credit, first to non-bank investors and then to each other in the inter-bank market. This exacerbated the crisis and frightened regulators, who apparently did not fully appreciate the dangers embedded in the NFA.

III. 4 Contrary to the narrative, giant banks took on enormous risk under the NFA

III.4.1 *The narrative claim that commercial banks distributed almost all risky assets to capital markets and hedged whatever risk remained was false.*

The NFA narrative claimed that banks were no longer very risky because they sold loans to capital markets and hedged whatever risk remained through credit default swaps. Both of these crucial foundations of the narrative turned out to be false.

In 2007, The Bank of England expressed surprise at the explosive growth in the assets of giant global banks because they were supposed to be operating on the "originate and distribute" model. Rather than slim down as the narrative predicted, the *on-balance-sheet* assets of large global banks grew at about 15% per year from 2000 to 2006. The BOE estimated that on-balance-sheet assets expanded from $10 trillion in 2000 to $23

[41] There is a peculiar asymmetry related to the claim that markets always price securities correctly. Economists and Important financial market players insist that markets get prices right in the boom; therefore, 'leaning against the wind' by regulators to slow the boom is inefficient and destructive. But when the crisis comes, these same people demand that the government use aggressive monetary policy to slash interest rates to rescue large financial firms. Their justification for bailout is, in effect, that the market has priced credit incorrectly. Perhaps the appropriate claim would be that markets price securities correctly sometimes.

trillion in 2006 (BOE 2007). The regulatory regime obviously failed to constrain the sharp rise in leverage that enabled such rapid asset growth: regulatory capital expanded only by about 20% over this period: the asset to capital ratio exploded.[42] The main cause of this asset growth was the incredible rise in bank holdings of MBSs and CDOs – precisely the kinds of securities the narrative assumed would be sold to markets. CDOs were especially attractive since they could be held off-balance-sheet with no capital reserve requirements. As of May 2008, estimates of total expected bank asset losses due to writedowns of mortgage related securities across the globe ranged between $269 and $600 billion (S&P 2008, p. 1). In July 2008, the IMF estimated that global bank writedowns were already $500 billion (IMF 2008). The ultimate losses will not be determined until all these problem assets are sold or reach maturity.

Banks kept risky structured financial products such as MBSs and CDOs for four main reasons, none of which were considered in the NFA narrative. First, to convince potential investors that these securities were safe, banks often retained the riskiest part – the so-called 'toxic waste.' Raghuram Rajan, put it this way:

> Banks cannot sell all risks. They often have to bear the most complicated and volatile portion of the risks they originate, so even though some risk has been moved off bank balance sheets, balance sheets have been loaded with fresh, more complicated risks. In fact, the data suggest that despite a deepening of financial markets, banks may not be any safer than in the past. Moreover, the risk they now bear is a small (though perhaps the most volatile) tip of an iceberg of risk they have created. (2005, p. 3)

Moreover, as the *Financial Times* noted, the sale of securitized assets "does not mean the bank has shed all its risk. Usually a lender remains liable for any initial wave of losses (say, for the first 10 percent decline in a mortgage values)" (*Financial Times*, "A tale of low rates and high technology," January 15, 2007, p. 9).

[42] Many observers believe that regulators failed to adequately increase required reserves as assets skyrocketed because they believed in the narrative. "This decade has brought a move to what bankers describe as an "originate and distribute" model – meaning that although banks still tend to make (or originate) loans, these are increasingly sold (or distributed) to other capital market investors rather than retained on the banks' books. Since they have been selling these loans, regulators have assumed that the banks would be less vulnerable if loans turned bad. Thus, they have been willing to let the banks hold smaller cushions of capital relative to the volume of loans they create" (*Financial Times*, "Back on the books," September 20, 2007).

Second, given banks' incentive to generate high profits and bonuses through high risk discussed in section II.2, they purposely kept substantial shares of the riskiest products they created to maximize compensation by maximizing short-term profits.

Third, the rate of flow of these securities through banks was so great and the time lapse between the 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. According to the Securities Industry and Financial Markets Association, global CDO issuance fell from $186 billion in the first quarter of 2007 to $11 billion one year later, a collapse of 94% (SIFA website). The Bank of England estimates that the global issuance of all asset backed securities fell by about 85% from the second quarter of 2007 to the first quarter of 2008 (2008, p. 6). Thus, when demand for MBSs and CDOs literally collapsed in the crisis, banks were left holding huge amounts of mortgages and mortgage backed products they could not sell on their balance sheets. Collapsing prices of these products generated large losses for the banks.

Fourth, when banks found the safest or 'super senior' tranches of mortgage backed securities hard to sell because their yield was low, they kept them themselves. However, the crisis slashed even the prices of the 'safe' securities. In late April of 2008, Standard and Poor's estimated that "super-senior" AAA mortgage-backed CDO tranches "were likely to recover 60 percent" of their face value (*Financial Times*, "S&P delivers blow to CDOs," April 29, 2008). CDO assets that were almost all classified as level 1 assets in the regulatory schema (assets that have a clear market value) before the crisis were shifted en masse to level 3 (assets that have no market value and therefore must be valued by mathematical model) after the crisis hit. Under the BIS system, level 3 assets have much higher capital requirements than do level 1 asset. The cumulative effect of these developments was that the onset of crisis found global banks holding about $1 trillion worth of these securities.

Consider Merrill Lynch and Citigroup, the two largest underwriters of CDOs in the three years leading up to the crisis. The *Wall Street Journal* estimated that in November 2007 Citigroup had $12 billion in warehoused mortgage related securities, and $43 billion in super-senior tranches of CDOs ("Why Citi Struggles to Tally Losses," November 5, 2007). Merrill Lynch was a latecomer to the explosion of MBSs and CDOs,

but under CEO Stan O'Neill it quickly became a leader in the business. Merrill had only $3.4 billion in CDO origination in 2003, but 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. When problems began to appear in the subprime mortgage market, Merrill and most other big investment banks continued to buy all the mortgages they could to feed their profitable CDO machine in search of high bonuses.[43] In a comment that reflects both the power of perverse incentives and the destructive dimensions of financial market competition, Citigroup CEO Chuck Prince said in July 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*, "A bruising game of musical chairs," November 15, 2007).

> *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*, "The subprime mortgage crisis keeps getting worse – and claiming more victims," November 17, 2007).

The piling up of risky assets on bank balance sheets was stimulated in part by inept regulation. Under Basle I rules, capital requirements for on-balance-sheet loans were much higher than they were for assets, provided only that banks declared that these assets were being held for trading and thus would presumably not be on the books for long.[44] This provided a strong incentive for banks to create and warehouse the 80 percent of CDO tranches rated AAA. Yet the kinds of assets banks were piling up in their trading books were longer-term, illiquid, risky assets whose price could plummet in a crisis. Gillian Tett, senior capital market analyst of the *Financial Times*, explained this phenomenon as follows:

[43] Goldman Sachs made money by betting against the continuation of the housing boom.
[44] Regulators simply accepted bankers' assurance that they would not hold these assets for long. This is one of many examples of what we might call "phantom regulation."

> [While] the Basel rules require banks to hold large capital reserves against the risk of credit default in their loan book, regulators only require small buffers for assets held in the trading book if these are labeled as low-risk, according to so-called Value at Risk models. Research by supervisors suggests that the proportion of assets held in banks' trading books has risen sharply in recent years, *often to above 50 per cent of those assets*, apparently because of the favourable regulatory treatment… In April, the FSF said: "Global banks' trading assets have grown at double digit rates in recent years, and in some cases represent the majority of a bank's assets. (Tett 2008b. emphasis added).

In a follow-up piece Tett showed how reckless giant banks had become once the regulatory restraint of the Golden Age regime had eroded.

> The travails of UBS have served as a particularly painful wake-up call. UBS had quietly stockpiled tens of billions of dollars of so-called super-senior CDO tranches on its trading book, supposedly because it planned to sell these to investors (although it is unclear whether the bank expected such sales to occur.) The bank made little provision against the chance of these instruments turning sour, because the models implied a negligible risk of losses. When the price of these super-senior tranches collapsed by up to 30 per cent late last year, this created more than $10bn (£5.1bn, €6.4bn) worth of trading book losses *for which the bank had set nothing aside*… (Tett 2008c, emphasis added)

It is clear that under the NFA, regulators did little to restrain banks' reckless attitude toward risk. Tett noted that regulators looking at banks' trading books in June 2008 discovered that some banks have been exploiting so many regulatory loopholes in recent years that they got away with posting virtually no capital reserves against assets such as senior tranches of CDOs. By mid April of 2008 banks had lost roughly $230 billion dollars on their super-senior CDO holdings "either because they never sold them or because off-balance-sheet vehicles which bought a lot of this paper were forced back onto their balance sheets" (Tett 2008a). If regulators had been checking banks' trading books all along, the crisis not might have reached systemic proportions.

Claims that banks hedged most risk through credit default swaps were equally shaky. For example, UBS hedged only 2-4% of the super-senior tranches of the CDOs it held (*The Economist*, "Wealth Mismanagement," April 26, 2008, p. 91). 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 is evident that massive speculation by banks and others, not just hedging, was taking

place.[45] Reflecting on this incredible ratio of CDSs to insurable debt, Roger Altman, Deputy Secretary of the Treasury under Clinton, noted: "this growth had nothing to do with protecting against defaults. Instead, it was just betting on markets" (*Financial Times*, "Keep hold of the basic rules of finance, May 15, 2008). This is confirmed by Fitch Ratings, who report that 58% of banks that buy and sell credit derivatives acknowledged that "trading" is their "dominant" motivation for operating in this market while only 10% chose 'hedging/credit risk management." This "confirms the transition of credit derivatives from a hedging vehicle to primarily another trading asset class" (2007).

Moreover, the likelihood that a credit default swap on something like a CDO will lead to full payment in the event of a market crisis is uncertain. Large banks insured tens of billions of dollars in CDOs with monoline insurance companies, but since these insurance companies have miniscule capital relative to potential liabilities, no one knows how much – if anything - these hedges are worth to the banks. "These credit default swaps are casting a seemingly unnavigable pall over the bond insurance sector, because it is not clear whether payouts on these CDS will be very little or add up to tens of billions of dollars" (*Financial Times*, "Banks and bond insurers ponder CDS wipe-out costs," June 24, 2008). One reason the Fed felt pressured to rescue Bear Stearns was that Bear was a counter-party in a huge volume of credit default swaps.

Securitization and the rise of credit default swaps did raise big-bank profits for several years, but, contrary to the narrative, they simultaneously raised bank risk and eventually created huge losses that for some banks exceeded their cumulative gains in the boom. "Citigroup, the biggest U.S. bank by assets, lost more money than it made from financial instruments based on U.S. subprime mortgages, a senior company executive said…" (*Bloomberg*, "Citi's losses 'greatly exceeded' profits for subprime," December 4, 2007).The return on equity for the banking industry fluctuated between 12 and 15 percent from 1992-2006 in the new Golden Age of finance, but it fell to 8.2 percent in 2007 and will certainly be much lower in 2008 (S&P 2008, p. 10). From the end of 2003 to the end

[45] In August 2007 the *Financial Times* reported that "the CDS market is now 10 times larger than the tangible cash bond on which they are supposed to be based" (*Financial Times*, "Unbound," August 8, 2007). It argued that a key advantage of CDSs for investors was that "the size of the corporate bond market is limited by companies' need for funding, which in practice has been much less than the desire of investors to trade credit…" The shift of investment activity from the bond market to the CDS market and the CDS index market moved activity from regulated to unregulated, and from transparent to opaque.

of 2006, the return on assets for the 30 largest US banks averaged about 1.40 percent, far above its post WWII average. But in the third quarter of 2007, the downside of this risk appeared. The ROA fell to 0.86 percent, then collapsed to minus 0.12 percent in the fourth quarter of 2007 (*Fitch Ratings* 2008). This profit implosion reflected a global financial crisis that led banks to write down the value of their assets worldwide by a half trillion dollars by July 2008.

The collapse of the originate-and-distribute banking model raises the serious question of what new strategy banks can use to restore their profitability in the aftermath of the crisis. How will they regenerate revenues and profits now that they cannot originate and sell the structured products that drove the boom to global capital markets? Nouriel Robini stated the problem as follows.[46]

> Capital losses are one-time problems; but destruction of the income generation process is a more severe and persistent problem that will require banks and other financial institutions to rethink their overall business model of credit risk transfer. But there is no clear and sound new business model for them: going back to the old days of "originate and hold" is not fully possible while the new "originate and distribute" model has shown all of its wrong and distorted incentives, risks and systemic failures. … It is not clear if banks and other financial institutions have a better model. (Roubini 2008)

III.4.2 *In the NFA, regulators allowed giant banks to measure and manage their own risk and set their own capital requirements which, given perverse incentives, naturally led to excessive risk-taking.*

Deregulation and financial innovation have made the portfolios of the giant bank conglomerates that are at the center of the global financial system so complex that it is now impossible for anyone to make a reliable estimate of the degree of risk associated with them. In 1996 the Bank for International Settlements sanctioned the idea that, as of 1998, regulators should shift responsibility for setting limits on giant banks' risk from regulatory authorities to the banks themselves. This edict is a core component of the new Basel II regulatory regime. Banks would manage risk through a statistical exercise known as Value at Risk (VAR). Regulators "began allowing financial institutions to use their own version of [statistical] models to assess whether they were complying with rules that

[46] If key financial institutions escape serious regulation in the aftermath of the crisis, history suggests they will eventually create new products that will be the vehicle for yet another crisis.

required them to reserve a sufficient cushion of capital based on the risks they took" (Partnoy 2003, p. 265). They were, in effect, permitted to set their own capital requirements. This ceded to banks, as it had to ratings agencies, crucial aspects of regulatory power.[47]

VAR is an estimate of the highest possible loss in the value of a portfolio of financial assets and liabilities over a fixed time interval with a specific statistical confidence level. The standard exercise calculates VAR under negative conditions likely to occur only 5% of the time: all large New York investment banks used a 95% confidence interval.[48] There are three fundamental flaws in this mode of risk assessment: there is no period of historical data that can generate a reliable result; VAR assumes that the substantial negative 'shocks' to the financial system that occur every five or six years cannot possibly take place; and the assessment of asset price correlations based on historical data used in VAR calculations always becomes grossly unrealistic when a crisis breaks out.

First, a VAR calculation uses historical data to forecast future financial market performance. VAR calculations implicitly assume that financial prices are governed by risk rather than uncertainty, and is thus in principle a treacherous endeavor. VAR typically uses data for the past year or less. Suppose the financial system is in the midst of a bubble such as the stock market boom of the second half of the 1990s or the housing-based boom from 2003 to mid 2007 when the calculation is made. If data covering the past year or two are used in a maturing boom, the data will reflect the 'perfect calm' of the period – corporate profits will be high as will capital gains on securities, while defaults and asset price volatility will be low. Under these conditions, the true risk associated with boom-induced high leverage, excessively optimistic expectations and low risk aversion will be severely under estimated. The possibility of the outbreak of crisis

[47] Wray observes that the new Basel proposals allow "larger banks to adopt "internal risked-based approaches" and to rely on external ratings agencies to assess riskiness of assets. Calculated risk ratings are used, in turn, to calculated capital requirements" (Wray 2006, pp. 8 and 9).

[48] The crisis may lead to a change in the details, but not the substance of the VAR based risk management. The Basel Committee on Bank Supervision recently expressed its intent to demand VAR calculations be done at a 99.5% confidence level, and that the expected losses be estimated for a full year, rather than for the 10 day period now used. They also proposed a capital cushion for loans that considers not only default risk, as is presently done, but also risks related to ratings downgrades, price changes and market liquidity (*Financial Times*, Basel committee to tighten rules on how banks calculate risks, July 23, 2008). Keep in mind that the BIS only suggests regulatory reforms; it has no power of enforcement.

will not be considered because there are no crises in the data base. Alternatively, if the data period is extended to cover past crises, financial growth and innovation will have changed the system substantially, so the future is quite unlikely to resemble the past extrapolated. Data from many years or decades in the past will have little if any predictive power in the current system and the VAR calculation will therefore be unreliable. Thus, there is no possible historical data period that can make VAR an accurate measure of portfolio risk.

Second, VAR models assume that financial security prices are generated by a normal distribution. In other words, the procedure forces security price data to conform to a normal distribution whereas in fact they follow a "Taleb" distribution in which the preponderance of observations are 'normal' but upon occasion observations far from the mean appear – the well-known 'fat tail' phenomenon (Taleb 2007). In a normal distribution the likelihood that an observation several standard deviations beyond a 95% confidence interval will occur is infinitesimal. VAR models thus:

> cannot deal with what concerns users most, namely the rare occurrence of major market disturbances. As some risk managers have pointed out, the assumption of normal distribution of returns (no "fat tails") implies that events such as the stock market crash of 1987, the EMS debacle of 1992, or the Asian, Russian and Brazilian crises are not apprehended by such models. (Steinherr 2000, p. 114.)[49]

Yet such tail events inevitably occur from time to time, though at unpredictable intervals in unpredictable forms. In August of 2007, two large hedge funds managed by Goldman Sachs collapsed, forcing Goldman to inject $3 billion dollars into the funds. To explain why Goldman should not be held responsible for their collapse, CFO David Viniar said "We were seeing things that were 25 standard deviation moves, several days in a row" (*Financial Times*, "Goldman pays the price of being big," August 14, 2007, p.

[49] The President of the German Central Bank has stressed "the fact that financial instability is inherently non-linear. As one consequence of this non-linearity, risk factors are typically not normally distributed. Instead, their distribution is characterized by fat tails, implying that extreme values are observed more frequently than what would be predicted under the assumption of normality. Modeling non-linearity … is indispensable, given the central focus of financial stability analysis on default, contagion and spillover effects" (Weber 2008b).

25). Given a normal distribution, such an event would literally be unlikely to occur in the life span of the universe.[50] *The Economist* observed:

> The standard statistical approach to risk management is based on a "bell curve" or normal distribution, in which most results are in the middle and extremes are rare. It is the bell curve to which investors are referring when they talk about a "nine standard deviation event." But financial history is littered with bubbles and crashes, demonstrating that extreme events or so-called "fat tails" occur far more often than the bell curve predicts. In a fat-tail world it is very hard to monitor how much risk you are taking on. ("Spooking Investors," October 27, 2007.)

The use of normal distributions to estimate risk guarantees that the possibility of a serious financial crisis will not be taken into consideration, while the use of historical data from the past year or less guarantees that in a financial bubble risk estimates will be overly optimistic. *Thus, the use of VAR allows banks to minimize required capital and maximize leverage and lending capacity, which maximizes profits and bonuses in the boom even as it sows the seeds of a future crisis*. Nicholas Taleb explained that bank rainmakers want to use what they know is a fundamentally flawed risk management system in order to justify the excessive risks that enrich them in the upturn. "We have had dismal failures in quantitative finance in measuring these risks, yet people hire quants and hire risk managers simply to back up their desire to take these risks" (*Bloomberg*, "Death of VaR Evoked as Risk-Taking Vim Meets Taleb's Black Swan," Christine Harper, January 28, 2008).[51]

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. Most VAR models assume that asset prices are jointly normally distributed and that future asset price correlations will be similar to those of the recent past. However, asset price correlations change even over relatively short time periods. For example, asset prices became more positively correlated as the recent boom progressed because asset managers adopted similar strategies in search of high returns: most investors poured money into all high yield assets certified as safe by rating agencies, raising the correlation of their

[50] Taleb states that the assumption that security prices are normally distributed implies that "an episode such as the [1987] crash (more than twenty standard deviations) would take place every several billion lifetimes of the universe" (2007, p. 274).

[51] Reliance on VAR also causes investors to under estimate bank and financial sector risk, which sustains aggressive investor risk taking in the boom.

returns. "By deliberately investing in assets that have shown little correlation in the past, investors may be making these assets more correlated" (*Wall Street Journal*, "Bets for safely only left many at greater risk," March 1, 2007, p. C1).[52] More important, we know that in crises, the historical correlation matrix loses all relation to actual asset price dynamics. In market 'scares' and in crises most prices fall together as all investors run for liquidity and safety, creating a positive correlation unaccounted for in VAR calculations. An editorial in the *Financial Times* on the global asset price decline of February 27, 2007 observed: "The price of almost every risky asset fell everywhere in the world." It continued: "It is a reminder that, in a correction, and especially in a crisis, apparently unrelated assets suddenly start to do similar things: portfolios that look diversified may not be" ("A timely reminder about market risk," March 3-4, 2007, p. 6).[53]

Though the flaws of managing risk through VAR were apparent to anyone who understood the process, only a few important financial observers warned against the futility of standard risk management practices before the crisis broke out. Frank Partnoy was one. He described the problems with using VAR to measure risk as follows.

> 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)

Even New York Fed President Timothy Geithner expressed concern about these models late in the boom.

> The foundation of modern risk measurement rests on a framework that uses past returns to measure or estimate the distribution of future risk. The stability of the recent past, even if much of it proves durable, probably understates potential risk.

---

[52] For example, the correlation between hedge fund returns and returns on the S&P 500 stocks was about 30% in the boom in the second half of the 1990s, but it rose to more than 90% in the perfect calm in 2005-06 (Parenteau 2008).

[53] "In a deleveraging world, everything gets sold in the scramble for cash. Hence the waggish but prescient saying, in the last days of the bubble, that when the crunch came the only thing going up would be correlation," (*Financial Times*, "The safest form of diversification is to avoid the herd," August 25, 2008).

> The parameters used to estimate value at risk can produce large differences in predicted exposures, especially at extreme confidence intervals. Estimating the potential interactions among these exposures in conditions of stress is even harder, due to the uncertainty about the behavior of investors and other market participants and because of the potential effects of financial stress on overall economic activity (Geithner 2006)

After the crisis erupted and the failings of VAR were undeniable, everyone joined in the chorus. "Reports from the IMF, the Financial Stability Forum, the Basel Committee on Banking Supervision and other august bodies have drawn attention in the past week to the appalling risk-management by many banks before the credit crisis" **(***The Economist*, **"**Derivatives: Taming the beast," April 17, 2008). Paul Volcker 2008 noted: "Mathematical modeling, drawing strong inferences from the past, has demonstrably failed to anticipate unexpected events of potentially seismic importance." Larry Summers argued that:

> allowing institutions to determine capital levels based on risk models of their own design is tantamount to letting them set their own capital levels. We have seen institutions hurt again and again by events to which their models implied probabilities of less than one in a million. Where it is desired to impose capital requirements, this should be done in a way that can be monitored by supervisors on the basis of balance sheet data. (Summers 2008)

In sum, in the NFA neither the bank conglomerates nor those who were obligated to regulate them could reliably estimate how risky they became in their reckless pursuit of high profits in the bubble. They were allowed to self-regulate via a VAR exercise structured to produce severe underestimates of risk in the boom and thus to leave banks with inadequate capital when the inevitable crisis broke out.

III.4.3 *Regulators allowed banks to hide risk off-balance-sheet to evade capital requirements, which lowered their capital/asset ratios and increased their risk.*

In the NFA, regulators allowed banks to hold risky complex securities off their balance sheets, with no capital required to support them. Since capital had to be held against on-balance-sheet assets, the regulatory system induced banks to move as much of their assets off-balance-sheet as possible. The concept of the SIV arose in the late 1990s, "when large global banks…realized they could exploit loopholes in the Basel capital-adequacy rules if they placed assets such as mortgage backed securities, in off-balance-

sheet vehicles" (*Financial Times*, "A ray of light for shadow banking," June 18, 2008). When the demand for risky structured financial products cooled off in mid 2007, bank-created off-balance-sheet SIVs and conduits became the buyer of last resort for the ocean of new MBSs and CDOs emanating from investment banks. The SIVs were supposed to be stand-alone institutions that paid service fees to the originating banks, but to which the banks had no obligations. "The SPV is a legal entity created [by a bank] for … CDO transactions [that] is run separately with no shared management and no legal ties between it and the originating institution" (Chacko, Sjoman, Motohashi and Dessain 2006, p. 193).[54] At the end of 2007, J.P. Morgan Chase & Co. and Citigroup Inc. each had nearly $1 trillion in assets held off their books in special securitization vehicles.[55] For Citigroup this represented about half the bank's overall assets. J.P. Morgan generated nearly $3.5 billion in revenue, or about 6% of total 2007 net revenue, from administering special securitization vehicles (*Wall Street Journal*, "FASB Signals Stricter Rules For Banks' Loan Vehicles," May 2, 2008).[56]

SIVs borrowed short-term in the commercial paper market (and issued medium term notes) to finance their 'purchase' of mortgage backed securities from the originating banks. To enable this commercial paper to receive AAA ratings and thus low interest rates, the originating banks had to make commitments to provide their SIVs with lines of credit. The SIVs invested this short-term money in long-term, illiquid but highly profitable securities such as CDOs. Noriel Roubini noted that when

> this garbage of CDOs (or CDOs cubed) was not fully distributed to clueless and greedy investors banks created off-balance sheet SIVs and conduits that would buy the leftover trash that no investor wanted to touch and repackaged it into structures that were financed with the most short term ABCP; these SIVs were then blessed with credit enhancement and guarantees of liquidity lines from the banks that made them de facto on balance sheet items even if they were de jure off balance sheet; but there were extra fat fees to be made from managing this toxic SIVs and conduits and thus the fee generation machine kept on rolling. "How will financial institutions make money now that the securitization food chain is broken?" (Roubini 2008)

[54] The SPV or special purpose vehicle is the genus of which bank-created SIVs are a particular species.
[55] An article in the *Financial Times* gave a lower estimate. It claimed that SIV assets peaked at $400 B in July 2007 (*Financial Times*, "A ray of light for shadow banking," June 18, 2008).
[56] SIVs also contributed to the non-transparency of financial markets. "The largest Citigroup SIV is Centauri Corp., which has $21 billion in outstanding debt as of February 2007… There is no mention of Cenauri in it 2006 annual filing with the Securities and Exchange Commission" (*Wall Street Journal*, "Conduit risks are hovering over Citigroup," September 5, 2007).

Borrowing short to fund long-term illiquid assets without a strong capital base was a dangerous game for supposedly independent SIVs to play, and competent regulators committed to preventing excessive risk would have never sanctioned them. Indeed, several years ago a group of Spanish banks approached their central bank asking permission to set up a network of SIV's that would allow them to profit from off-balance-sheet holdings of CDO's without setting aside capital to support them. The Spanish Central Bank demanded that they post an eight percent capital charge against the SIV assets just as they would have to do if they were on balance sheet. This decision prevented the spread of SIVs to Spain (*Financial Times*, "Insight: Spain's banks weather credit crisis,**"** January 31 2008).

When problems in the housing market triggered a wave of subprime defaults, the value of MBSs and derivative assets based on mortgages collapsed, revealing to everyone the house of cards on which SIVs were built. This naturally triggered an exodus from the asset-backed commercial paper market that forced SIVs to pay off debt they had assumed would be rolled over. US asset-backed commercial paper outstanding fell from $1.2 trillion in July 2007 to $840 billion by year's end (SIFA website). Ben Bernanke explained that "As the problems with these facilities multiplied, banks came under increasing pressure to rescue the investment vehicles they sponsored--either by providing liquidity or other support or, as has become increasingly the norm, by taking the assets of the off-balance-sheet vehicles onto their own balance sheets" (Bernanke 2008). Citigroup was forced to bring about $25 billion in CDO assets onto its books by the end of February 2008, which played a part in forcing Citi to take nearly $20 billion in write-downs (*Wall Street Journal*, "Look Under the Banks' Hoods FASB to Re-Examine Whether Financing Vehicles That Added To Woes Should Stay Off Books," February 29, 2008.)[57] 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, exacerbating their shortage of capital and further restricting their ability to lend to consumers and companies (*Financial Times*, "Rule changes could hit balance sheets," July 21, 2008).[58]

[57] By July 2008 Citi's writedowns totaled $55 billion and the total writedowns for the four hardest hit banks were $167 billion (*Financial Times*, "Painful move becomes Thain's only real option," July 30, 2008).
[58] I assume that this figure includes derivatives measured in notional values.

The combination of bank write downs on assets held on balance sheet and the increase in balance sheet assets caused by shifting SIVs on balance sheet seriously eroded capital. This in turn forced banks to reduce risk by cutting lending and raising interest rates both to other financial institutions and to households and nonfinancial businesses. The resulting credit squeeze exacerbated the crisis, which in turn raised the pressure on the banks, reinforcing the downward momentum of the crisis. New York Fed President Tim Geithner described this destructive dynamic made possible by change in the role of banks celebrated in the NFA narrative.

> Banks could not fully absorb and offset the effects of the pullback in investor participation—or the "run"—on this non-bank system [of hedge funds, investment banks and SIVs], in part because they themselves had sponsored many of these off-balance-sheet vehicles. They had written very large contingent commitments to provide liquidity support to many of the funding vehicles that were under pressure. They had retained substantial economic exposure to the risk of a deterioration in house prices and to a broader economic downturn, and as a result, many suffered a sharp increase in their cost of borrowing. The funding and balance sheet pressures on banks were intensified by the rapid breakdown of securitization and structured finance markets. Banks lost the capacity to move riskier assets off their balance sheets, at the same time they had to fund, or to prepare to fund, a range of contingent commitments over an uncertain time horizon. The combined effect of these factors was a financial system vulnerable to self-reinforcing asset price and credit cycles. (Geithner 2008b)

I**II. 5 The NFA raised systemic risk.**

III.5.1 Heavy reliance on complex financial products in a tightly integrated, capital-market based global financial system created channels of contagion and raised systemic risk

The narrative claimed that in the capital-marked based NFA, complex derivatives would allow the risk associated with any primitive security to be divided into its component parts and sold to those agents best able to bear the risks involved. Adventurous but rational institutions such as hedge funds would create demand for the riskiest segments. Since markets priced risk correctly, no one would hold excessive risk, and since risk would be spread widely rather than concentrated in commercial banks as in the previous regime, systemic risk would be minimized.[59] New York Fed Chairman

[59] "Risk can be shifted to those who can bear it, and it can be widely spread among market participants…" (Brunnemeir 2008, p. 5).

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).

There are four major flaws in this argument. First, and perhaps most important, it implicitly assumes that the NFA will generate no more risk than the previous more tightly regulated bank-based regime, but only spread the given risk across more investors. Indeed, almost all arguments made by financial economists in support of the assured risk-reducing character of innovations in complex derivatives are based on the assumption that distributions of future real-sector cash flows are exogenous, unaffected by financial decisions. Transactions in perfect financial markets thus simply redistribute the fixed volatility of the cash flows among agents, they cannot reduce it. However, *the degree of risk associated with any financial regime is endogenous.* Financial booms and busts are inherent in capitalist financial markets, but some financial architectures create more volatility or risk than others. The effect of a 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. Derivatives can be used to speculate rather than hedge, and aggressive risk taking during financial expansions is hard-wired into the NFA. The evidence suggests that the NFA dramatically increased the total risk associated with the global financial system at the same time it distributed risk more widely, and the explosion of sophisticated financial engineering was a critical factor in risk creation.[60]

Second, the narrative insists that derivatives unbundle risk, dividing it into simpler segments. But in fact, sophisticated derivatives such as CDOs, whose growth helped drive the bubble, rebundle risk in the most complicated and non-transparent ways: this is what financial engineering and structured derivative products do.[61] These derivatives also add substantial ‘embedded’ leverage to the underlying or primitive products to enhance their profits. Das explains the layers of unseen leverage investment bankers added to derivative products sold to Orange County California. “Greenspan had

[60] “Observations from financial wise men notwithstanding, it is not correct that the growth of derivatives invariably reduces risk... The sudden and exponential growth in derivatives, such as CDS, promoted risk. Derivatives facilitated speculation” *(Financial Times*, “Keep hold of the basic rules of finance,” Roger Altman [deputy secretary of treasury under Clinton] May 14 2008).

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

been right – risk 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" (2006, p. 50). As shown below, leverage increased dramatically in global markets in the boom along with the supply of illiquid high-risk derivatives, and leverage is a key component of systemic risk.

Third, innovations made it possible to hedge risk, but as shown above in the case of banks, they also made it possible to engage in highly leveraged speculation. In the boom, hedging via derivatives is relatively inexpensive, but key financial institutions have risk-seeking incentives and most agents are optimistic in the boom and either believe they don't need to hedge or don't want to accept the deductions from profit full hedging would entail. "Why fund managers don't hedge liquidity risk better is no mystery. It…costs money and cuts into returns – and, of course, their fees" (*Wall Street Journal*, "Macquarie's Liquidity Risk," August 2, 2007). Conversely, after serious troubles hit financial markets, many agents would like to hedge their risk, but the cost becomes prohibitively expensive. For example, the annual cost of insuring $10 million of Bear Stearns debt for five year through credit default swaps was $40,000 in January 2007 but $240,000 in January 2008. To insure Citigroup debt against default in credit market swaps was about $15,000 in May 2007, but $190,000 in February 2008. To purchase credit-default insurance on $10M of shaky Countrywide debt in January 2008, investors had to pay $3M up front and $500,000 annually (*Wall Street Journal*, 'Default danger: protection costs worry the street," January 10, 2008). A jump in the cost of hedging may occur quickly. The cost of insuring Countrywide rose from $75,000 in early July 2007 to $230,000 a month later, to $350,000 the next day (*Wall Street Journal*, "Reversal in Fortune," August 11, 2007).

Speculation via derivatives became a common practice in large nonfinancial corporations as well, where Treasury departments were looked to as profit centers. "Treasurers argued that it was too expensive to cover risk all of the time. They would carefully time entry into and exit from hedges, all the while adding to the company's bottom line. This was the corporation as casino" (Das 2006, p. 98).

Moreover, hedging often involves sophisticated, complex, dynamic derivative trading strategies. This form of hedging relies on the existence of 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 or interest rate or volatility changes in the market, 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 a risky asset market, 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. William Gross, the chief investment officer of Pimco, the largest global fixed-income mutual fund, complained that "Our current system of levered finance and its related structures may be critically flawed. Nothing within it allows for the hedging of liquidity risk, and that is the problem at the moment" (*New York Times*, "A new kind of bank run tests old safeguards," August 10, 2007). In 'normal' times, dynamic hedging can lower risk, but under conditions of market stress, it can prove dangerous for large institutions and therefore for the entire financial system. Automated dynamic hedging systems are especially dangerous, as the fiasco with automated 'portfolio insurance' schemes demonstrated in the stock market crash of 1987.

Fourth, securitization and funding via global capital markets created channels of contagion in which a crisis originating in one product in one location (US subprime mortgages) 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 also adds to the danger that any one part of the hyper-financial system can bring down the whole. Monoline insurers exemplify this kind of reef under the water. Their capitalisation is tiny – a few tens of billion dollars in equity – yet because they act as guarantors to hundreds of billion dollars in bonds, their failure would cause losses at almost every bank and insurance company in the world (*Financial Times*, "Editorial:The start of the great unwinding,**"** January 25 2008). The quantum jump in the potential for contagion created in the NFA raised systemic risk and, ultimately, triggered a severe crisis that affected

much of the global financial system. Bookstabber noted before the recent crisis erupted that:

> The complexity at the heart of many recent market failures might have been surmountable if it were not combined with another characteristic that we have built into markets, one that is described by engineers as *tight coupling*. Tight coupling means that components of a process are critically interdependent; they are linked with little room for error or time for recalibration or adjustment. … The interplay of complexity and tight coupling that comes from combining liquidity with its derivative and leverage offspring is a formula for disaster. If all the eventualities cannot be anticipated (which is the case for complex systems) and if there is no time to rework the process (which is the implication for tight coupling), then when things go wrong a crisis will be unavoidable. Things will go bad, and when they do, they will quickly move from bad to worse before the cascade can be stopped. (2007, pp. 144-45)

When the Savings and Loan crisis hit the US in the decade after 1985, the ultimate cost, borne largely by the public, was about $200 billion, but there was no serious fallout in other national financial markets. When the crisis hit Asia in 1997-98, no serious damage was done to Western financial systems. However, the subprime mortgage crisis in the US that began in 2007 actually caused more banking losses outside the country than inside. An Institute of International Finance report stated that in 2007 and early 2008 US banks lost $166 billion in the crisis while European banks lost $200 billion. The head of the financial stability division at the French central bank observed that "The risk of subprime mortgages has been dispersed to Europe and Asia, and within the euro area, bank losses were relatively widely spread" (*Financial Times*, "European banks harder squeezed by credit crunch than US rivals," June 6, 2008).

Moreover, risk has not only risen and been spread more widely, the inherent non-transparency of complex MBSs and derivatives and the lack of serious monitoring of large financial institutions has made it impossible to tell where the risk is located, which seriously complicates lender of last resort responsibilities of central banks. As Jean-Claude Trichet, president of the European Central Bank commented: "There is now such creativity of new and very sophisticated financial instruments that we don't know where the risks are located" (*Financial Times*, 'Derivatives boom has created instability, says ECB president," January 29, 2007).

The President of the German Central Bank recently acknowledged that the NFA created the contagion that led to the crisis.

> When transferring credit risks, one must always bear in mind that the transferred risks themselves do not vanish into thin air – they are merely elsewhere and the danger remains that they could resurface, possibly even in concentrated form. It was precisely such new concentrations of risk that led to the distress in the past few months threatening the existence of a number of financial institutions which were not themselves active players in the area of real estate lending. ... In a nutshell: 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 credit excesses in the US mortgage market. These new instruments exhibited several weaknesses that seriously hampered the efficient flow of information between originators and investors. In the end, the new instruments of credit risk transfer "distributed fear instead of risks." (Weber 2008a)

The current crisis allows us to understand the good and bad news about the NFA. The bad news is that it created the worst financial crisis since the 1930s. The IMF estimates expected financial institution losses over the next two years at almost $1 trillion (*Wall Street Journal*, "IMF Urges Rethinking on Risk Management," April 9, 2008). The good news, apparently, is that capital markets have become tightly integrated and risk widely shared – but this spread the crisis everywhere.

III.5.2 The NFA facilitated the growth of dangerously high system-wide leverage.

The structural flaws in the NFA facilitated the creation of dangerous leverage throughout the financial system. Rising leverage means rising financial fragility and the increased likelihood of an outbreak of systemic crisis. The leverage problem was made evident with the 1998 collapse of Long Term Capital Management, a hedge fund that had managed to control $125 trillion in derivative products (at notional value) on a capital base of less than $5 billion. Regulators said they had to rescue LTCM to avoid a global financial meltdown. Yet the lesson of the 1998 crisis that high leverage is dangerous seemed to be quickly forgotten. *Debt issued by US financial institutions nearly doubled between 2000 and 2007* – an astonishing rate of growth. Borrowing by US financial institutions rose from 62% of GDP in 1997 to 114% of GDP at the end of 2007. In 2004, large investment banks had asset-to-equity (or leverage) ratios of 23 but by 2007 this had increased to an historic high of 30. By year's end Morgan Stanley and Bear Stearns had leverage ratio of 33 to 1. It is estimated that half of the spectacular rise in investment banking return on equity in the four years ending in mid 2007 was attributable not to

clever investment strategies, but simply to higher leverage with higher risk (*Financial Times*, "Worst period for investment banking in 30 years," April 2, 2008). Goldman Sachs used about $40 billion of equity as the foundation for $1.1 trillion of assets. At Merrill Lynch, $1 trillion of assets was backed by $30 billion of equity (*The Economist*, "What went wrong," March 19, 2008).[62] With leverage rates this high, any serious fall in asset prices can trigger a crisis.

Rising leverage was facilitated by the extraordinarily easy money policies of the Fed. To avoid a deep financial crisis following the collapse of the late 1990s stock market boom, the Fed began to cut short-term interest rates in late 2000 and continued to hold them at record lows through mid 2004. Since inflation was modest in this period, real short term interest rates were negative from mid 2001 to mid 2005. Financial firms of all kinds were thus able to borrow cheaply and use the additional funds to increase loans and generate higher profits in the boom years from 2003 to mid 2007. In the NFA, each government financial bailout leads to a bigger and more dangerous new crisis.

Noriel Roubini explained how easy – and how dangerous – it was to develop hyper leverage under the NFA.

> Today any wealthy individual can take $1 million and go to a prime broker and leverage this amount three times; then the resulting $4 million ($1 equity and $3 debt) can be invested in a fund of funds that will in turn leverage these $4 millions three or four times and invest them in a hedge fund; then the hedge fund will take these funds and leverage them three or four times and buy some very junior tranche of a CDO that is itself levered nine or ten times. At the end of this credit chain, the initial $1 million of equity becomes a $100 million investment out of which $99 million is debt (leverage) and only $1 million is equity. So we got an overall leverage ratio of 100 to 1. Then, even a small 1% fall in the price of the final investment (CDO) wipes out the initial capital and creates a chain of margin calls that unravel this debt house of cards. (Roubini 2007)

Consider the buildup to the collapse of two Bear Stearns hedge funds in the summer of 2007.

> Documents show that they were simply taking investors' money, leveraging it to the hilt, and then buying complex bonds called collateralized debt obligations, or CDOs, that were backed by subprime and other mortgages. … The funds' voracious buying of lightly traded bonds drove down their yields, meaning

[62] The risk involved in operating with such high leverage ratios was heightened by the fact that modern investment banks rely heavily on overnight borrowing on the repo market.

> [Manager Ralph] Cioffi's team had to buy more and more of them to boost returns. That meant more borrowing. Banks such as Merrill Lynch, Goldman Sachs, Bank of America, and JPMorgan Chase lent the funds at least $14 billion all told. Cioffi also used a type of short-term debt to borrow billions more; in some cases he managed to buy $60 worth of securities for every $1 of investors' money (*Business Week*, "Bear Stearn's bad bet," October 13, 2007).[63]

Commercial banks appeared to be adequately capitalized during the boom, but only because a high percent of their assets – for some more than half – was kept off-balance-sheet. In fact, they were dangerously leveraged. A respected association of international accountants estimated that off-balance-sheet accounting "allowed trillions in assets to escape close scrutiny" (*Financial Times*, "Off-balance sheet rules for banks 'irretrievably broken' say experts," April 10, 2008, p. 15). If these assets had been kept on balance sheet, the excessive leverage would have been evident. When the crisis hit, the value of these assets, and therefore of bank capital, plummeted, causing a frantic global search for new capital.

The rise in leverage helped push the size of financial markets to unsustainable heights relative to the real economy. It made the financial system itself exceptionally fragile. This systemic fragility caused the decline in security prices brought on by the onset of crisis to trigger a de-leveraging process in which liquidity – the ability to sell a financial asset quickly with little if any capital loss - disappeared. "Liquidity is fragile, i.e, it can suddenly evaporate. Relatively small shocks, or instigators, can trigger liquidity spirals, causing liquidity to dry up suddenly and carrying the potential for a full-blown financial crisis" (Brunnermeier 2008, p. 21).Asset price declines led to margin calls, which led to forced assets sales and more margin calls in a dangerous downward spiral. "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*, "How reverse leverage in structured financial instruments works," July 29 2007). The BIS's Claudio Borrio explained that "The turmoil represented a sharp repricing of risk that, given the leverage built up in the system, led to, and was exacerbated by, an

[63] Cioffi would later be charged by federal authorities with lying to investors about the precariousness of Bear Stearn's financial situation.

evaporation of liquidity in many markets, including in the interbank markets" (Borrio 2008, p. 9). New York Fed Chairman Timothy Geithner expressed concern about the destructive power of reverse leverage in May 2007:

> Over the past 25 years or so, we have seen a significant number of episodes of financial shocks, in U.S. markets and globally. Although more different than similar in their nature and impact, they had some common features. They were unanticipated… And they typically involved the dynamic in which a sharp change in risk perception results in a fall in asset prices … 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 2008a).

A serious develeraging process will freeze credit markets. Financial institutions will be less willing to take the additional risks associated with new loans, and interest rates on bonds will rise as forced sales lower bond prices. The rising cost of capital to shaky financial institutions means that whatever loans they are willing to make will have high interest rates attached. Since the modern nonfinancial business and household sectors run on credit, the shrinking availability and rising cost of borrowing will eventually create a slowdown in economic growth. This is turn, will lead to lower profits and higher defaults on both business and household loans, which will aggravate the financial crisis and accelerate develeraging dynamics. The precise character of the crisis will depend on conditions in both sectors. The quarter century deregulation process along with the rapid pace of financial innovation and the moral hazard caused by past government bailouts created the conditions that spawned the recent financial boom that in turn created this potentially devastating crisis. Central banks and other regulatory bodies will be forced to take whatever interventions are required to stop the financial and possible economic collapse - no matter how high the cost. The dynamic of deregulation leading to financial booms that eventuate in crises that lead to bailouts and thus to yet larger booms rolls on.

The Fed tried to unlock frozen markets by extending massive loans to commercial banks, and, for the first time since the Great Depression, to investment banks as well. The Fed exchanged US Treasuries for shaky mortgage-related securities in such large quantities that the proportion of its assets invested in government bonds fell from 91% in August 2007 to 52% one year later (*The Economist*, "Mission creep at the Fed," August

9, 2008). In addition, the Federal Home Loan Bank increased its loans to banks by almost $300 billion between June 2007 and June 2008, a rise of 43%. In the Bear Stearns rescue, the Fed in effect bought $29 billion worth of devalued securities from the failing investment bank. The near collapse of Fannie May and Freddie Mac, two Government Sponsored Enterprises that own or insure almost $5 trillion in mortgages (and made their top executives fabulously rich by investing in shaky mortgage-backed securities in the boom) led to a government promise to rescue them as well, including a commitment to buy their stock if necessary. In July 2008 the Congressional Budget Office estimated that this rescue could easily cost the taxpayer $25 billion, with a five percent chance of a loss of $100 billion. These desperate actions were motivated by a perceived need to stop the dangerous de-leveraging process from causing a systemic breakdown. It is quite likely that the cost of the bailouts will continue to rise and the form of bailouts will continue to break with precedent (in a process we might think of as induced regulatory innovation) as the crisis deepens.

IV. Conclusion

The NFA was created in response to the financial market troubles of the late 1970s and early 1980s. The emergence of this regime was made possible by the rise of right-wing governments and free market ideology in the US and UK in that period. Deregulation allowed financial assets to grow more rapidly than the real sector in the US starting in the early 1980s, a process accelerated by the stock market boom in the second half of the 1990s, the mortgage-housing boom that began in the late 1990s, and the rapid pace of financial innovation in the past decade. Following a recovery from the chaos of the 1980s, financial sector profits relative to GDP grew rapidly from the early 1990s through the end of the decade, then took off after 2002. From 1.5% in 1994, this ratio grew to 2% by 2000 and 3.7% by 2006 –at which point they constituted 40% of corporate profit.[64]

The NFA thus facilitated a tremendous increase in the size of financial markets and the profits of financial agents, but the structural flaws that made such growth possible

[64] See Crotty 2007 for an explanation why financial profits were so high in an era believed to be one of ferocious competition.

also helped drive this process beyond safe boundaries, leading time and again to serious financial crises in both developed and developing countries. Reinhart and Rogoff 2008 show that while there were very few banking crises in the Golden Age, the number of countries that experienced banking crisis exploded under the NFA. Alan Blinder, former vice chairman of the Federal Reserve said of the NFA: "It's a failure at a lot of levels. It's hard to find a piece of the system that actually worked well in the lead-up to the bust" (Blinder 2008). Horst Kohler, former head of the International Monetary Fund, recently compared bankers with alchemists, arguing that they are responsible for the "massive destruction of assets."

> The only good thing about this crisis is that it has made clear to any thinking, responsible person in the sector that international financial markets have developed into a monster that must be put back in its place. We need more severe and efficient regulation, higher capital requirements to underpin financial trades, more transparency and a global institution to independently oversee the stability of the international financial system. (*Financial Times*, "Köhler attacks markets 'monster,'" May 14 2008.)

The NFA is so dangerous that it cannot reproduce itself over time without frequent government bailouts. But after every such 'rescue,' financial markets become larger, more complex, more opaque, and more highly leveraged. Thus, every rescue eventually leads to the need for yet larger and more aggressive future bailouts because the potential cost of nonintervention keeps rising along with the size and influence of financial markets. Meanwhile, the deleterious effects of this bloated and inefficient system - such as slower real sector growth, greater financial market volatility and rapidly rising economic and, therefore, political inequality - keep getting worse. As the recent crisis showed, this ratcheting secular process calls not only for larger state rescue operations, but more complex and creative interventions as well. The *Financial Times* chief capital markets editor Gillian Tett summarized the situation neatly: "Welcome to one of the most pernicious problems now haunting [financial] markets – namely the utter inadequacy of modern regulatory structures to cope with the shape of 21st-century finance" (Tett 2007).

Echoing Kohler's call for a qualitative change in regulation to once again create effective social control over financial markets, Crotty and Epstein 2008 suggest a serious

program of regulatory reform designed to eliminate precisely those structural flaws that created the crisis. But thus far at least, regulators have proposed only mild palliatives clearly incapable of correcting the deep structural flaws in the NFA. Largely reflecting the interests of large financial institutions and the global rentier class, regulators have yet to demonstrate a willingness to meet the challenge posed by the new era of Finance Capital that has arisen under the auspices of the NFA. Radical regulatory reform adequate to its difficult task requires two substantial changes: 1) a qualitative change in the vector of political forces impinging on the 'what should we do about reforming financial markets' political debate that can help end the domination of the lords of finance on this issue; and 2) rejection of the theory of efficient capital markets that helped create and sustain the NFA, and reliance instead on the time-tested, realistic theory of financial markets developed by Keynes and extended by Minsky. We are not likely to achieve the first unless we achieve the second.

REFERENCES

Amromin, Gene and Steven Sharpe (2008) "Expectations of Risk and Return Among Household Investors: Are Their Sharpe Ratios Countercyclical?," Board of Governors of the Federal Reserve System, *Finance and Economics Discussion Series* 2008-17, April.

Baker, Dean (2008) "The housing bubble and the financial crisis," *Center for Economic and Policy Research.*

Bank of England (2008) "Financial Stability Report," April.

Beaver, William (1981) "Market Efficiency," *The Accounting Review*, Vol. LVI, No 1, January, pp. 23-37.

Bernanke, Ben (2008) "Financial Markets, the Economic Outlook, and Monetary Policy," January 10, 2008 – speech.

Blinder, Alan (2008) "What Created This Monster?," *New York Times*, March 23.

Bookstabber, Richard (2007a) "The next financial crisis starts here," *Financial Times*, August 23.

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

Borio, Claudio (2008) *Bank of International Settlements*, Working Paper 251, March.

Brunnermeier, Markus 2008 "Deciphering the 2007-08 Liquidity and Credit Crunch," *Journal of Economic Perspectives*, forthcoming.

Caballero, Ricardo and Arvind Krishnamurthy 2008 "Musical chairs: a comment on the credit crisis," Banque de France, *Financial Stability Review*, No. 11, February.

Caprio, Gerard and Daniela Klingebeil (2003) "Episodes of Systemic and Borderline Financial Crises," World Bank, January.

Chacko, George, Anders Sjoman, Hideto Motohashi, and Vincent Dessain (2006) Credit Derivatives (Philadelphia: Wharton School).

Crotty, James (1985) "The Centrality of Money, Credit and Financial Intermediation in Marx's Crisis Theory." In S. Resnick and R. Wolff, eds., Rethinking Marxism: Essays in Honor of Harry Magdoff and Paul Sweezy. New York: Autonomedia, pp. 45-82.

Crotty, James (1994) "Are Keynesian Uncertainty and Macrotheory Incompatible? Conventional Decision Making, Institutional Structures and Conditional Stability in

Keynesian Macromodels." In G. Dymski and R. Pollin, eds., New Perspectives in Monetary Macroeconomics: Explorations in the Tradition of Hyman Minsky. Ann Arbor: Univ. of Michigan Press, pp. 105-142.

Crotty, James (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 website, April.

Crotty, James and Gerald Epstein (2008) "The Costs and Contradiction of the Lender-of-Last Resort Function in Contemporary Capitalism: The Sub-Prime Crisis of 2007-2008," Political Economy Research Institute website.

Davis, S (2003) Investment Banking: Addressing the Management Issues (New York: Palgrave).

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

DeLong, Brad (2007) "Grasping Reality with Both Hands: Brad Delong's Semi-Daily Journal," August 17).

Dymski, Gary (2007) "From Financial Exploitation to Global Banking Instability: Two Overlooked Roots of the Subprime Crisis," unpublished.

Financial Stability Forum (2008) "Interim Report to the G7 Finance Ministers and Central Bank Governors," February 5.

Findley, M.C. and E.E. Williams (1985) "A Post Keynesian View of Modern Financial Economics: In Search of Alternative Paradigms," *Journal of Business and Finance*, 12 (1), Spring.

Fitch Ratings (2007) "CDx Survey: Market Volumes Continue Growing while New Concerns Emerge," July 16.

Fitch Ratings (2008) "U.S. Banking Quarterly Review – 1Q08," May 14.

Folkman, Peter, and Julie Froud, Johal Sukhdev and Karel Williams (2007) "Working for themselves?: Capital market intermediaries and present day capitalism," *Business History*, 49 (4), pp. 552-572.

Gapper, John (2007) "A bruising game of musical chairs," *Financial Times*, November 15.

Geithner, Timothy (2006) "Hedge funds and derivatives and their implications for the financial system," New York Federal Reserve Bank website, September 15.

Geithner, Timothy (2008a) “Comments by New York Fed President Timothy Geithner,” *Wall Street Journal*, May 30).

Geithner, Timothy (2008b) “Reducing Systemic Risk in a Dynamic Financial System,” Remarks at The Economic Club of New York, New York City; June 9.

International Monetary Fund (2007) “Global Financial Stability Report,” April.

International Monetary Fund (2008) “Global Financial Stability Report Market Update,” July.

New York State Comptrollers Office (2008) “Dinapoli: Wall Street bonuses slip from 2006 record,” February 7.

Minton, B, Stulz, R. and Williamson, R. (2006) "How Much do Banks use Credit Derivatives to Reduce Risk?" AFA 2007 Chicago Meetings Paper Available at SSRN: http://ssrn.com/abstract=785364, June.

Parenteau, Rob (2008) “MacroStrategy Edge,” July 4, proprietary.

Partnoy, Frank (2003) Infectious Greed (New York: Times Books).

Partnoy, Frank (2008) “Do Away with ratings-based rules,” *Financial Times*, July 9.

Rajan, Raghuram (2005) “Has Financial Development Made the World Riskier?,” *NBER Working Paper* No. W11728.

Rajan, Raghuram (2008) “A View of the Liquidity Crisis,” Speech given in Chicago, http://faculty.chicagogsb.edu/raghuram.rajan/research/A%20view%20of%20the%20liquidity%20crisis.pdf, February.

Reinhart, C. and K. Rogoff (2008) “Is the 2007 U.S. Sub-Prime Financial Crisis So Different? An International Historical Comparison,” http://www.economics.harvard.edu/faculty/rogoff/files/Is_The_US_Subprime_Crisis_So_Different.pdf, February.

Roubini, Nouriel (2007) “Credit market turmoil: non-priceable Knightian “uncertainty” rather than priceable market “risk”,” http://www.rgemonitor.com/blog/roubini/210688, August 15.

Roubini, Nouriel (2008) “How will financial institutions make money now that the securitization food chain is broken?,” http://www.rgemonitor.com/blog/roubini/, May 19.

Russell, Ellen (2008) New Deal Banking Reforms and Keynesian Welfare State Capitalism (New York: Routledge).

Sharpe, William (1964) "Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk," *The Journal of Finance*, Vol. XIX, No. 3, September, pp. 425-442.

Standard and Poor's 2006 *Industry Surveys: Banking.*

Standard and Poor's 2008 *Industry Surveys: Banking*," June 5.

Shiller, Robert (2005) Irrational Exuberance (New York: Doubleday).

Steinherr, Alfred. (2000) Derivatives: The Wild Beast of Finance (New York: Wiley).

Summers, Larry (2008) "Six principles for a new regulatory order," *Financial Times*, June 1.

Soros, George (2008) "The worst market crisis in 60 years," *Financial Times*, January 23.

Taleb, Nassim (2007) The Black Swan: The Theory of the Highly Improbable (New York: Random House.

Tett, Gillian (2007) "Market Squeeze no regulator has the ability to resolve," Financial Times, September 14.

Tett, Gillian (2008a) 'Super-senior' CDO investors flex their muscles," *Financial Times*, April 14.

Tett, Gillian (2008b) "Plan to make complex debt more expensive," *Financial Times*, June 1.

Tett, Gillain (2008c) "Battered banks face regulators' harder line on trading books," *Financial Times*, June 3.

Veneroso, Frank (2007) "Why Are The Emerging Losses So Large?," November 6, proprietary.

Volcker, Paul (2008) Speech to the Economic Club of New York April 8.

Weber, Axel (2008a) Speech at the London School of Economics, London, June 6.

Weber, Axel (2008b) "Financial markets and monetary policy," Speech at the University of Constance, July 25.

Wray, Randall (2006) "Can Basel II Enhance Financial Stability?: A Pessimistic View," Public Policy Brief No. 84, Levy Economics Institute.

Wray, Randall (2007) "Lessons from the Subprime Meltdown," *Levy Institute Working Paper* No. 522, December.

Yellen, Janet (2008) FRBSF *Economic Letter*, "The Financial Markets, Housing, and the Economy," April 18.