

# Fall of the Titans, a Study of the Financial Behemoths that Crumbled in 2008

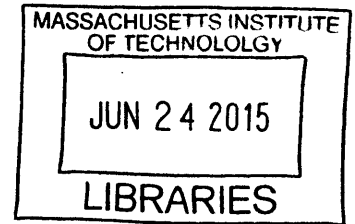
By

**Abhimanyu Chaudhry**

B.Tech. Electrical and Electronics Engineering  
Guru Gobind Singh Indraprastha University, 2008

Post Graduate Diploma in Management  
Management Development Institute, 2010

**ARCHIVES**



SUBMITTED TO THE MIT SLOAN SCHOOL OF MANAGEMENT IN PARTIAL  
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE IN MANAGEMENT STUDIES  
AT THE  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

JUNE 2015

©2015 Abhimanyu Chaudhry. All rights reserved.

The author hereby grants to MIT permission to reproduce  
and to distribute publicly paper and electronic  
copies of this thesis document in whole or in part  
in any medium now known or hereafter created.

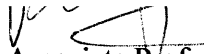
Signature of Author:

**Signature redacted**

MIT Sloan School of Management  
May 8, 2015


Certified by:

**Signature redacted**

  
Rajkamal Iyer  
Associate Professor of Finance  
Thesis Supervisor

Accepted by:

**Signature redacted**

  
Michael A. Cusumano  
SMR Distinguished Professor of Management  
Program Director, M.S. in Management Studies Program  
MIT Sloan School of Management

# **Fall of the Titans, a Study of the Financial Behemoths that Crumbled in 2008**

By

**Abhimanyu Chaudhry**

Submitted to MIT Sloan School of Management  
on May 8, 2015 in Partial Fulfillment of the  
requirements for the Degree of Master of Science in  
Management Studies.

## **ABSTRACT**

At the heart of the global financial crisis of 2008-09 crisis were the American real estate market, age old financial institutions, and their greed. This study goes back to that tumultuous period of 2007-2009, when some of the world's biggest names in finance, the players that were considered "too big to fail", failed.

Through careful studies of international and American economics, politics and society, the first part of this thesis chronicles the events and factors that led to a crisis of such gargantuan proportions.

In the second part, we take a closer look at Lehman Brothers, a 150-year old institution that symbolized American capitalism at one time, crumbled because of its own greed. We study how excessive exposure to the mortgage market, sinister accounting, flawed risk management and failed corporate governance led this mammoth to its ultimate demise.

And in the final part, we see the measures that are absolutely essential to ensure that the world does not have to witness a repeat of the financial crisis of 2008. We study the policy actions undertaken by the US government to keep a close watch on financial institutions and to safeguard the economy from another such catastrophe.

**Thesis Supervisor:** Rajkamal Iyer  
**Title:** Associate Professor of Finance

*To my advisor Prof. Rajkamal Iyer for his invaluable guidance.*

*To the scores of investment bankers who shared their stories with me.*

*To the extremely helpful staff at Dewey Library (Massachusetts Institute of Technology) and Baker Library (Harvard Business School)*

*And finally, to my parents Manoj and Preeti and my little brother Shantanu for their endless support and encouragement.*

## Table of Contents

1. Introduction	7
2. Unraveling the Crash	9
2.1 The Credit Bubble	9
2.1.1 Global capital flows	10
2.1.2 Monetary Policy	11
2.1.3 The Risk-Return Mismatch	13
2.2 The Housing Bubble	13
2.2.1 Freddie and Fannie	14
2.2.2 The Governmental Push	15
2.2.3 The Genesis of the Bubble	16
2.3 The Role of the Central Bank	19
2.4 Toxic Financial Assets	21
2.4.1 Asset Backed Securities – the Basics	21
2.4.2 The Evolution of Mortgage Backed Securities and Pass-Through	22
2.4.3 Private Label MBS	24
2.5 The Bane of Financial Modeling	24
2.5.1 Securitization and Tranching	25
2.5.2 The US MBS Market	27
2.5.3 Credit Derivatives	33
2.6 When Genius Failed	34
2.6.1 Systemic Failures	35
3. Anatomy of a Disaster: The Fall of Lehman Brothers	36
3.1 From Humble Beginnings to a Financial Behemoth	36
3.2 Balance Sheet Management through Repo 105 Transactions	39
3.2.1 Accounting Treatment for Repo Transactions	40
3.2.2 Lehman’s Accounting Wizardry	42
3.2.3 Legal Treatment of Repo 105	45
3.3 Risk Management and Product Control	45
3.3.1 Shift from Moving to Storage – Change in Business Strategy	46
3.3.2 Growth in the Face of Crisis	49
3.4 Valuation of Assets	50
3.4.1 Wall Street loses confidence	50
3.4.2 Bad valuation shoos away investors and bidders	52
3.5 Corporate Governance	52
3.5.1 Board of Directors	53
3.5.2 Audit Committee	54
3.5.3 Finance and Risk Committee	55
3.6 The Disadvantage of Not Failing First	56
3.6.1 Bad Timing	57
3.6.2 Moral Hazard	58
3.6.3 Legal Issues	58
4. Lessons from Lehman	59
4.1 Capital Adequacy	59

4.1.1 Capital Requirement	59
4.1.2 Leverage Ratio	60
4.1.3 Liquidity Coverage Ratio	60
4.1.4 Net Stable Funding Ratio	61
4.2 Financial Stability	61
4.3 Orderly Liquidation	62
4.4 Board Oversight	62
4.5 Compensation Schemes	63
Bibliography	69

## List of figures

Figure 2.1 Growth of Current Account to GDP of China and Saudi Arabia (1995 – 2008)	10
Figure 2.2 United States capital flows (1995 - 2008)	11
Figure 2.3 United States benchmark interest rates (1995 - 2008)	12
Figure 2.4 US Fed Funds Rate vs. US New Home Sales (1975 - 2008)	13
Figure 2.5 Case Shiller Home Prices Index (2000 - 2008)	16
Figure 2.6 Genesis of the housing bubble	17
Figure 2.7 Vicious circle of Solvency and Liquidity risks	20
Figure 2.8 Outline of a basic ABS structure	22
Figure 2.9 Outline of a basic Mortgage Pass-Through structure	23
Figure 2.10 A plain CDO	26
Figure 2.11 Waterfall structure of a basic three tranche CDO	27
Figure 2.12 Typical MBS with senior-subordinate structure	30
Figure 3.1 An ordinary repo transaction	41
Figure 3.2 Lehman's Typical Execution of a Repo 105 Transaction	43
Figure 3.3 Lehman's Repo 105 usage	44
Figure 3.4 Lehman Brothers Risk Appetite and Limit Usage	48

## List of tables

Table 2-1 US debt outstanding, by instrument (2000 - 2006)	14
Table 2-2 Differences between classic mortgage, basic ABS, and MPT Security	24
Table 2-3 Description of Residential MBS categories	29
Table 2-4 Performance indicators for ABS tranches	32
Table 3-1 Lehman Brothers Risk Appetite Limit Allocation	47
Table 3-2 Comparison of financial positions of Bear Stearns and Lehman Brothers	57

## List of exhibits

Exhibit 1 Lehman Brothers Stock Price Jan 2, 2008 - September 15, 2008	64
Exhibit 2 Accounting for Transfers and Servicing of Financial Assets: SFAS 140 Paragraph 9	65
Exhibit 3 Circumvention of legal issues around Repo 105 (Valukas 2010)	65
Exhibit 4 Matthew Lee's Whistleblower Letter	66

# 1. Introduction

October 6, 2008 at 2:37 pm, standing in front of the House Committee of Government Reform, Richard S. Fuld (Chairman and CEO, Lehman Brothers Holdings Inc.) said in a sad, dejected, emotional voice, *“I do not know why we were the only one...I must tell you...we walked into that weekend firmly believing that we were going to do a transaction. I believe that Lehman and Merrill Lynch were in the same position on Friday night.... that transaction, though awfully close, never got consummated. My employees, my shareholders, my clients, have taken a huge amount of pain.”* He pauses, maybe a little fed up with the aggressive questions. *“And again, not that anybody on this committee cares about this, but I wake up every single night thinking, ‘what could I have done differently? What could I have said? What should I have done?’ And I have searched myself every single night. And I come back to this: at the time I made those decisions, I made those decisions with the information I had. I can look at you and say, this is a pain that will stay with me the rest of my life, regardless of what comes out of this committee, and regardless of what the record-book will say when it’s finally written.”* A lot of analysis had been done before that day, and a lot of analysis has been done since, but these few lines sum up Fuld’s feelings of sadness and dejection, his remorse over what happened, and his utter bafflement about how a 150 year old institution could crumble in a matter of months. (Moore 2008)

As an Investment Banking enthusiast, and someone who grew up with a dream of making a career with one of these banks, I have been studying with great interest about what went so horribly wrong in 2007-08, that financial mammoths like Lehman Brothers, Bear Sterns, Merrill Lynch and AIG attained (or almost reached) the proverbial extinction. This thesis is another attempt to peel the wounds and dig deeper to see what caused the biggest dent in global capitalism.

In the pages that follow, I have attempted to answer three burning questions:

- **What went wrong in 2007-08?**

The causes and the genesis of the crash – from the economic boom in developing economies to the rise in the US housing markets and the socio-political causes behind the same, from the innovations in financial modeling to the accumulation of risky toxic financial assets.

- **How could a 150-year old behemoth like Lehman Brothers fail?**

A brief history of Lehman Brothers followed by what exactly went wrong with the fourth largest investment bank in the United States. In this section, I have conducted a detailed study of the murky accounting practices, flawed risk management, questionable asset valuations and failed corporate governance structure. The later part of this section explores the hypothesis that Bear Stearns was at an advantage by failing first.

- **What needs to be done to prevent a repeat of this crisis?**

In a conclusion to this scary tale of the global financial meltdown, we shall look at the policy measures that governments, regulators or even financial institutions have taken or should take to prevent another financial crisis from happening.



## **2. Unraveling the Crash**

The global financial crisis which began with a fall in housing prices in a few American states and went on to become a global phenomenon was not an overnight event. It was a complex series of events marked by considerable variations in inter-country and intra-country bank performance. The root of the crisis also lied in the fact that banking systems in some of the biggest economies of the world were highly exposed to what in retrospect were extremely fragile investments in securitized credit instruments. It was an utter failure, not only of the risk management frameworks of the banking system, but also of firm level corporate governance, market level credit rating infrastructure and regulatory frameworks at the country level. According to estimates by International Monetary Fund economist Oliver Blanchard in 2009, the total losses during the crisis exceeded over \$4,700 billion (Blanchard 2009). In the United States and the United Kingdom alone, the taxpayer support to the banking system amounted to more than 80% of the GDP. (Blanchard 2009)

So the question on everybody's mind is that if this was a crash of such epic proportions, then why didn't anybody see it coming? Why didn't the regulators, politicians or economists do anything to prevent it? How were over 60,000 "structured instruments" awarded the coveted AAA rating when only a handful of corporate debts are considered equally safe? (Lawson 2009) Why were banking institutions allowed to keep their leverage ratios at 30:1 when this meant that a mere 3% dip in the collateral or underlying asset would push them to insolvency? (Stiglitz 2009) How was it that a Californian farm worker earning just \$15,000 a year was given a home loan to the tune of \$650,000 without even paying a deposit? But to be fair, it is easier to ask these questions with the benefit of hindsight. If we are to probe why it is that nobody saw the crisis coming, we need to understand the genesis of the problem. We need to see how the financial system works (or worked in those days) and the effect it had on the society.

Let us examine the different aspects of the financial system that went wrong.

### **2.1 The Credit Bubble**

The deepest roots of the financial crisis can be found in the credit bubble in the United States and Europe. By the turn of the millennium, the credit spreads had narrowed significantly, thereby decreasing the cost of borrowing to finance risky investments.

Out of these risky investments, the ones that had the highest impact were the high-risk mortgages. The US housing bubble, as we will see in the next section, was the most visible and the most disastrous effect of the credit bubble. However, it was not the only one. Commercial real estate, high-yield debt, and leveraged loans were also deeply affected by the huge inflow of cheap credit. Let us look at this growth of inexpensive credit from different aspects.

**2.1.1 Global capital flows**

By the end of the 20<sup>th</sup> century, China, India, the major oil producing countries, and other large developing countries were witnessing a sharp growth in their economies. As these economies grew, their savings grew as well. On the other hand, large oil producing countries received a boost in their national incomes, thanks to the high global oil prices. As a result, all these countries accumulated large capital surpluses and the United States (and Europe) seemed to be a lucrative investment option (Hennessey, Holtz-Eakin and Thomas 2010). Figure 2.1 depicts the sharp growth of Current Account to GDP for China and Saudi Arabia during this period. This sparked off a tremendous amount of capital inflow into the United States (as depicted in figure 2.1), making borrowing inexpensive. As expected, the American population and businesses used the cheap credit to make riskier investments. A similar trend was followed in Europe. While Germany earned and saved, its investments flowed into countries like Portugal, Spain, Ireland and Italy. Steady and large increases in capital inflows into the U.S. and EU economies encouraged significant increases in domestic lending, especially in high-risk mortgages. (Rajan 2010)

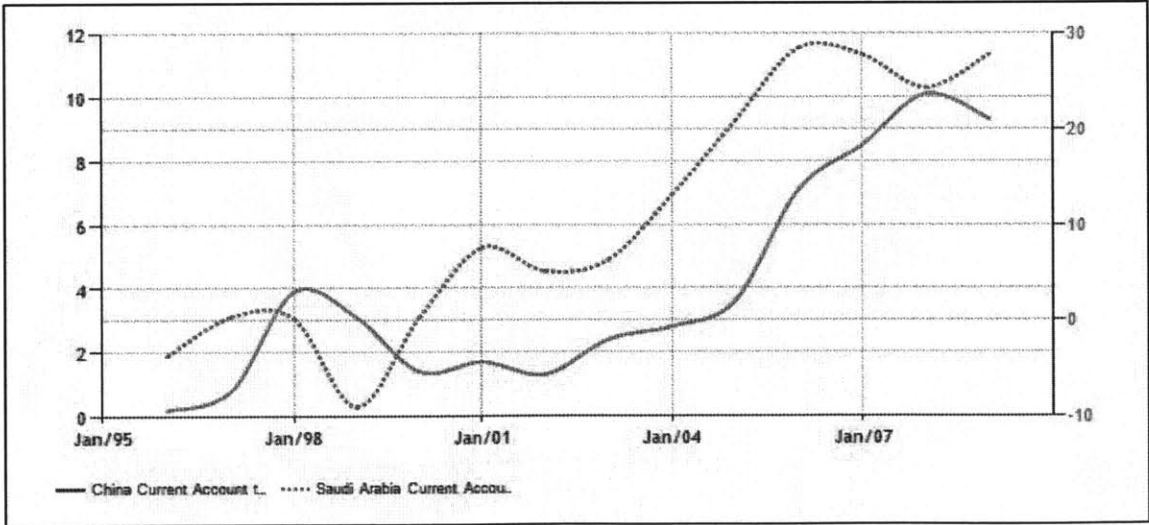


Figure 2.1 Growth of Current Account to GDP of China and Saudi Arabia (1995 – 2008)

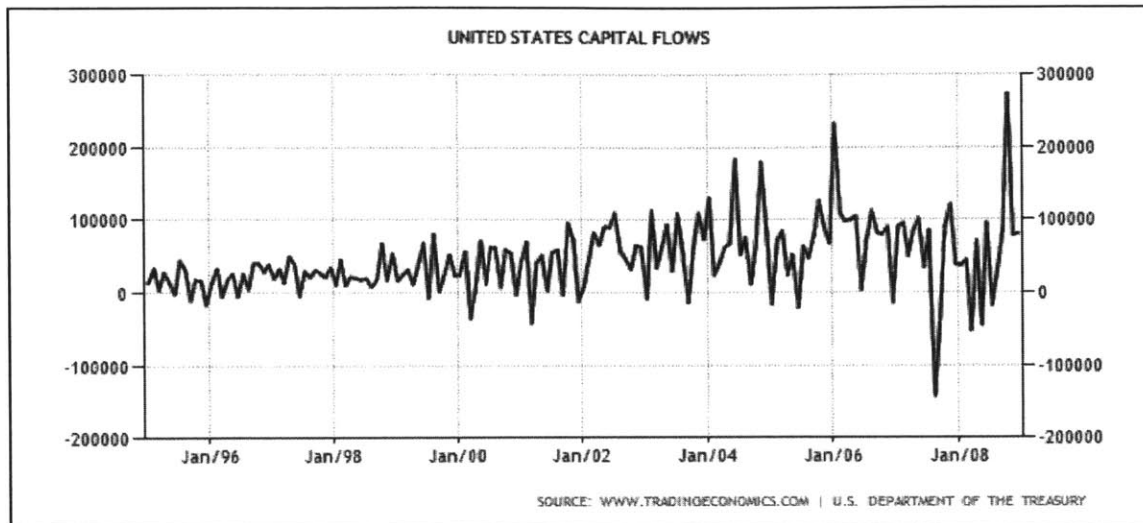


Figure 2.2 United States capital flows (1995 - 2008)

### 2.1.2 Monetary Policy

Monetary Policy is the process by which Central Banks ensure economic growth and stability. The Central Banks influence demand in the economy by controlling the supply of money and altering interest rates. Ideally, if the inflation rate rises too fast, that means that the demand is at a high level. The Central Bank, in such a case, raises interest rates, which limits the supply of money in the market and thus controls inflation. On the other hand, if the economy is witnessing sluggish growth, then the Central Banks lower interest rates so that individuals and businesses have easier access to money, which can be invested in the economy.

On September 9, 2001, the United States suffered the biggest terrorist attack in its history. This was followed by a period of panic and confusion in the markets. Corporations were wary in investing in businesses and the US economy was on the brink of a slowdown. The then Federal Reserve Chairman, Alan Greenspan initiated a spate of interest rate cuts to boost the economy. Figure 2.3 depicts the fall in benchmark interest rates from 2001 to 2005.

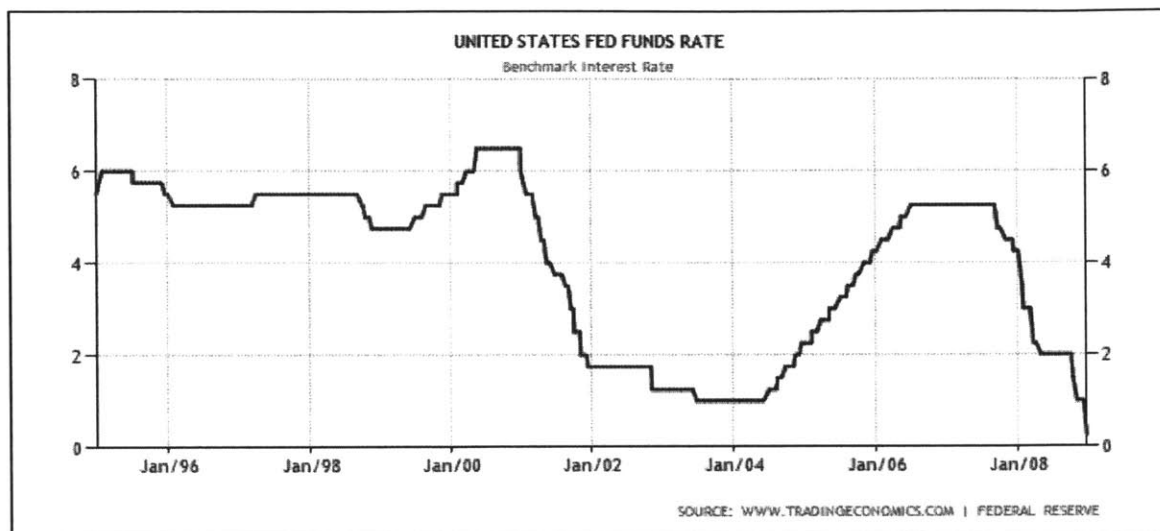


Figure 2.3 United States benchmark interest rates (1995 - 2008)

This has led to a school of thought that argues that the Fed contributed to the increased demand for risky investments by keeping interest rates too low for too long. Critics of the Fed's policy argue that, starting from Greenspan's tenure and continuing under Bernanke's tenure, the prolonged lowering of interest rates led to low mortgage rates and ultimately resulted in the housing bubble.

However, both Greenspan and Bernanke argue that there is little connection (if any) between short-term interest rates and house prices. The fact that the Fed's target for overnight lending between banks was too low does not necessarily mean that the rates on thirty-year mortgages would also be low. (Hennessey, Holtz-Eakin and Thomas 2010)

This is an endless debate. Loose monetary policy does not necessarily lead to smaller credit spreads. But there is certainly a correlation between short-term interest rates and house price appreciation. Figure 2.4 depicts this correlation from as early as 1975. We can see that a drop in the Fed rate has been accompanied by a rise in new home sales.

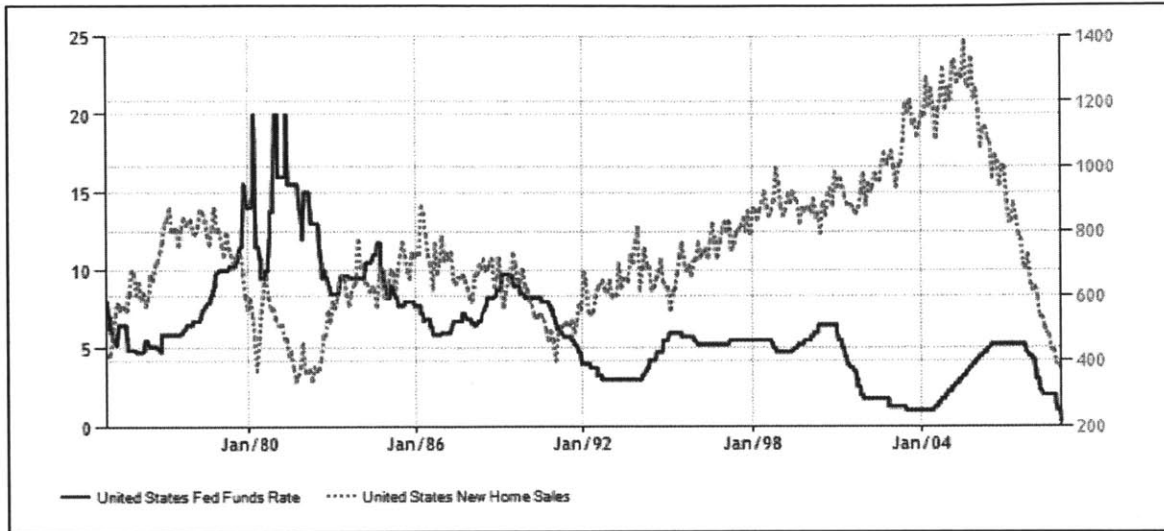


Figure 2.4 US Fed Funds Rate vs. US New Home Sales (1975 - 2008)

### 2.1.3 The Risk-Return Mismatch

It is true that low-cost capital can lead to an increase in risky investments, but that is not necessary. We cannot, with absolute certainty, blame collective irrational behavior of investors for the credit bubble. However, there is a possibility that rational investors might have been willing to accept lower returns for high risk investments thinking that it was how the market had evolved. These investors might have adopted a mob or bubble mentality, which led them to assume that, a higher price for risky assets can be justified if those assets can be sold later for an even higher price. Moreover, increasing economic growth in both (Blanchard 2009) the developing and developed economies might have fortified their expectations of a stronger and safer economic scenario.

A combination of these reasons resulted in a increase in the investors' willingness to pay more for risky assets in the years leading up to the crisis, and ultimately led to a bubble.

## 2.2 The Housing Bubble

No matter how much critics might deny it, the housing bubble was the center point of the crash. As we saw above, the drop in Fed rates led to a pumping of liquidity into the market. Even

though it did not have a direct impact on the mortgage rates, the liquidity inflows certainly made the American population feel a lot richer and made luxury houses seem a lot more affordable.

Though the drop in Fed rates caused a jump in all American debt instruments, but the size and speed at which the US mortgage market grew was unsurpassed by any other debt instrument. Table 2.2 shows the size of the US debt market by instrument from 2000 to 2006. The CAGR of residential and commercial mortgage debt outstanding was 11.6%, amounting to a whopping \$10.7 trillion by the end of 2006. (Chang, et al. 2013) The credit losses from mortgages were much greater than any other form of debt, amounting to 71% of the \$1.4 trillion total losses estimated. (International Monetary Fund 2008)

	<b>2000 Q1</b>	<b>2006 Q4</b>	<b>CAGR</b>
Res. Mortgage	5,518	10,655	11.60%
Consumer	1,554	2,418	7.70%
Municipal	1,462	2,403	8.60%
Treasury	3,626	4,862	5.00%
Corporate (non-fin)	4,410	5,976	5.20%

Table 2-1 US debt outstanding, by instrument (2000 - 2006)

(Chang, et al. 2013)

### **2.2.1 Freddie and Fannie**

Freddie Mac and Fannie Mae were inarguably the most peculiar, yet the most important players in the whole game. They were popularly known as Government Sponsored Enterprises (GSEs) and had government benefits and public duties. However, private shareholders owned them. Set up to support the American housing market, they enjoyed a line of credit from the US Treasury and had state appointees on their boards. They bought mortgages that conformed to their credit quality standards from banks. This allowed banks to issue more mortgages in the markets. Freddie and Fannie then packaged these mortgages together into tranches and issued mortgage backed securities in the markets. Because they themselves were not banks, Freddie and Fannie could enjoy much lower capital adequacy requirements as compared to a bank, allowing them to take more leverage.

### **2.2.2 The Governmental Push**

However, the root of the problem did not lie in the interest rates, but in the government policies on homeownership (Rajan 2010). In early 1990s, a majority of Americans faced the problem of stagnant or declining incomes. Income inequality was at an all time high. (Piketty and Saez 2001) Clearly this was a direct consequence of the long awaited education reform. However, the policymakers during the time opted for quick-fire solutions and increasing homeownership through affordable housing for lower income groups was the lowest hanging fruit (Green and Wachter 2005). This also led to Freddie and Fannie becoming increasingly more important. In 1992, the US Congress passed the Federal Housing Enterprise Safety and Soundness Act, paving the way for increased homeownership for lower-income and minority groups. The Department of Housing and Urban Development (HUD) was instructed to develop affordable housing goals for the agencies and to monitor the progress of these goals. (Rajan 2010) Initially, given the risky nature of these home loans, Freddie and Fannie were not really keen to back them. However, looking at the political backing, they complied and took on significant risks. The Clinton administration also increased the funding required by agencies to foster low-income housing, indirectly coaxing these agencies to take higher risk. In fact, the mandate for low income lending, which was 42% in 1995 had gone up to 50% by the end of the Clinton administration in 2000.

Such was the push on the financial sector to find ways to assist people who could not afford a home, that in 1995, in a strategy document of increasing homeownership, President Clinton wrote, “For many potential home buyers, the lack of cash available to accumulate the required down payment and closing costs is a major impediment to buying a home. Other households do not have sufficient available income to make the monthly payments on mortgages financed at the market rates for standard loan terms. Financing strategies, fueled by the creativity and resources of the private and public sectors, should address both of these financial barriers to homeownership.” (National Home Ownership Strategy 1995) In addition to this, Clinton also gave more teeth to the Community Reinvestment Act (CRA) of 1977, which required banks to lend in their local areas, especially to lower income and minority groups.

President Bush added some more fuel to the fire. In a speech to the HUD in 2002, he said, “I believe owning something is a part of the American Dream, as well. I believe when somebody owns their own home, they're realizing the American Dream. They can say it's my home, it's nobody else's home. And we saw that yesterday in Atlanta, when we went to the new homes of the new homeowners. And I saw with pride firsthand, the man say, welcome to my home. He didn't say, welcome to government's home; he didn't say, welcome to my neighbor's home; he

said, welcome to my home. I own the home, and you're welcome to come in the home, and I appreciate it. He was a proud man. He was proud that he owns the property. And I was proud for him. And I want that pride to extend all throughout our country.” (Remarks by the President on Homeownership 2002) The Bush administration increased the lending mandate for low-income segments from 50% (during the Clinton administration) to 56% in 2004.

The problem was not only in the assumption of these risks, but also in their recognition. Many of the loans (to lower-income groups) on the books of Freddie and Fannie were not recognized as subprime loans. For example, Freddie and Fannie recognized a loan as subprime only if the loan originator was a specialist in subprime loans. Thus, several risky loans managed to stay under the radar of subprime lending. However they were still as risky (in some cases even riskier) than the usual subprime loans. (Rajan 2010)

### 2.2.3 The Genesis of the Bubble

Though it became a national phenomenon, at the epicenter of the housing bubble were the “Sand States” of California, Arizona, Nevada and Florida. Figure 2.5 depicts the S&P/Case Shiller 20-City Composite Home Price Index plotted against the home price indices for Las Vegas (Nevada), Los Angeles (California), Phoenix (Arizona) and Miami (Florida).

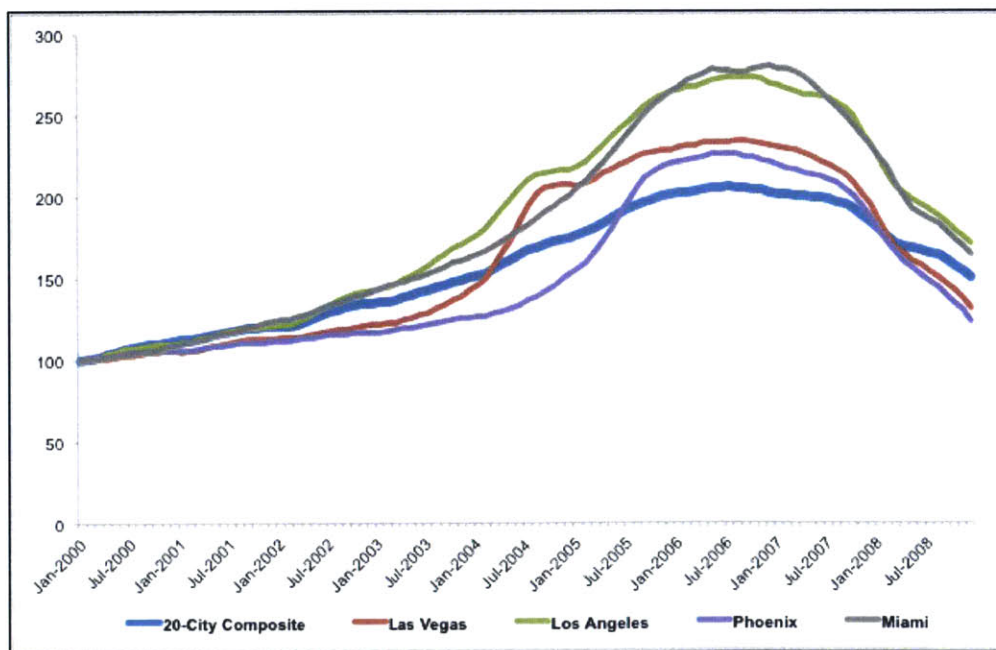


Figure 2.5 Case Shiller Home Prices Index (2000 - 2008)



As we can see, the US average home prices rose by more than 200% of their 2000 levels, but came down sharply to about 170% by mid 2008. Also, as far as the biggest (and most prime real estate) cities in the Sand States were concerned, the home prices had risen much higher than the national average by 2006, but plunged much further.

Figure 2.6 depicts the genesis of the housing bubble, explained as follows.

- The population growth in some of the American states, especially the “Sand States” was way higher than the US national average. This had a direct implication on the demand for houses. As demand increased, so did the prices.
- As explained above, due to a variety of reasons, the mortgage rates in the United States had gone down, making it easier for potential home-buyers to borrow more money and buy bigger homes. This was instrumental in driving up the demand for houses.
- In a classic example of a bubble creation, a rise in prices of houses led to the expectation that the prices might go up even further, inciting a sense of panic and urgency in the minds of potential homebuyers. This increased the demand for houses and further increased the prices.
- In some states, land use restrictions and zoning laws created barriers to building new houses. This thinned the supply of houses and increased the prices.

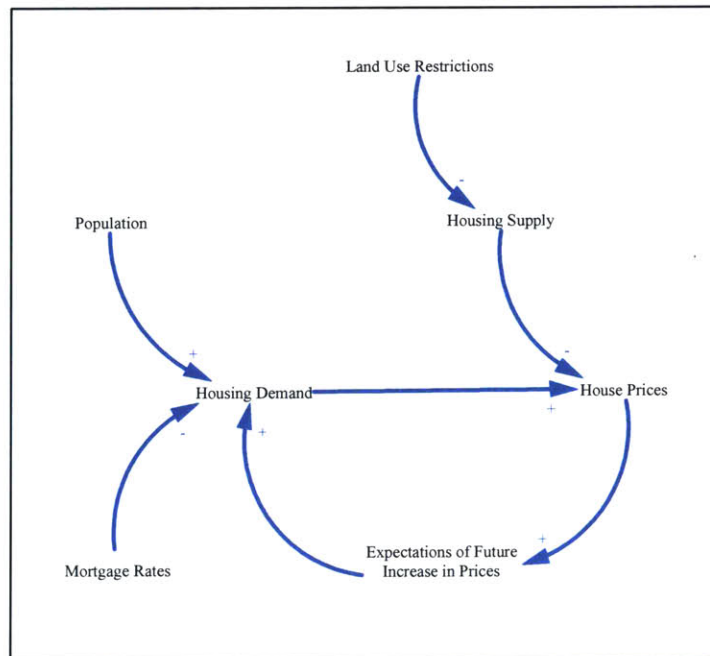


Figure 2.6 Genesis of the housing bubble

Innovation in the structure of mortgages was also one of the factors that were instrumental in the creation of the housing bubble. Adjustable rate mortgages (ARMs) or teaser rate mortgages gave the borrowers the freedom of paying smaller monthly payments earlier in the tenure. These monthly payments started skyrocketing after a couple of years, forcing the borrowers to either refinance or default on their loans.

As Fed Chairman Ben Bernanke put it, “At some point, both lenders and borrowers became convinced that house prices would only go up. Borrowers chose, and were extended, mortgages that they could not be expected to service in the longer term. They were provided these loans on the expectation that accumulating home equity would soon allow refinancing into more sustainable mortgages. For a time, rising house prices became a self-fulfilling prophecy, but ultimately, further appreciation could not be sustained and house prices collapsed.” (Bernanke, Monetary Policy and the Housing Bubble 2010)

In addition to this, mortgage sales agents and brokers had origination targets and were paid for new originations but did not ultimately bear the losses on poorly performing mortgages. Thus there was no incentive for them to conduct thorough scrutiny of the borrowers. (Murphy 2009)

Moreover, many borrowers did not understand the terms of their mortgage. They could not foresee the risk that home values could fall abruptly and significantly. This ignorance, coupled with easily available mortgage led them to believe that they could borrow too much and buy bigger houses than they could ever reasonably expect to afford. However, this does not imply that the borrowers were all innocent. We notice a lot of criminal or at least borderline behavior by some of the borrowers. (Murphy 2009)

- **Misrepresentation:** As the documentation requirements on these loans were minimal, borrowers were encouraged to overstate their annual incomes. This phenomenon increased to such an extent that stated income loans came to be known as “liar loans”. Also, some construction loans were misrepresented as completed property loans, and some buy-to-let loans as owner-occupied house loans, in order to get favorable mortgage rates.
- **Multiple mortgages:** Many borrowers applied for several second mortgages on the same house simultaneously. In some cases, second mortgage was used as a tool for raising cheap cash for small business ventures.
- **Buyer-seller collusion:** In a lot of cases, it was noticed that the seller or appraiser overstated the value of the property, allowing the borrower to get a larger loan on the

property. The loan amount was then split with the seller or appraiser. If the borrower defaulted, the bank or lender was left with a property whose book value was a lot more than its fair value.

It can be easily concluded that irresponsible subprime lending was both the cause and the effect of the housing price bubble. But was it enough to bring down the entire financial system? Let's find out in the next sections.

### **2.3 The Role of the Central Bank**

It is popular knowledge that a financial institution fails because of one of these two reasons:

- Liquidity Crisis – when a financial institution is unable to roll its funding
- Solvency Crisis – when a financial institution loses too much money

If we examine closely, we notice that these two are always intertwined and end up having a cause-and-effect relationship. Let's take a simple example. If too many loans made by a financial institution (bank) default, or if the assets held by the bank have decreased in value, then the bank's credit quality decreases. The bank has become less safe because its capability to absorb further risk has decreased. This affects investors' willingness to provide funding to it, and results in a dip in its credit rating. Thus, the cost of borrowing increases thereby reducing the bank's profitability. The bank might find itself in a struggle to build its capital. If loss of confidence in the market coincides with the bank's need to borrow, then the bank might find itself unable to roll its liabilities.

At this point, the only way for the bank to raise money is by selling assets. However, in order to do that, the assets must be liquid, which in crisis situation, may not be possible. In such situations, when the bank is highly leveraged and is facing too much funding liquidity risk, it is forced to sell its assets at whatever price it is getting from the market. In a crisis situation, there are many forced sellers in the market and not many buyers, initiating a vicious circle of selling – losses – illiquidity – selling. Figure 2.7 depicts this vicious circle. (Murphy 2009)

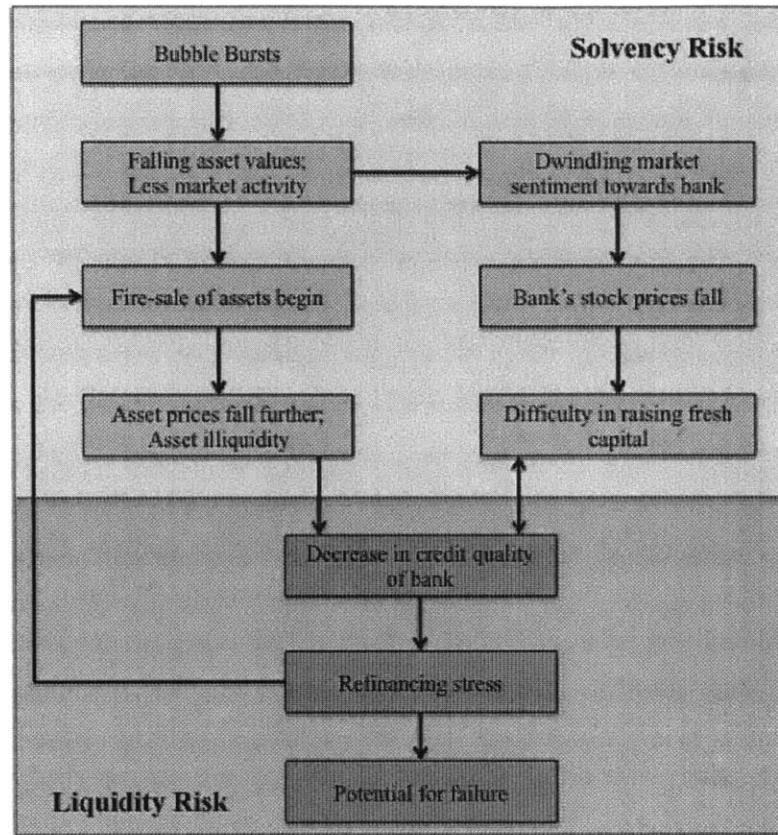


Figure 2.7 Vicious circle of Solvency and Liquidity risks

The role of a central bank is to ensure sustainable economic growth and financial stability. In order to achieve financial stability, the central bank has to take care of a variety of aspects:

- Safety of deposits
- Prevention and localization of failures
- Availability of credit
- Stable financial markets

It is the central bank's responsibility to ensure demand in the economy. The central bank does this by controlling the supply of money and/or altering interest rates to vary the demand for money. Another important responsibility that the central bank bears is that of the "lender of last resort". It is extremely important for governments to prevent banks from failing. Therefore, central banks do not allow firms with significant systemic risk to go bankrupt. They arrange for the firms to be taken over and inject additional funds to ensure the continuity of such firms.

## **2.4 Toxic Financial Assets**

At the very heart of a financial system lie two models – the banking model and the capital markets model. In the banking model, the bank accepts deposits and pays interest on these deposits, and uses the deposits to fund loans and earn interest. In the capital markets model, a corporation or an entity issues securities in the form of shares, bonds, etc in the capital markets and raises money from investors, while the investors get whatever has been promised by the entity (voting rights, ownership, etc) in lieu of their investment. While the banking model governed the first part of the meltdown, the second part belonged to its capital markets counterpart.

### **2.4.1 Asset Backed Securities – the Basics**

The concept of asset backed securities (ABS) makes the centerfold of the capital markets part of the financial meltdown. Before moving any further, let us try to understand how these securities were structured. It all starts with an originator who has a collection of assets, which pay cash at regular and predictable intervals. These assets may be a portfolio of mortgages, personal loans or corporate loans. The originator sets up a Special Purpose Vehicle (SPV), which buys these assets. In order to get money to buy the assets, the SPV issues tradable instruments in the capital markets. These tradable instruments comprise primarily of bonds and a little bit of equity. Let us assume the SPV issues \$90 of bonds and \$10 of equity to buy a pool of \$100 worth of mortgages. The bonds in this case are known as Asset Backed Securities, as their repayment is backed by the assets (mortgages in this case), and the assurance that the losses on the mortgage pool will not be in excess of \$10. Since in a normal flourishing economy, the loss rate on a safe pool of mortgages is not more than 5%, the investors are very keen to invest in these ABS's even though the credit spreads are not large. The originator is happy because he gets cheap funding for his assets.

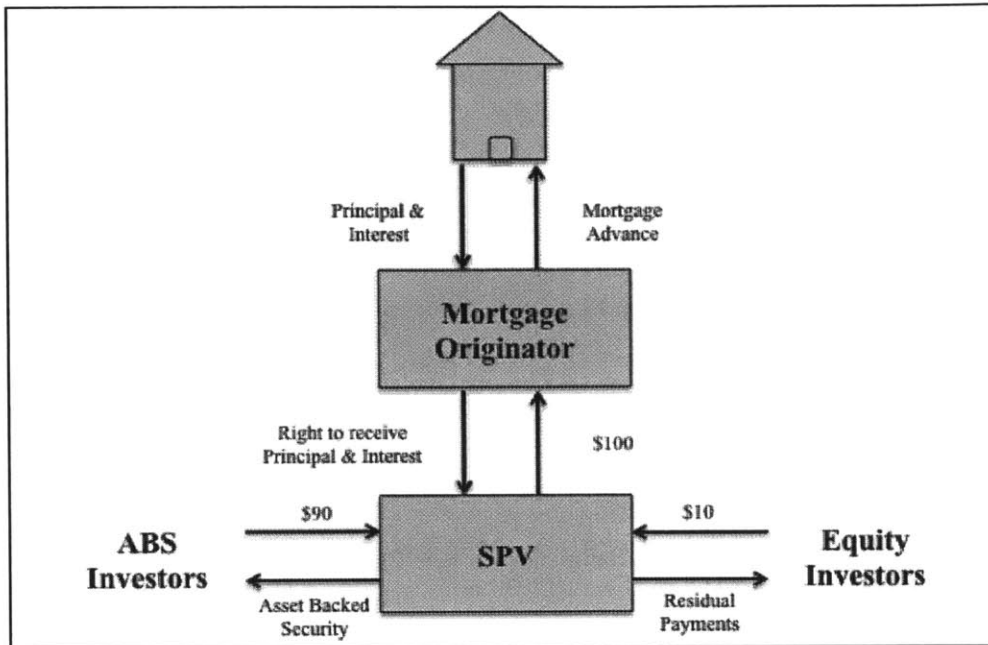


Figure 2.8 Outline of a basic ABS structure

#### 2.4.2 The Evolution of Mortgage Backed Securities and Pass-Through

As described before, Freddie and Fannie used to guarantee the mortgages, charging a sufficient fee to cover defaults and to pay back the shareholders. However, with the evolution of the ABS market, Freddie and Fannie started buying mortgages, keeping some of them with themselves while securitizing and selling the rest into the secondary market. In order to fund this buying, they issued bonds, and since they were government backed agencies, their bonds were treated by the markets as government securities. Therefore, Freddie and Fannie were able to raise debt capital very cheaply. However, thanks to the prepayment risk in mortgages, this model was very questionable.

- If Freddie and Fannie issued long-term bonds and the interest rates dipped, then a lot of mortgage customers would have prepaid their mortgages. But Freddie and Fannie would still have to pay interest on the long-term bonds.
- If Freddie and Fannie issued short term bonds and the interest rates rose, then the mortgages wouldn't have prepaid so fast, leaving Freddie and Fannie cash strapped for paying interest on their bonds. (Murphy 2009)

In order to solve this issue, Freddie and Fannie came up with a new type of ABS. In the original model, the SPV used to assume both the prepayment risk and the default risk on the mortgages. However, through the new model, Freddie and Fannie passed on all the prepayment risk to the investors, while keeping the default risk with themselves, therefore guaranteeing the performance of the mortgages. A mortgage backed security, without the default risk, was extremely attractive to investors. This form of ABS was called “Pass-Through”. The monthly mortgage payments collected were divided among three entities as described in the figure below. (Murphy 2009)

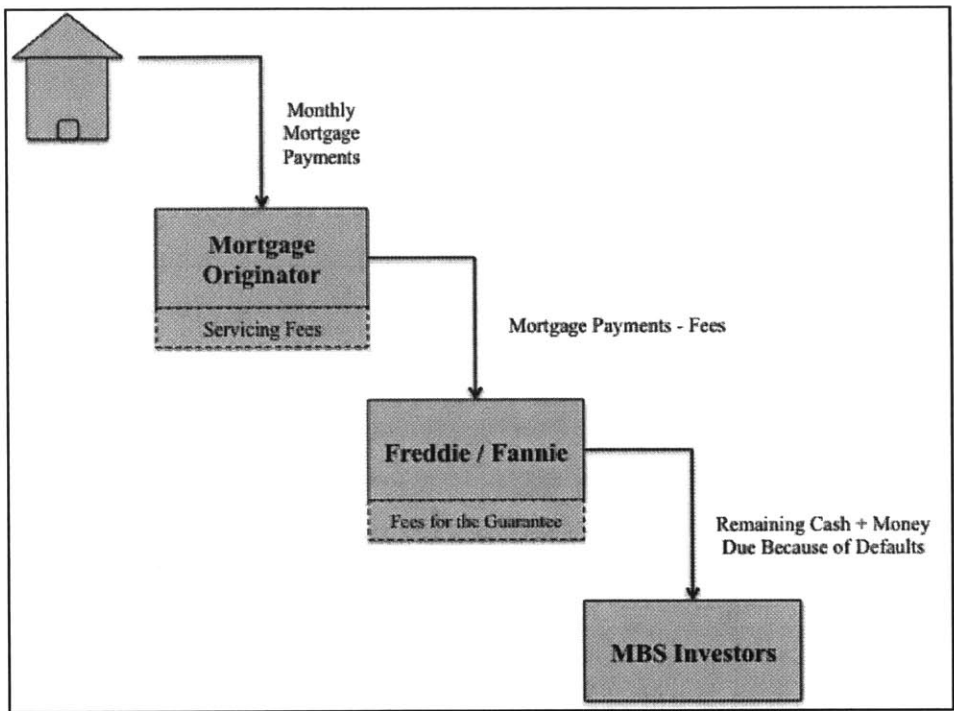


Figure 2.9 Outline of a basic Mortgage Pass-Through structure

Therefore, in this model, the MBS investors receive most of the principal and interest repayments on the mortgages. Using this model, Freddie and Fannie were able to solve their prepayment risk problem. Now instead of taking a guess on the duration of the unsecured debt, they could package the mortgages into an MBS and sell it to buyers who found it more attractive than individual mortgages. Moreover, what made the MBS more attractive to buyers was the assurance of payment, thanks to the guarantee by Freddie and Fannie. The table below shows the differences between a classic mortgage, a basic ABS, and an advanced Mortgage Pass-Through Security in terms of risks. (Murphy 2009)

<b>Model</b>	<b>Responsibility of Initial Lender</b>	<b>Funding</b>	<b>Prepayment Risk</b>	<b>Default Risk</b>
<b>Classic Mortgage</b>	Retains loan on its books	Lender	Lender	Lender
<b>Basic ABS</b>	Sells to Aggregator / SPV	Aggregator / SPV	Aggregator / SPV	Aggregator / SPV
<b>Mortgage Pass-through Security</b>	Sells to Freddie / Fannie, who repackages it into an MBS	MBS Buyer	MBS Buyer	Freddie / Fannie

Table 2-2 Differences between classic mortgage, basic ABS, and MPT Security

### 2.4.3 Private Label MBS

The MBS model soon became extremely popular both with the investors and the markets. Investors were comfortable with taking on the prepayment risk on mortgages as they were paid a significant spread over the US Treasuries. The rise of the MBS's attracted a lot of private players such as Bank of America, Lehman Brothers, Merrill Lynch etc to enter the MBS market. In fact, these private players made some changes to the Mortgage Pass-Through model to ensure that even the default risk was passed on to the investor. Unlike Freddie and Fannie backed MBS's, there was no guarantee. So the investors were exposed to losses if there were considerable amount of defaults on the underlying mortgages. In order to counter this, the private players based these MBS's on portfolios of very high quality mortgages to begin with.

The MBS market also received a lot of support from the regulators in 1980s. Regulated financial institutions were allowed to invest into private label MBS's in 1984, and in 1986, changes in the tax codes paved the way for more sophisticated MBS's to be issued. (Murphy 2009) Slowly, the propensity of investors to take on more risk increased, which allowed the MBS packagers to include lower quality mortgages into the underlying pools. Gradually, it reached to such an extent that originators felt comfortable in passing off even high risk mortgages to the investors.

## 2.5 The Bane of Financial Modeling

The economic crisis of 2008-09 has been referred to as an STD: Securitization Transmitted Disease. Even though the underlying cause of the crisis was reckless mortgage lending, if it



wasn't for securitization and modern financial wizardry, the crisis would have been largely limited to mortgage lenders. It was the innovative financial modeling and securitization of these toxic assets that made this crisis a global economic phenomenon.

### 2.5.1 Securitization and Tranching

The process of creating asset backed securities, as described above, is called securitization. Securitization can be done on a variety of underlying assets such as residential or commercial mortgages, corporate bonds, credit cards, etc. However, all these types of securitizations share some common aspects such as, all these assets are self liquidating; the risk of exposure to any of these asset classes can be reduced by diversification; it is easy to judge the risk of the portfolio through statistics and past trends; finally, and this is probably what doomed the financial world, the future movements in the value of these assets can be predicted by historical trends.

Different investors have different risk appetites. Tranching is the outcome of innovative financial engineering that is used to satisfy the many desires of investors. In tranching, we take the securities that are needed to pay for the mortgages (or other underlying assets), and split them into three classes. Let us study these three classes with the example of \$1000 worth of securities. (Murphy 2009)

- **Junior / Equity Tranche:** As the name suggests, it is the junior-most tranche and absorbs the most losses. Let's say we issue \$40 worth of Junior tranche. Past trends have shown that there is only a 4% chance that there would be no defaults on the underlying mortgages. Therefore, the chances of this security paying back its full principal are very bleak. Hence, in order to entice the investor into buying this security, the broker / investment bank offers a very high interest rate on this security. Moreover, junior tranche helps safeguard the rest of the securities as there is a 90% chance that the losses would not be more than \$40.
- **Mezzanine Tranche:** The next step would be to issue \$50 worth of mezzanine securities. These securities are less risky than the junior tranche, so the credit spread needed to pay to the investors to persuade them to buy this security is not as high as that of junior tranche. The junior and mezzanine tranche together absorb \$90 of losses and past trends have shown that there is a 0.05% chance that the losses would be more than \$90.

- Senior Tranche:** The senior tranche, as the name suggests, has the senior-most claim on the cash flows, and thus absorbs minimal losses. Since the payout on these securities is assured, the credit spread offered on these securities is very low.

Together, these three tranches make up what is popularly known as a Collateralized Debt Obligation (CDO), as depicted in Figure 2.10. Using a CDO, the issuer is able to satisfy all types of investors. The investors seeking high risk – high return can invest in the equity tranche. Whereas the more risk averse investors can invest into the senior tranche.

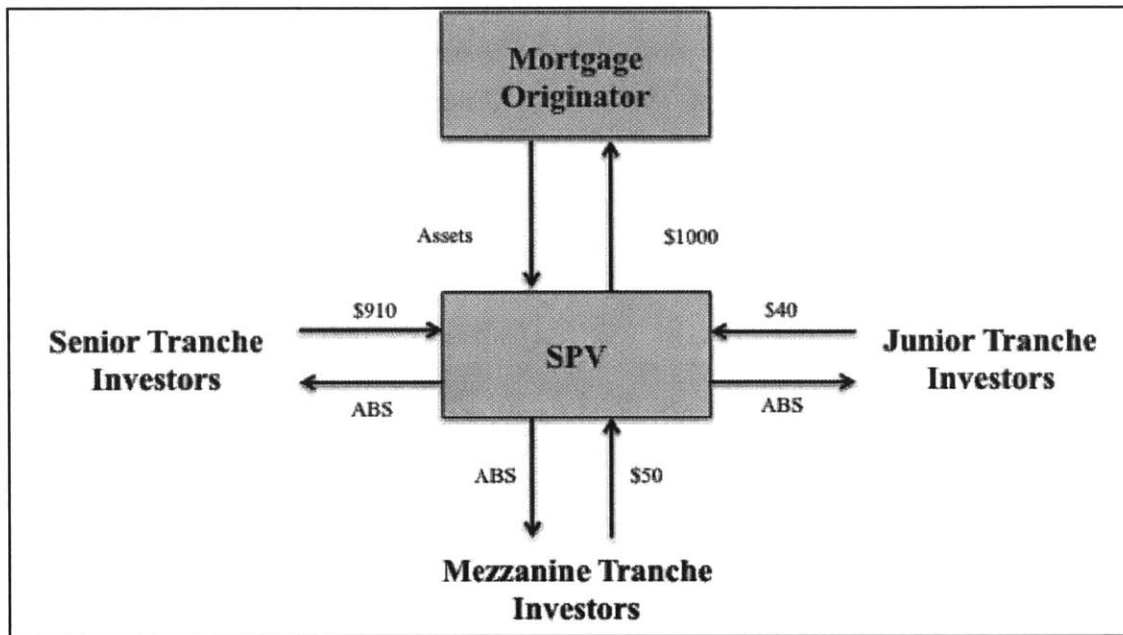


Figure 2.10 A plain CDO

In essence, the structure of tranches is like a waterfall. Cash (interest / principal) paid by the mortgage borrowers goes first to the senior tranche holders, then to mezzanine and then to junior. (Murphy 2009)

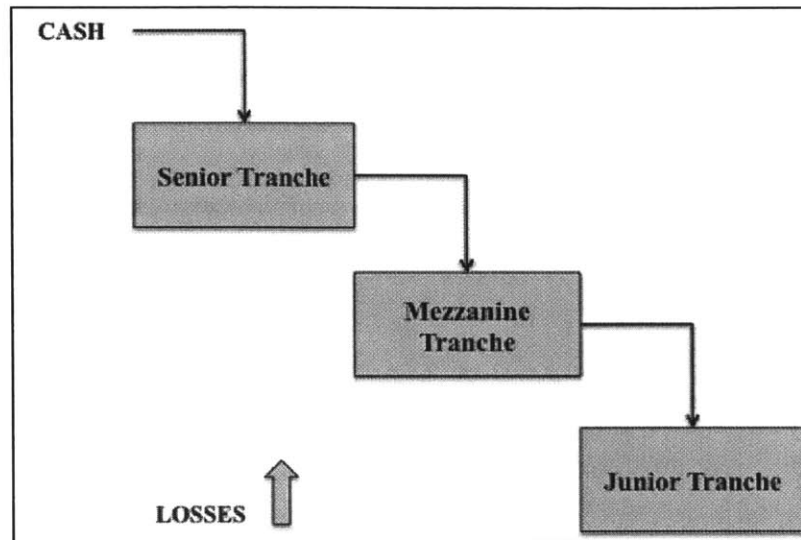


Figure 2.11 Waterfall structure of a basic three tranche CDO

### 2.5.2 The US MBS Market

The US MBS market is divided into a number of segments. Table 2.3 depicts 4 of the most common of these segments. (Cho 2008) (Gorton 2008) The segments and their characteristics are as follows:

- **Prime:** This includes the mortgages that conform to all underwriting criteria established by Fannie and Freddie. Only borrowers with good credit histories and income levels that are three to four times greater than their mortgage payments can be approved for prime mortgages. Since these are considered to be the safest of all mortgages, they do not need explicit government guarantee on credit losses caused by mortgage defaults. (Cho 2008)
- **Jumbo:** These are loans that may have high credit quality, but the loan amount is above conventional conforming loan limits set up by Freddie and Fannie. Traditionally, the interest rates on these mortgages are higher than for conforming mortgages, however with GSE fees increasing, Jumbo loans have recently seen lower interest rates than conforming loans. These loans are a higher in risk because of their larger size rather than credit quality. This is primarily because the underlying asset is a luxury residence, the pricing of which is more volatile. (Lins, Picard and Lemke 2013)

- **Alt-A:** Alt-A stands for Alternative A-paper, and is a mortgage that is considered riskier than prime. Typically Alt-A mortgages are characterized by borrowers with low income or reduced asset documentation, lower credit scores, higher debt-to-income ratios than what is stipulated by Freddie and Fannie, higher loan-to-values, and too many investment properties. (Fibozzi 2005) (Lins, Picard and Lemke 2013)
- **Subprime:** These are loans given out to borrowers with weak credit histories, non-conforming documentation, and/or a higher risk of potential default. Such borrowers are mostly characterized by limited debt experience, absence of any property assets that could be used as collateral, excessive unpaid debt, a history of defaults, late or missed payments so that the loan period had to be extended, or any legal judgments such as “orders to pay” or bankruptcy. (Federal Deposit Insurance Corporation 2001) Subprime mortgages are also characterized by LTV ratios and make up a larger share of second-lien mortgages. While the prime lending market is dominated by fixed rate mortgages (FRMs), the majority of mortgages in the subprime market are adjustable rate mortgages (ARMs). These subprime ARMs have a variety of special features, such as Interest Only (IO) ARMs, option ARMs (borrowers have several payment options to choose from in each payment node including a negative amortization of principal), 2/28 or 3/27 hybrids (usually have below-market interest rates and no- or negative-amortizing principal during first 2–3 years of loan life), and 40-year maturity ARMs. (Chang, et al. 2013)

	<b>Prime</b>	<b>Jumbo</b>	<b>Alt-A</b>	<b>Subprime</b>
<b><i>Mortgage Characteristics</i></b>				
Lien position	1 <sup>st</sup> lien	1 <sup>st</sup> lien	1 <sup>st</sup> lien	Over 90% 1 <sup>st</sup> lien
Weighted average LTV	Low 70s	Low 70s	Low 70s	Low 80s
Borrower Credit History	No credit derogatories	No credit derogatories	No credit derogatories	Credit derogatories
Conforming to GSE criteria	Conforming	Conforming (by all standards but size/amount)	Non-conforming due to documentation or LTV	Non-conforming due to multiple reasons
Loan-to-Value	65-80%	65-80%	70-100%	60-100%
<b><i>Securitization Attributes</i></b>				
MBS Products	Pass-Through CMO	ABS	ABS, CDO, CDO-squared	ABS, CDO, CDO-squared
Collateral	Predominantly FRMs (15-30 years)	Mixed with ARMs and FRMs	Mixed with ARMs and FRMs	Predominantly ARMs with “exotic” features
Credit Enhance	External CE	Internal “6-pack” CE	Internal “6-pack” CE	Internal, XS/OC
Risk Indicators	Prepay-OAS, G-fee	N/A	Credit-OAS	Credit-OAS
Issuers	GSEs	Private label issuers	Investment Banks and large Commercial Banks	Investment Banks and large Commercial Banks

Table 2-3 Description of Residential MBS categories

(Cho 2008) (Chang, et al. 2013) (Gorton 2008)

According to estimates, almost all of the prime market MBS's are backed by safe, fully amortizing 15 and 30-year FRMs, which in most cases, do not have prepayment penalties. (Asset Securitization Report & Source Media Inc. 2007) The uncertainty in projecting cash inflows from such mortgages is very low, and the only risk that such mortgages bear is the frequency of prepayment. The investors need not worry about the borrower's default risk because such mortgages are accompanied with external credit enhancement by GSEs. GSEs charge insurance premiums, known as G-fees, for mortgage loans with different degrees of default risk. (Chang, et al. 2013)

For one, it is extremely complex to assess the embedded risk in subprime mortgage backed MBS tranches. Moreover, thanks to innovations in financial engineering, the multiple layers of securitization increase this complexity by many folds. This embedded default risk in subprime mortgages can be controlled by three ways:

- **Subordination:** In an MBS issue, a senior-subordinate structure is formed using a senior bond class and a subordinated bond class, with each class consisting of one or more tranches. For example, as shown in Figure 2.10, a \$500 million MBS with one senior bond class with a principal of \$400 million and six subordinate classes with a total principal of \$100 million. (Murphy 2009) (Fibozzi 2005)

<b>AAA Rating</b>	<b>\$400 million</b>	} <b>Senior Tranche</b>
<b>AA Rating</b>	<b>\$40 million</b>	
<b>A Rating</b>	<b>\$20 million</b>	} <b>Subordinate Tranches</b>
<b>BBB Rating</b>	<b>\$10 million</b>	
<b>BB Rating</b>	<b>\$10 million</b>	
<b>B Rating</b>	<b>\$10 million</b>	
<b>Not Rated</b>	<b>\$10 million</b>	

Figure 2.12 Typical MBS with senior-subordinate structure

For this MBS issue, the default losses are absorbed first by Tranche 7 (starting at the bottom) and ascend up. If losses on the collateral are less than \$10 million, then only Tranche 7 will experience a loss. However, in case of a \$30 million loss, Tranches 7, 6,

and 5 will realize losses. Owing to the varied levels of default risk, each of the subordinate tranches are separately rated by rating agencies, with the lower tranches receiving lower ratings.

- **Over-collateralization (OC):** Overcollateralization is the process by which the MBS issuer makes sure that the par value of the collateral exceeds the value of the MBS issued. For example, if the MBS issue of \$500 million had \$550 million in collateral, then the \$50 million excess would then be used to absorb default losses. (Fibozzi 2005)
- **Excess Spread (XS):** Excess Spread, or Excess Interest, is the interest from the collateral that is not being used to pay MBS investors and management fees. The excess spread is maintained in an account and can be used to offset any default losses. When this is done, the excess interest can be set up similar to a notional interest-only (IO) class, with the proceeds going to a reserve account and paid out to IO holders at some future date if there is an excess. (Fibozzi 2005)
- **Monoline Insurance:** Some Non-agency MBSs also have external credit enhancements in the form of insurance provided by Monoline insurance companies. A monoline insurance company provides guarantees to issuers often in the form of credit wraps. These insurance companies first began providing wraps for municipal bond issues. However over the years, they started providing coverage for MBS's, CDO's etc too. The guarantees provided by monoline insurers, in turn, shifts the default risk to the insurer. (Fibozzi 2005)

Several empirical studies have been done on the optimal structure of CDO tranches. Table 2.4 depicts one such study based on a pool backed by a standard fully amortized 30-year FRM loan. (Chang, et al. 2013) They took a large number of mortgage products within the pool with a 95% LTV, debt-to-income (DTI) of 28%, and a contract rate of 7%. The subordination levels obtained are 11.9% for AAA, which is lower than the usual subprime mortgage-based sizing (e.g., 19% for AAA subprime ABS tranches 2008); (Gorton 2008) 7.8% for AA; and, 1% for NR. This implies that the mean economy (50<sup>th</sup> percentile) generates only a 1% expected losses from the FRM pool.

	<b>NR</b>	<b>B</b>	<b>BB</b>	<b>BBB</b>	<b>A</b>	<b>AA</b>	<b>AAA</b>
Size (%)	1.0%	0.7%	1.3%	2.2%	2.7%	3.1%	89.1%
Spread	39.0%	15.3%	6.6%	3.0%	1.5%	0.9%	0.4%
Avg Life	7.03	9.78	11.82	13.2	13.24	12.89	7.18
Std (Life)	5.4	5.49	4.45	2.94	2.33	1.86	1.35
E (IRR)	32.1%	13.3%	6.7%	6.0%	5.5%	5.5%	5.4%
Std (IRR)	11.0%	10.2%	10.0%	7.0%	4.7%	2.2%	0.001%
Sharp Ratio	2.48	0.82	0.17	0.15	0.10	0.25	363.02
E (Loss)	72.4%	42.6%	25.1%	10.3%	4.9%	2.5%	0.001%
Loss (99.9%ile)	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.2%
EconK	27.6%	57.4%	74.9%	89.7%	95.1%	97.5%	0.2%

Table 2-4 Performance indicators for ABS tranches

(Chang, et al. 2013)

As discussed above, the credit spread offered on these instruments increases monotonically from 0.4% for AAA to 39% for NR. It was noted that average life was longer for middle tranches (13 years for BBB and A), but was shorter for AAA and NR (7 years). This proves the fact that these tranches either enjoy the top most priority in receiving principal payments (in case of AAA) or have the highest propensity to absorb losses (in the case of NR). Issuance was assumed to be at par. Therefore, the computed IRR is a function of the price of the security. As expected, mean expected IRR, E(IRR), increases as the rating moves to lower grades, and so does its dispersion, std(IRR). This implies that the required rate of return is larger from riskier assets, such as NR and B, as compared to senior assets, such as AAA and AA. However, the Sharpe Ratio (E (IRR) divided by std(IRR)) shows that the three middle tranches BB, BBB, and A have lower risk-adjusted returns than other tranches. This is due to the fact that these tranches have longer duration as shown in the average life statistics. One of the most important stat, the economic capital, EconK, is defined as the difference between the estimated default loss under a stressed economy (i.e., 99.9th percentile loss) and the expected economic environment (i.e., 50<sup>th</sup> percentile loss). This gives an indication of the unexpected loss due to default. As expected, economic capital increases as the rating goes down from AAA to NR. This explains why financial institutions are expected to adhere to capital adequacy norms and use more capital reserve as a buffer to absorb unexpected default losses in lower-grade tranches. (Chang, et al. 2013)



### 2.5.3 Credit Derivatives

Another testimony to the extent of financial wizardry was credit derivatives. A credit derivative, in simple terms, is a guarantee or an insurance for which the seller receives a fee from the buyer. In return, the protection seller undertakes to compensate the protection buyer in case of a credit event on a reference credit(s) during a mutually decided period. The most popular type of credit derivative is a Credit Default Swap (CDS). (Murphy 2009)

Let us take an example. Suppose party A owns a bond and buys a CDS (from a protection seller) on that bond. If the bond defaults, A can deliver it to the protection seller and receive the face value of the bond. If it does not default, then the bond issuer pays A the face value at the end of the bond period. The presence of the protection seller minimizes A's risk of losing his entire money. In essence, the spread on the CDS should be equal or more than the spread on the bond.

In the 2000s, as the market for ABS's and MBS's grew, investment banks started taking increasingly more risks. In order to cover their downside, they bought protection from insurance companies like AIG. Gradually, the underlying security for a CDS moved from plain bonds to securitized instruments like CDOs.

On first sight, this arrangement seems pretty safe. Whereas in reality, it actually increases the amount of risk inherent in the system. Credit derivatives do not just pass on risk, they add to it. As per our previous example, when A buys protection on the bond, he transfers the non-performance risk to the protection seller. Whereas, A has a new type of risk – the counterparty risk on the protection seller. Moreover, even the protection seller is not completely insulated either. It faces the risk of loss caused by claims on the CDS, the risk of changes in the value of the bond without a credit event, and liquidity risk on any margin requirements generated by changes in value. (Murphy 2009)

In 2008, when investment banks started failing, they turned to AIG with claims for covering their losses in the mortgage backed securities market. As the number of claims increased, AIG faced severe solvency issues, which finally culminated in the failure of the insurance giant in September 2008.

## 2.6 When Genius Failed

The story so far talks about house price appreciation, low interest rate regimes, toxic financial assets and dangerously high levels of securitization. But none of these aspects could bring the financial world to its knees alone. The catastrophe was brought about by the correlation of these factors and markets, coupled with insufficient capital and extremely poor risk management by the leading financial institutions, which together ultimately resulted in a snowball effect.

During the Congress led investigation, some common elements across all financial institutions were observed (Hennessey, Holtz-Eakin and Thomas 2010):

- **Heavily concentrated and correlated risk:** Owing to the increase in demand for mortgages, and the high returns on MBS's, brokerage firms and fund managers bet massively on the mortgage market, while comforting themselves that their competitors were doing the same.
- **Capital inadequacy:** The leverage ratios for some of the final institutions was close to 35:1, meaning that every \$35 of assets was financed with just \$1 of equity capital and \$34 of debt. While this might sound like an extremely profitable proposition, but it made these firms very sensitive to even the smallest of losses, as a 3% decline in the market value of these assets would have pushed them into a solvency crisis. Also, in only a few cases were the leverage figures understandable and transparent. With the increasing dependence on Special Investment Vehicles, most of the firms did not show these investments on their books, giving them a larger impetus to increase their exposure to such investments without worrying about regulatory or auditory requirements. It was because of this, that in the aftermath of the global financial meltdown, strict capital adequacy requirements were set up for banks and financial institutions.
- **Overdependence on volatile short-term markets:** The overdependence on short-term liquidity from repo and commercial paper markets meant that the tiniest of shock to the market would have resulted in a run on the firms' liquidity cushions. It seems that most of the firms were being run on the assumption that their sources of funding would continue to be healthy.

- **Extremely poor risk management:** Most of the firms did not diversify their exposure to the risky mortgage markets. And when the markets started tumbling, a majority of these firms found it extremely difficult to sell or hedge their risks.

### 2.6.1 Systemic Failures

One of the most frequently mentioned terms about the financial crisis was “systemic failure”. In finance, systemic risk is defined as the risk of collapse of an entire financial system or entire market, due to a few interconnected events. Here, we will look at two types of systemic failures:

**Contagion:** A contagion occurs when a financial institution fails, and because of a direct financial link between firms, the failure of one firm triggers a failure of the other, and so on. In such a case, the government or policymakers attempt to stop the first firm to go bankrupt in a sudden and disorderly fashion. This judgment is made largely keeping in mind the counterparty risk that other firms might be exposed to in the event of a failure of the first firm. (Hennessey, Holtz-Eakin and Thomas 2010)

**Common Shock:** In a common shock, the failure of one firm may be an effect of a larger problem which might affect other firms too. In the financial crisis of 2008, the common factor was concentrated losses on housing-related assets largely in the United States. In this case, it was not about a single insolvent firm that might transmit its failure to others. Policymakers were dealing with a scenario in which a single problem might affect several large, midsize, and small financial institutions at roughly the same time. (Hennessey, Holtz-Eakin and Thomas 2010)

### **3. Anatomy of a Disaster: The Fall of Lehman Brothers**

On December 12, 2007, Lehman Brothers announced its fourth quarter and full year earnings, comprehensively beating market estimates. The firm had earned \$4.2 billion in the year. Revenues from the capital markets division (after adjustments for mortgage related write-downs) were up by 9%, revenues from the Investment Banking division were up by 24% and from the Asset Management business, the revenues were up 28% on a year-on-year basis.

On the earnings call, the management sounded exceptionally upbeat about the performance of the company. Chris O'Meara, Global Head of Risk Management and former CFO, said that the performance, "reflects our commitment to customer-flow activities versus proprietary as the primary source of revenues, which has helped us mitigate the impact of difficult market environments, as institutional and high-net-worth investors remain active. More fundamentally, it reflects the strength of our risk management culture in terms of managing our overall risk appetite, seeking appropriate risk reward dynamics and exercising diligence around risk mitigation."

Even Erin Callan, the CFO of the firm, said that they were "pleased with this performance, especially since these results were a clear demonstration of the diversification we have achieved and worked so hard for over the past several years" and emphasized on the strong liquidity position of the firm. She admitted that the times were indeed tough for the mortgage business but stressed that the firm was "able to navigate these markets relatively successfully and post a reasonable financial performance." Besides the better business and geographic mix, she attributed this success to strong risk and liquidity management. She went on to say that the firm had ample liquidity and capital in place to have at least 12 months of funding available, bolstered by \$35 billion in cash and cash equivalents and an "additional \$50 billion in unencumbered high quality assets that could be pledged as collateral for borrowings or sold to generate cash." (Lehman Brothers Holdings Inc., Earnings Call Transcript Q4 2007 2007)

9 months later, on September 15, 2008, Lehman Brothers filed for bankruptcy.

#### **3.1 From Humble Beginnings to a Financial Behemoth**

Lehman Brothers was started in 1844 when Henry Lehman, a German immigrant from Bavaria, along with his brothers Emanuel and Mayer, started a humble grocery store in Montgomery,

Alabama. Though they were listed as a grocery store in the city directory, they soon began trading in a number of consumer goods, especially cotton. Pretty soon, they moved to cotton trading on a full fledged basis and were one of the founding firms of the New York Cotton Exchange, with Mayer Lehman appointed as a member of the Board of Governors. (Pederson 2009)

By 1980s, Lehman Brothers was one of the most powerful and profitable investment banks on the Wall Street. Following a very public power struggle in 1983 between the firms banks and traders, the firm was sold to Shearson / American Express in 1984. In 1994, Lehman Brothers was spun off by American Express, creating a standalone public company. Richard Fuld, Jr. became its new Chairman and CEO.

Traditionally, Lehman's biggest strength was its fixed income business. In 1995, over 55% of the firm's revenues were from underwriting and trading of fixed income securities. However, there were increased worries among Lehman's investors about its increased dependence on fixed income, forcing the firm to bring this proportion down to 39% by 2007, with growth in equity and advisory businesses. However, Lehman remained a leader in fixed income underwriting with special emphasis on mortgage related securities. Fuld described this as a very consciously developed strategy, "Years ago we made a decision to build out the best-in-class commercial and residential mortgage orientation and distribution platforms. We created significant revenues and net income over the years that funded many of the firm's investments that have diversified our core franchise today." (Lehman Brothers Holdings Inc., Earnings Call Transcript Q2 2008 2008) Lehman's expertise and dependence on packaging and trading mortgage backed securities increased by the day. By the end of 2007, Lehman had surpassed Bear Stearns as the largest underwriter of mortgage-backed securities. In fact, in an interview to The Economist in 2008, Fuld said, "Smart risk management is never putting yourself in a position where you can't live to fight another day". (Fuld of Experience 2008) The 2000s also saw Lehman moving from a low risk model to a high risk model, transforming its balance sheet to "holding" assets from merely "transferring" assets to third parties. During this time, Lehman took increasingly high levels of leverage. Between 2004 and 2007, its assets grew by over \$300 billion while its equity grew by only \$6 billion.

Being outside the purview of a traditional bank, Lehman did not have access to low cost retail deposits, which forced it to rely largely on constantly refinanced short-term loans. This increased the importance of maintaining investor confidence in the firm. This investor confidence took a major beating (down by 48%) when on March 17, 2008, Lehman's biggest competitor and most similar firm, Bear Stearns collapsed and had to be acquired by JP Morgan with the backing of the

Fed. Because of the similarity of both firms and their extensive exposure to the mortgage market, investors grew extremely worried about the future of Lehman Brothers. Erin Callan, Lehman's CFO during that time, tried to quell the anxiety in the markets and said that Lehman had successfully brought down its leverage ratio from 16.1 to 15.4 in one quarter. Lehman stock recovered all its losses when first-quarter profit beat analysts' estimates.

In June 2008, Standard and Poor's downgraded Lehman's credit ratings from A+ to A, but added a sweetener saying that Lehman had a strong liquidity / funding profile. A few days later, Lehman announced the first ever quarterly loss (of about \$2.8 billion) in its history as a public company. Joseph Gregory, president of the firm and Fuld's right-hand man for three decades, had to step down. The firm also appointed a new CFO and announced the issuance of \$6 billion worth of stock to raise fresh capital. The new CFO Ian Hewitt also announced that the gross leverage had come down from 31.7 times to 24.3 times and net leverage from 15.4 times to 12 times. However, some of Lehman's biggest investors were not impressed. David Einhorn, a hedge fund manager and founder of Greenlight Capital, announced that he strongly believed that Lehman was misstating its leverage ratios and that he was shorting Lehman's stock. (Brewster and White 2008) He was also one of the first people to claim that Lehman was indulging in dubious accounting practices. By June 2008, Lehman was the investment bank with the highest number of shorted shares. Moody's also lowered its outlook on Lehman to negative.

On August 19, news broke out that the firm solicited buyers for its investment-management division and that third-quarter writedowns would be worse than estimated. Lehman laid off 1500 employees (6% of its workforce) as the stock closed down by 13%. In the first 8 months of 2008, the stock had gone down by 73%.

By the beginning of September, Lehman was desperately looking for a buyer. On September 9, Lehman shares plunged 45% after talks about a capital infusion from Korea Development Bank ended. On the next day, Lehman reported a \$3.9 billion third-quarter loss, the largest in its history, on \$5.6 billion of write-downs. The firm announced its plans to sell a majority stake in its asset management business and spin off its commercial real estate holdings. Over the last few days, rumors of Bank of America and Barclays Bank expressing interest in acquiring Lehman had started surfacing. On September 12, Moody's Investor Service said that Lehman must find a "stronger financial partner" or it would downgrade the company's credit rating. This resulted in a further plunge of 42% in Lehman's shares. Bankers from other firms started reviewing Lehman's books for possible bids. Lehman received bids for its asset management unit from three private-equity firms. On September 13, The Federal Reserve Bank of New York held an emergency

meeting with top Wall Street executives to discuss the future of Lehman Brothers. In attendance were government officials, including New York Fed President Timothy Geithner, Mr. Paulson and Securities and Exchange Commission Chairman Christopher Cox; Wall Street executives including Morgan Stanley Chief Executive John Mack, Merrill Lynch Chief Executive John Thain, JP Morgan Chase CEO Jamie Dimon, Goldman Sachs Group CEO Lloyd Blankfein, Citigroup Inc. head Vikram Pandit and representatives from the Royal Bank of Scotland Group PLC and Bank of New York Mellon Corp., among others. It was made clear to everyone that without a deal, the firm could face liquidation, as Geithner made it clear that the government will not bail out the firm. (Paletta, Craig and Solomon 2008) Bank of America and Barclays formally emerged as potential bidders. On September 14, Barclays pulled its bid after failing to secure guarantees against losses, followed by Bank of America a few hours later. Firms met to net trades, or cancel those that offset each other, as Lehman liquidation or bankruptcy draws near. On September 15, Lehman Brothers filed for Chapter 11 bankruptcy, listing \$639 billion of assets, making it the largest bankruptcy filing in American history. (Mikes, Yu and Hamel 2013) (Fineman and Onaran 2008) Exhibit 1 chronicles this timeline along with Lehman's stock price movement.

Over the next sections, we shall explore different aspects of Lehman Brothers, such as accounting, risk management, product control, corporate governance and culture.

### **3.2 Balance Sheet Management through Repo 105 Transactions**

Before it filed for bankruptcy, Lehman Brothers used a special type of accounting treatment for repurchase agreements (Repo 105), which, though was acceptable under the US Generally Accepted Accounting Principles (US GAAP), helped Lehman distort its financial disclosures. This paved the way for conflicts between legal and accounting requirements which Lehman was able to circumvent. (Jones and Presley 2012) The intent behind using these transactions was to “window dress” the financial condition of the firm. The management relied heavily on these transactions and used them to impact both quarterly and annual disclosures for over 7 years.

However, Lehman was not the only investment bank to rely on Repo 105 transactions. Repos were becoming increasingly popular among financial institutions. In 2007, the size of the repo market had doubled over the last 5 years, with gross outstanding amounts of over \$11 trillion in

the US and Europe. (Developments in Repo Markets During the Financial Turmoil 2008) (Mikes, Yu and Hamel 2013)

### **3.2.1 Accounting Treatment for Repo Transactions**

A standard repo transaction was pretty straightforward. A firm would borrow money using the assets on its balance sheet as collateral. The value of the collateralized asset was equal to the borrowed amount plus a haircut (usually 2% for repo 102 transactions). When the firm repaid the cash, it would return the borrowed amount plus interest and repossessed the asset. From an accounting standpoint also, it was pretty simple. First, the borrowing firm would record a short term liability for the cash received. And after repayment, the liability disappeared and an expense was recorded for the interest paid. The collateralized assets remained on the firm's balance sheet with a footnote for the collateralized amount. In the cash flow statement, a repo transaction was recorded as a financing activity. Figure 3.1 illustrates a basic repo transaction. (Valukas 2010)




Assets (in millions)		Liabilities	
Cash	7,500	Short Term Borrowings	200,000
Financial Instruments	350,000	Collateralized Financings	325,000
Collateralized Agreements	350,000	Long Term Borrowings	150,000
Receivables	20,000	Payables	98,000
Other	72,500	Stockholders' Equity	27,000
<b>Total</b>	<b>800,000</b>	<b>Total</b>	<b>800,000</b>
<b>Gross Leverage</b>	<b>30</b>	<i>Total Assets / Stockholders' Equity</i>	
<b>Net Leverage</b>	<b>17</b>	<i>(Total Assets - Collateralized Agreements) / Stockholders' Equity</i>	
Firm executes \$50 billion of repo transactions with \$50 billion of financial instruments		Cash goes up by \$50 billion Collateralized Financings go up by \$50 billion	
			
Assets (in millions)		Liabilities	
<b>Cash</b>	<b>57,500</b>	Short Term Borrowings	200,000
Financial Instruments	350,000	<b>Collateralized Financings</b>	<b>375,000</b>
Collateralized Agreements	350,000	Long Term Borrowings	150,000
Receivables	20,000	Payables	98,000
Other	72,500	Stockholders' Equity	27,000
<b>Total</b>	<b>850,000</b>	<b>Total</b>	<b>850,000</b>
<b>Gross Leverage</b>	<b>31</b>	<i>Total Assets / Stockholders' Equity</i>	
<b>Net Leverage</b>	<b>19</b>	<i>(Total Assets - Collateralized Agreements) / Stockholders' Equity</i>	
Firm uses \$50 billion of cash borrowings to pay off current liabilities <b>Leverage ratios remain same</b>		Cash goes down by \$50 billion Collateralized Financings go down by \$50 billion	
			
Assets (in millions)		Liabilities	
<b>Cash</b>	<b>7,500</b>	Short Term Borrowings	200,000
Financial Instruments	350,000	<b>Collateralized Financings</b>	<b>325,000</b>
Collateralized Agreements	350,000	Long Term Borrowings	150,000
Receivables	20,000	Payables	98,000
Other	72,500	Stockholders' Equity	27,000
<b>Total</b>	<b>800,000</b>	<b>Total</b>	<b>800,000</b>
<b>Gross Leverage</b>	<b>30</b>	<i>Total Assets / Stockholders' Equity</i>	
<b>Net Leverage</b>	<b>17</b>	<i>(Total Assets - Collateralized Agreements) / Stockholders' Equity</i>	

Figure 3.1 An ordinary repo transaction

### **3.2.2 Lehman's Accounting Wizardry**

However in 2001, Lehman recognized a “loophole” in the accounting standard, Statement of Financial Accounting Standards (SFAS) 140. This accounting standard basically governed the way transfer and servicing of financial assets was done. The transfer of assets was essentially considered as temporary, but according to SFAS 140, the transfer could be considered as a sale if the borrower relinquished control over the asset. The borrower could maintain control over the asset if the collateralization was between 98% and 102% of the asset value. The standard also listed three conditions which could enable the transfer to be recorded as a sale (See Exhibit 2).

Taking advantage of this, Lehman created a new type of repurchase agreement where the firm would take higher haircuts to the tune of 5-8%. This allowed them to justify the transaction as a sale of assets under SFAS 140. In light of this, on its balance sheet, Lehman recognized a reduction in the collateralized assets (equivalent to borrowed amount plus haircut) and an increase in cash. The haircut (difference between cash and recorded value of collateralized asset) was recorded as an option to repurchase the asset at a later date. Lehman would then use the cash to pay down in liabilities, thereby decreasing its leverage ratios, as illustrated in Figure 3.2. (Valukas 2010)

According to Valukas, by recharacterizing a Repo 105 transaction as a sale, Lehman could achieve several objectives. Lehman could reduce the securities inventory on its balance sheet. Also, Lehman could borrow billions of dollars without affecting its leverage ratios. In fact, Lehman was able to reduce its net balance sheet through this practice by over \$138 billion between Q4 2007 and Q2 2008.

Moreover, most of these transactions were carried out just before Lehman's quarterly and annual earnings releases (as depicted in figure 3.3), so that Lehman could show lower leverage ratios. Whereas, in fact, the overall borrowing increased during this period.



Assets (in millions)		Liabilities	
Cash	7,500	Short Term Borrowings	200,000
Financial Instruments	350,000	Collateralized Financings	325,000
Collateralized Agreements	350,000	Long Term Borrowings	150,000
Receivables	20,000	Payables	98,000
Other	72,500	Stockholders' Equity	27,000
<b>Total</b>	<b>800,000</b>		<b>800,000</b>
<b>Gross Leverage</b>	<b>30</b>	<i>Total Assets / Stockholders' Equity</i>	
<b>Net Leverage</b>	<b>17</b>	<i>(Total Assets - Collateralized Agreements) / Stockholders' Equity</i>	
Lehman executes \$50 billion of repo transactions <b>showing a sale of \$50 billion of financial instruments</b>		Cash goes up by \$50 billion <b>Fin Instruments go down by \$50 billion</b> <b>Collateralized Financings remain same</b>	
			
Assets (in millions)		Liabilities	
<b>Cash</b>	<b>57,500</b>	Short Term Borrowings	200,000
<b>Financial Instruments</b>	<b>300,000</b>	<b>Collateralized Financings</b>	<b>325,000</b>
Collateralized Agreements	350,000	Long Term Borrowings	150,000
Receivables	20,000	Payables	98,000
Other	72,500	Stockholders' Equity	27,000
<b>Total</b>	<b>800,000</b>		<b>800,000</b>
<b>Gross Leverage</b>	<b>30</b>	<i>Total Assets / Stockholders' Equity</i>	
<b>Net Leverage</b>	<b>17</b>	<i>(Total Assets - Collateralized Agreements) / Stockholders' Equity</i>	
Lehman uses \$50 billion of cash borrowings to pay off current liabilities <b>Leverage ratios go down</b>		Cash goes down by \$50 billion Collateralized Financings go down by \$50 billion	
			
Assets (in millions)		Liabilities	
<b>Cash</b>	<b>7,500</b>	Short Term Borrowings	200,000
Financial Instruments	300,000	<b>Collateralized Financings</b>	<b>275,000</b>
Collateralized Agreements	350,000	Long Term Borrowings	150,000
Receivables	20,000	Payables	98,000
Other	72,500	Stockholders' Equity	27,000
<b>Total</b>	<b>750,000</b>		<b>750,000</b>
<b>Gross Leverage</b>	<b>28</b>	<i>Total Assets / Stockholders' Equity</i>	
<b>Net Leverage</b>	<b>15</b>	<i>(Total Assets - Collateralized Agreements) / Stockholders' Equity</i>	

Figure 3.2 Lehman's Typical Execution of a Repo 105 Transaction

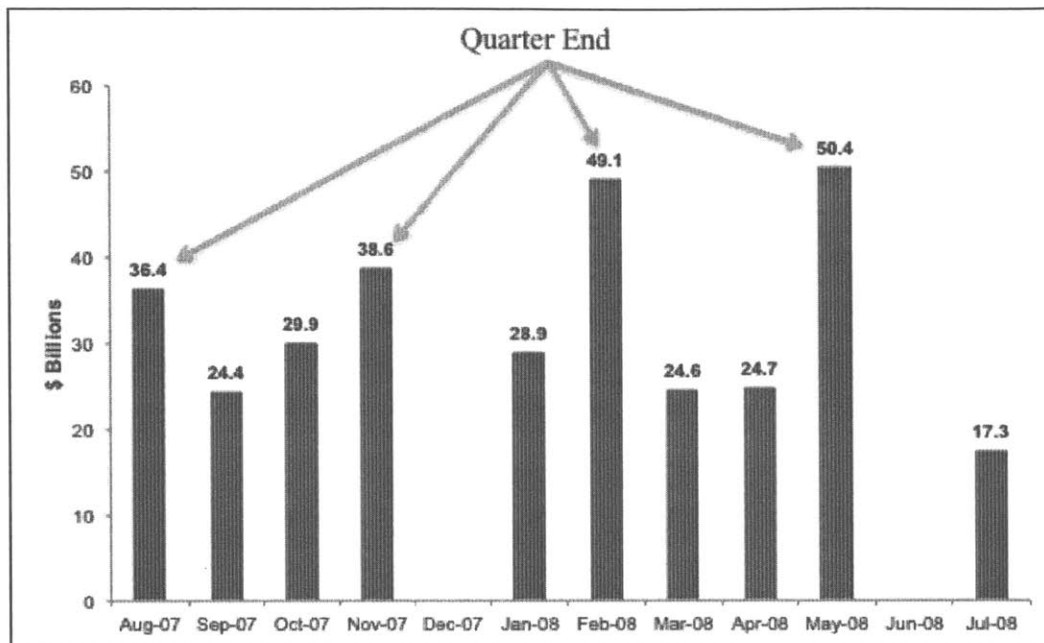


Figure 3.3 Lehman's Repo 105 usage  
(Valukas 2010)

Lehman never made any public disclosures of its Repo 105 transactions. In fact, it categorized its Repo 105 transactions under normal derivatives. Also, Lehman never mentioned in its financial statements that it had the obligation to repurchase these financial instruments at a later stage. Voices within Lehman, like Madelyn Antoncic (Chief Risk Officer, 2006) and Mathew Lee (Senior Vice President, Finance), who sought to bring this to the notice of senior management, were silenced or sidelined. Top Lehman executives increasingly pressured the firm's businesses to reduce the net leverage of the firm. In fact, Bart McDade, whose reputation was that of a "balance sheet czar" was specially brought in to increase the firm's deleveraging attempts. Though McDade had clearly instructed traders to exercise caution while using Repo 105 and sell inventory instead, traders always knew that they had Repo 105 to fall back upon whenever they found it difficult to sell an asset. (Mikes, Yu and Hamel 2013) In fact, in November 2007, after completing an audit of Lehman Brothers, auditors Ernst & Young commented, "Net leverage is an important ratio analyzed by the ratings agencies and included in Lehman's earnings release." (Valukas 2010)

However, in none of its earnings releases or calls did Lehman disclose its net leverage figures. It always emphasized on the need and efforts to increase deleveraging, but stopped short of quoting

the actual ratio. In fact, even in the presentations made to rating agencies in the summer of 2008, where Lehman made a case against ratings cuts, Lehman did not disclose the use or the impact of Repo 105.

### **3.2.3 Legal Treatment of Repo 105**

In early 2000s, Lehman informed its auditors E&Y that Repo 105 transactions were not recognized as sales by US law firms, whereas the UK law firm Linklaters had assured Lehman that such transactions can be qualified as sales under some very strict conditions (Mikes, Yu and Hamel 2013):

- the transactions had to involve securities “sited” in the UK, and
- the transactions had to be executed in the UK

Therefore, Lehman Brothers would first transfer its securities (American fixed income securities) to its London affiliate LBIE, who would then conduct the Repo 105 transaction. (Exhibit 3) Even though E&Y’s engagement partner William Schlich maintained that he had no idea about this, witnesses and evidences suggested that he did. (Mikes, Yu and Hamel 2013)

## **3.3 Risk Management and Product Control**

Lehman Brothers was in the business of taking inordinate amounts of risks and short term bets. Therefore risk management was of utmost importance to the firm. In fact, it appears that Lehman had a very strong risk management philosophy and prided in having “a culture of risk management at every level of the firm” (Lehman Brothers Holdings Inc., Annual Report to Security Holders for fiscal year ended November 30, 2007 2007) The firm’s risk management division had a mission to “protect and enhance the value of the franchise by proactively identifying, evaluating, monitoring and controlling firm market, credit and operational risks”. However, it is widely believed that after Repo 105, the things that hurt Lehman the most were its risk management and product control.

### **3.3.1 Shift from Moving to Storage – Change in Business Strategy**

During 2006, Lehman's management took the deliberate decision to move from the low-risk brokerage business to the high-risk capital intensive banking model. Earlier, Lehman used to acquire assets, like commercial and residential mortgages, primarily to "move them" by securitization or syndication and distribution to third parties. However, in 2006, the management decided to transition to the "storage business" – using Lehman's balance sheet to acquire assets for longer-term investment. (Valukas 2010) The management strongly believed that other banks were making highly profitable proprietary investments by using their balance sheets, and Lehman should not miss out on such an opportunity. While looking for specific areas of investment, their obvious first choice was commercial real estate, a business in which the firm was historically strong.

The firm was even willing to make commercial real estate bridge equity investments. This meant that the firm would take potentially riskier equity pieces of real estate investments in the hopes of reselling it quickly to third parties at a profit. The business of commercial real estate would have otherwise been less risky if Lehman had a strong capital base. But for a firm like Lehman, which had a high leverage and small equity base, these investments were extremely risky. The illiquidity of these investments made sure that Lehman could not sell them in the open market in times of distress. Moreover, the risks from such investments are more difficult to hedge. In fact, Lehman decided not to try to hedge its principal investment risks to the same extent as its other exposures as the management believed that hedges on these investments would not work and could even backfire. (Valukas 2010)

The inclusion of these new illiquid investments into the firm's asset base meant that Lehman had to recalibrate its risk controls, which the firm didn't. In fact, in order to facilitate the new investment strategy, Lehman's management actually relaxed its risk controls. There are numerous instances of relaxed risk controls that the bankruptcy report has evaluated.

#### **Stress Testing Coverage**

Stress testing was one of the major risk controls that Lehman had. However, Lehman's stress testing did not cover exposures to real estate, as these positions previously formed a very small part of the portfolio. Lehman's stress testing portfolio included the more frequently traded securities, such as stocks, bonds, etc. Until late 2007, Lehman's stress testing did not even include leveraged loan commitments – commitments that Lehman had expected to fund in the future but

hadn't done it yet. These stress testing exclusions also allowed Lehman to seamlessly transition from a less-risky moving business to a high-risk storage business.

By the time Lehman went bankrupt, the exclusion had reached significant proportions. Some of the experiments conducted during the investigation in 2008 concluded that a large proportion of Lehman's tail risk was from the securities excluded from the stress tests. According to one stress test, the maximum potential losses were to the tune of \$9.4 billion, which included \$7.4 billion worth of losses from securities excluded from the stress test. (Valukas 2010)

### **Increase in Risk Appetite**

Lehman's risk appetite limits were considered to be the center of its approach towards risk. An elaborate set of procedures designed to calculate the usage of risk appetite were employed by Lehman. These figures were calculated daily for each business unit and each division. Starting from the end of 2006, Lehman embarked on a path of dramatic expansion in its risk appetite limits, raising it from \$2.3 billion in 2006 to \$3.3 billion in 2007, and to \$3.5 billion later in September 2007. To put this into perspective, the then CRO of the firm, Madelyn Antoncic, who was pretty vocal about the firm's risk management practices and was later sacked because of precisely this reason, had recommended a risk appetite increase till \$2.6-\$2.7 billion. In addition to this, Lehman also changed the way it calculated the risk appetite so that these increases can be justified. The figure and table below depict this dramatic increase in risk appetite. (Valukas 2010)

<b>\$ million</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2007*</b>	<b>2008</b>
Fixed Income	1,400	1,550	1,625	2,200	2,500	2,500
Equities	400	450	550	800	800	800
Capital Market Prime Services	-	-	100	150	150	150
Principal Investing / IBD	-	-	-	100	100	100
Investment Management	250	325	325	650	2,000	2,000
Global Trading Strategies	300	450	450	600		
Global Principal Strategies	-	-	300	500		
Strategic Investing	-	-	-	150		
India Operations	-	-	-	250		
Diversification %	23.4%	24.3%	31.3%	38.9%	36.9%	27.9%
<b>Total</b>	<b>1,800</b>	<b>2,100</b>	<b>2,300</b>	<b>3,300</b>	<b>3,500</b>	<b>4,000</b>

\* Limit enhancement on September 1, 2007

Table 3-1 Lehman Brothers Risk Appetite Limit Allocation  
(Lehman Brothers Holdings Inc., Proxy Statement 2008)

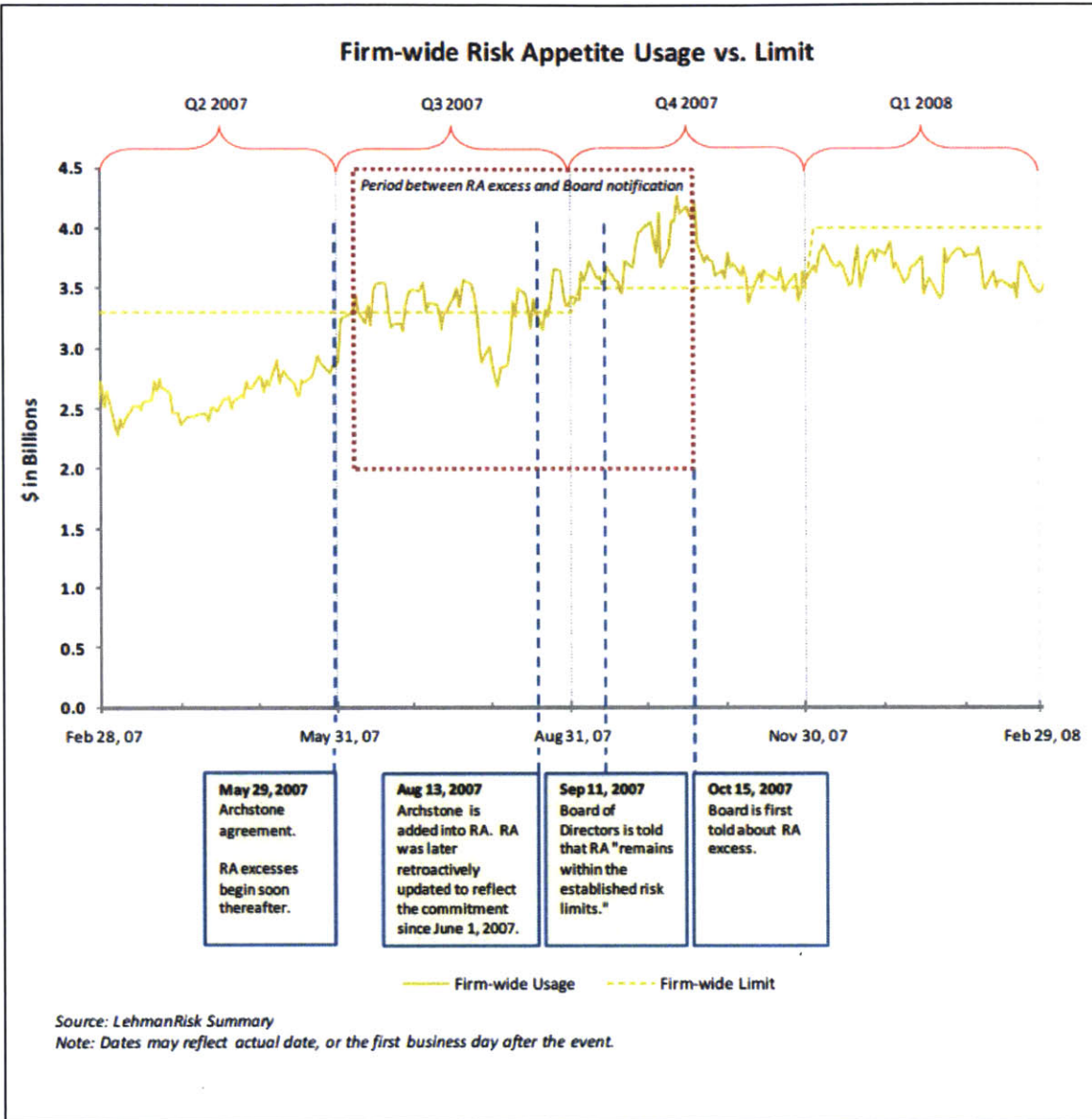


Figure 3.4 Lehman Brothers Risk Appetite and Limit Usage

(Valukas 2010)

### Single Transaction Limits

The single transaction limit system consists of two limits:

- one limit applicable to the notional amount of the expected leverage loan
- one limit applicable to a calculated amount that Lehman was at the risk of losing on the leveraged loan (Valukas 2010)



The point to be noted here is that these limits were a function of Lehman's equity. As Lehman was raring to make larger bets on the basis of a small equity base, the single transaction limit was a major constraint. This meant that Lehman was losing business to its competitors.

The proposal to remove single transaction limits was also heavily contested within Lehman by the likes of Madelyn Antoncic (CRO) and Alex Kirk, Head of Lehman's Credit Business. However, these voices were overruled by Fuld and Gregory who removed single transaction limits in 2006 as it had already "cost the firm significant opportunities". (Valukas 2010)

### **3.3.2 Growth in the Face of Crisis**

The subprime mortgage market had started showing its first signs of breakdown by the end of 2006. Subprime loan delinquency rates, which used to average around 10% in 2004 had risen to 13% by the end of 2006. (Bank for International Settlements 2007) As housing prices started declining in 2007, many banks started limiting their exposure to the subprime mortgage market. However, Lehman saw this as an opportunity to capture its competitors' market shares and adopted what they called as a "countercyclical growth strategy". (Lehman Brothers Holdings Inc., 2008 Financial Plan Summary Presentation to Lehman Board of Directors 2008)

Not only did Lehman continue to grow its leveraged loan and real estate mortgage businesses, it also acquired Archstone REIT in May 2007, without realizing that the underlying assets of all these investments had started to lose value. The Fixed Income Division of Lehman continued to increase its VaR limits even though return on assets were taking a hit.

In early 2006, when Lehman had started its expansion in mortgages, it had vertically integrated the entire real estate business where BNC and Aurora, both part of Lehman's Capital Division, would originate subprime and Alt-A loans respectively, and Lehman would securitize and distribute them. When cracks in the subprime mortgage market started showing, Lehman asked BNC to tighten its origination standards. However, Lehman did not put a halt to subprime lending till BNC's closure in August 2007. (Valukas 2010)

### 3.4 Valuation of Assets

Another striking aspect of the way Lehman Brothers conducted its business was its valuation of its assets. GAAP required Lehman to report the value of its financial inventory at fair value. However, early in the first quarter of 2007, Lehman adopted SFAS 157, which established the fair value of an asset as the price that would be received in an orderly hypothetical sale of the asset. SFAS 157 includes a three level fair value hierarchy that gives priorities to the inputs that might be used for valuation. (Valukas 2010)

- Level 1 - the highest priority is given to quoted prices in active markets for identical assets or liabilities
- Level 2 - observable inputs other than quoted prices
- Level 3 - unobservable inputs

If the fair value of an asset cannot be determined by reference to observable data based on transactions between parties in the market, other than data from distressed sales, SFAS 157 requires the reporting entity to use its judgment to determine fair value, taking into account its view as to the assumptions that market participants would use in pricing the asset. (Financial Accounting Standard Board, Statement of Financial Accounting Standards No. 157 2006)

#### 3.4.1 Wall Street loses confidence

Since Lehman depended largely on short term funding, investor confidence was extremely important. By the later part of 2007, as Lehman's assets started losing liquidity, Lehman increased its dependence on its own judgment to determine the fair value of its assets. However, some analysts on the street started raising concerns on the value of CDOs, write-downs etc. Among the most vocal was hedge fund manager David Einhorn. In an April 8, 2008 speech, he said,

*“At the end of November, Lehman had Level 3 assets and total assets of about 2.4 times and forty times its tangible common equity, respectively. Even so, at the end of January Lehman increased its dividend and authorized the repurchase of 19% of its shares. In the quarter ended in February, Lehman spent over \$750 million on share repurchases, while growing assets by another \$90 billion. I estimate Lehman's ratio of assets to tangible common equity to have reached forty-four times.*

*There is good reason to question Lehman's fair value calculations. It has been particularly aggressive in transferring mortgage assets into Level 3. Last year, Lehman reported its Level 3 assets actually had \$400 million of realized and unrealized gains. Lehman has more than 20% of its tangible common equity tied up in the debt and equity of a single private equity transaction – Archstone-Smith, a REIT purchased at a high price at the end of the cycle. Lehman does not provide disclosure about its valuation, though most of the comparable company trading prices have fallen 20-30% since the deal was announced. The high leverage in the privatized Archstone-Smith would suggest the need for a multibillion dollar write-down.*

*Lehman has additional large exposures to Alt-A mortgages, CMBS and below investment grade corporate debt. Our analysis of market transactions and how debt indices performed in the February quarter would suggest Lehman could have taken many billions more in write-downs than it did. Lehman has large exposure to commercial real estate. Lehman has potential legal liability for selling auction rate securities to risk averse investors as near cash equivalents. Lehman does not provide enough transparency for us to even hazard a guess as to how they have accounted for these items. Lehman responds to requests for improved transparency begrudgingly. I suspect that greater transparency on these valuations would not inspire market confidence.” (Einhorn, Private Profits and Socialized Risk 2008)*

At another investor conference in May, Einhorn alluded to some of the finer details in Lehman's 10-Q. (Einhorn, Accounting Ingenuity 2008)

- **CDOs:** Prior to 2008, Lehman had never made any mention of CDOs in its quarterly results. For the first time in Q2 2008, Lehman disclosed a CDO exposure of \$6.5 billion, which apparently it had been carrying for some time. This was revealed in a footnote to a table in Lehman's 10-Q. Lehman did have a similar table in its last quarter's earnings release, but without the footnote.
- **Write-downs:** Lehman said in its 10-Q that its had taken a \$200 million write-down for the value of its CDOs in that quarter. However, the street felt that this number was too low given the fact that 25% of the CDOs were rated below investment grade, and looking at the overall market scenario.
- **Number mismatch:** As per the March 18 earnings release, Lehman's Level III assets stood at \$38.9 billion (post a write-off of \$875 million). However, in the 10-Q filed on

April 8, this number went up to \$40.2 billion (with a profit of \$228 million, instead of a \$875 million loss). Lehman's CFO Erin Callan could not give a reasonable explanation for this, and shrugged it off as a "typical re-categorization of certain assets between Level II and III".

### 3.4.2 Bad valuation shoos away investors and bidders

Lehman was a party to tri-party trades with a number of investment banks. As the confidence in Lehman's asset valuations dipped, Lehman's clearance banks started demanding more collateral to secure risks associated with Lehman's trades. Lehman was forced to pledge structured instruments to its principal settlement banks. Here's how three big banks on the street reacted to the increasingly deteriorating situation of Lehman Brothers (Valukas 2010):

- **Citigroup:** Citigroup was not impressed by the illiquid nature of Lehman's assets and rejected the assets proposed.
- **JP Morgan:** JP Morgan was a little more accommodating than Citigroup and agreed to accept Lehman's structured instruments. However, the bank demanded additional collateral from Lehman. In fact, this collateral call from JP Morgan added fuel to the fire which was Lehman's liquidity situation.
- **Bank of America:** As noted earlier, Bank of America was one of the potential bidders for Lehman. However, as CEO Ken Lewis said, this was not a good deal for Bank of America "based entirely on the numbers." In all fairness, Bank of America did send a diligence team to Lehman. But the deal fell apart primarily because of what Lewis described as a "\$66 billion hole" in Lehman's valuation of its assets. And as it became clear to Lewis that the government was not willing to help them, they pulled out of the deal.

## 3.5 Corporate Governance

To be fair to Lehman, the business decisions that spelled doom for the firm might have been bad, but they were largely within the business judgment rule. However, the decision to prevent full disclosure of such judgments was definitely wrong on the part of Lehman's CEO Richard Fuld,

and its CFOs O'Meara, Callan and Lowitt. There are numerous evidences that suggest that Lehman had some serious problems with corporate governance.

### **3.5.1 Board of Directors**

The Lehman board consisted of 12 individuals. Fuld had served in the dual capacity of Chairman of the Board and CEO since 1994, and by 2008 owned 2.41% of the firm's outstanding common stock. His shareholding made up for more than 50% of the shares held by the firm's employees. The remaining 11 members of the board were not members of management and by NYSE independence rules, were considered independent. As per the proxy statement for the 2008 annual meeting, 10 of these 11 directors received an average compensation over \$365,000 in director fees, including distribution of profit and returns of capital (one director did not receive any compensation). In addition to this, eight directors had brokerage or investment accounts with the firm, six directors had investment in investment partnerships, and four served on boards of companies that were a source of revenue for Lehman. Moreover, some of the charities to which Lehman contributed also had affiliations to four of its directors. In essence, while these directors might be independent by NYSE standards, only one of the directors had no financial ties to Lehman Brothers. (Presley and Jones 2014)

Here is a list of Lehman's board of directors, nine of who were retired, four over 75 years old, one theater producer, one former Navy admiral, and only two with direct experience in the financial-services industry. (Berman 2008)

- Richard S. Fuld, Jr. (61) – CEO and Chairman
- John Macomber (80) – former McKinsey & Co. consultant and Chief Executive of chemical-maker Celanese Corp
- John Akers (74) – former IBM chief
- Thomas A. Cruikshank (77) – Chief Executive of Halliburton Co. prior to Vice President Dick Cheney
- Henry Kaufman (81) – Chief Economist at Salomon Brothers (1970s and 80s), was known as “Dr. Doom” for his bearish views on the U.S. economy
- Sir Christopher Gent (60) - one-time chief of Vodafone PLC
- Roger S. Berlind (75) – theatre producer
- Roland Hernandez (50) - former Telemundo Chief Executive

- Michael Ainslie (64) - former Chief Executive of Sotheby's Holdings
- Marsha Johnson Evans (61) - one-time head of the Red Cross and a former Navy rear admiral

Until 2006, Lehman's board included Dina Merrill, the 83-year-old actress once featured in the old Katharine Hepburn movie "Desk Set," as well as "Caddyshack II." (Berman 2008)

The power within the board was concentrated in the hands of Fuld, who held more than 50% of the beneficial ownership owned by company employees (officers and directors). Fuld had been a member of the board since 1990 and only one of the directors pre-dated him in board tenure. Also, the term of an elected director was one year, which reduced their impact on the decision making process. Fuld, on the other hand, was completely involved in the day-to-day operations of the firm and was aware of the leverage situation of the firm. According to the bankruptcy report, Fuld acted with gross negligence and breached the duty of care in filing misleading financial statements. When questioned by examiners, Fuld denied knowing that Repo 105 transactions were used to remove assets from the balance sheets, which was later proved to be untrue. (Valukas 2010)

Fuld also failed to inform other board members about the usage of Repo 105 transactions and the removal of single transaction limits

### **3.5.2 Audit Committee**

According to Lehman's proxy statement in 2008, the Lehman Brothers Audit Committee comprised of the following people (Lehman Brothers Holdings Inc., Proxy Statement 2008):

- Thomas H. Cruikshank, Chairman
- Michael L. Ainslie
- Roger S. Berlind
- Sir Christopher Gent

Cruikshank had been a former CEO and chairman of the board of Halliburton, and was deemed "an audit committee expert". However, according to the proxy statement, he is not indicated to have any experience in the financial services industry. None of the other members were deemed financial experts or had any experience in the financial services industry (Ainslie was from

Sotheby's, a leader in fine arts auction; Berlind was a theatre producer; and Gent was from Vodafone, a telecom giant). Therefore, they could not have claimed of a complete understanding the financial decisions at Lehman. Hence, it can be claimed with reasonable certainty that they had very limited knowledge or understanding of the Repo 105 transactions undertaken by Lehman Brothers.

Also, after the letter sent by Matthew Lee (Exhibit 4) came to light, it was required that the audit committee should have at least considered hiring an outside expert to provide assurance to the committee that each one of the whistleblower's allegations had been thoroughly investigated. Even if the audit committee had not read the letter, hiring an outside expert would have been extremely important, given the situation of the market and the firm. (Selling 2010)

### **3.5.3 Finance and Risk Committee**

The main responsibility of the Finance and Risk Committee was "reviewing and advising the board on the financial policies and practices of the Company, including risk management". This 5-person committee consisted of the following people:

- Henry Kaufman – Chairman
- John Akers
- Roger S. Berlind
- Marsha Johnson Evans
- Roland Hernandez

Kaufman was credited with over 26 years of experience in investment management, and had also served as an economist for the Federal Reserve. (Lehman Brothers Holdings Inc., Proxy Statement 2008) However, when questioned during the bankruptcy proceedings of Lehman Brothers, he said that he did not believe that \$50 billion in Repo 105 transactions was a significant amount, although he said that he would consider a four or five point change in leverage significant. (Valukas 2010)

The Finance and Risk Committee received periodic updates on Lehman's stress testing. As discussed above, SEC required the use of stress testing to evaluate the company's to quantify potential losses. The projections were designed to measure tail risk, a one in ten year event. However, the committee was not informed that many of the investments were excluded from the

stress testing. They were later informed about this by the management in a disclosure notation. According to the bankruptcy report, some of the directors were of the opinion that these exclusions were reasonable. Whereas, in reality, these exclusions were so significant that they were potentially equivalent to \$7.4 billion in losses. The bankruptcy report also found that the majority of the overall tail risk (or the risk that the firm was facing) was in the investments that were excluded from the stress testing. (Presley and Jones 2014) (Valukas 2010)

### 3.6 The Disadvantage of Not Failing First

On Monday 24, 2008, JP Morgan acquired troubled investment bank Bear Stearns for \$10 per share with the help of the New York Federal Reserve. According to the deal, JP Morgan purchased 39.5% of Bear’s shares on a pro forma basis and agreed to guarantee Bear’s borrowings from the New York Fed. Also, JP Morgan agreed to assume the first \$1 billion dollar of losses on the \$30 billion collateral pool provided to Bear by the New York Fed.

The Fed did this for a variety of reasons. But the biggest factor was systemic risk. On March 13, 2008, when Bear Stearns CEO Alan Schwartz called up Timothy Geithner to tell him that Bear would be filing for bankruptcy the next day, the Fed realized that Bear Stearns was “too interconnected to fail without causing catastrophic damage”, and was concerned that “if Bear collapses, any institution that looks anything like Bear could be the next domino to fall.

Lehman and Bear Stearns were starkly similar. They both had perilously high exposure to the mortgage market. Being investment banks, both of them did not have direct access to the Fed’s discount window and had to depend on short term loans for liquidity. Both had extremely high leverage ratios and as table 3.2 suggests, Lehman was probably in a better shape than Bear Stearns, even at the time of filing for bankruptcy.

	<b>\$ million</b>	<b>Bear Stearns</b>	<b>Lehman Brothers</b>
<b>Quarter of Failure</b>	MBS and ABS	\$38,186	\$72,461
	Shareholders’ Equity	\$11,896	\$26,276
	Ratio of MBS and ABS to Equity	3.2	2.8
	Leverage Ratio	32.8	24.3
	% of Level 3 Assets	9.4%	6.5%
<b>Previous Quarter</b>	MBS and ABS	\$46,141	\$84,609
	Shareholders’ Equity	\$11,793	\$24,832
	Ratio of MBS and ABS to Equity	3.9	3.4
	Leverage Ratio	32.8	31.7



	% of Level 3 Assets	9.9%	6.5%
<b>2 Quarters Prior</b>	MBS and ABS	\$55,937	\$89,106
	Shareholders' Equity	\$13,000	\$22,490
	Ratio of MBS and ABS to Equity	4.3	4.0
	Leverage Ratio	30.5	30.7
	% of Level 3 Assets	5.1%	6.1%
<b>3 Quarters Prior</b>	MBS and ABS	\$52,164	\$88,007
	Shareholders' Equity	\$13,274	\$21,733
	Ratio of MBS and ABS to Equity	3.9	4.0
	Leverage Ratio	29.7	30.3
	% of Level 3 Assets	4.8%	5.3%

Table 3-2 Comparison of financial positions of Bear Stearns and Lehman Brothers  
(Kensil and Margraf 2012)

So the biggest question that one would ask is, if the Fed and the government were so afraid of systemic risk, and if they could save Bear, why couldn't they save Lehman? The answer to this question can be explained by a variety of aspects.

### 3.6.1 Bad Timing

After the Fed backed acquisition of Bear Stearns, the Fed and the government received a lot of flak for using taxpayer money to bail out "greedy and reckless" investment banks. When on July 15<sup>th</sup>, 2008, when the news first surfaced that Lehman was considering going private or finding a buyer, the government did make an effort to organize an acquisition of Lehman. However, by the end of summer, it became clear that Freddie and Fannie, two Government Sponsored Entities were in more urgent need of a bail out than Lehman. Therefore, on September 6, 2008, the US government put Fannie and Freddie in conservatorship. Even this action of the government received a lot of backlash from the opposition, who was looking for a reason to point fingers at the government in light of the upcoming presidential elections. Therefore, the timing for Lehman's failure could not have been worse.

### **3.6.2 Moral Hazard**

When the government backed JP Morgan to acquire Bear Stearns, this action seemed to be a signal to the markets and financial institutions that there was significant likelihood of future intervention. This effectively created a moral hazard issue where the managements of these investment banks could afford to remain reckless, given the possibility of federal assistance, instead of focusing on improving their balance sheets. It was probably in light of this, that when faced with the possibility of Lehman's bankruptcy, Treasury Secretary Henry Paulson said, "I can't be Mr. Bailout". The government did not want to give a message to the markets that any financial institution with extremely toxic assets could expect to be saved by the government, just because of their systemic importance. (Kensil and Margraf 2012)

### **3.6.3 Legal Issues**

Also, the Fed's decision not to back a possible acquirer for Lehman was based on Section 13(3) of the Federal Reserve Act of 1913, which points out that direct lending by the Fed can be for the purpose of providing liquidity to a financial institution or the financial system, and not a failing entity. The Act also requires that the firms funded by the Fed must have adequate collateral to cover the loan and "[prohibits] borrowing from programs and facilities by borrowers that are insolvent." In light of the constantly deteriorating asset quality of Lehman, the Fed figured that Lehman did not have adequate collateral for the Fed to lend them money against. At the time of failure, Lehman was considered to be deeply insolvent, whereas evidence suggests that Bear Stearns was probably not completely insolvent. (Kensil and Margraf 2012)

## **4. Lessons from Lehman**

It has been more than 6 years since Lehman Brothers filed for bankruptcy. Ever since that fateful day, much of the public debate has been centered around two questions – Should the government have saved Lehman Brothers? What can governments, regulators and the financial world as a whole do to prevent another such crisis? There are several lessons that the financial world has derived from the Lehman debacle, lessons that help policymakers work towards building stronger, safer and more robust financial markets.

### **4.1 Capital Adequacy**

One of the biggest issues that financial institutions were grappling with in 2008-09 was capital inadequacy. In the case of Lehman Brothers, Bear Stearns, Merrill Lynch and many other investment banks that (almost) failed, there was a near run on the firms' capital and these firms did not have enough assets that could be collateralized to borrow additional funds from the market to maintain solvency. It was not just the investment banks that faced grave capital inadequacy issues, but even commercial banks with high exposure to such securities and instruments were facing a possible run on their funds.

In light of this, the Basel Committee on Banking Supervision came up with third installment of the Basel Accords to rectify the deficiencies in financial regulation revealed by the financial crisis. Basel III was built to increase bank liquidity and decrease bank leverage, thereby fortifying bank capital requirements. This accord was constituted with a focus of mitigating potential risks of a run on a bank's capital. According to the Basel III standards, there are four requirements that banks are mandated to fulfill:

#### **4.1.1 Capital Requirement**

The Basel III accord mandates banks to hold 4.5% of common equity (up from 2% in Basel II), and 6% of Tier I capital (up from 4.5% in Basel II) of risk-weighted assets (RWAs). In addition to this, Basel II norms also mandate banks to keep a "capital conservation buffer", equivalent to 2.5% of RWAs and; keep a "discretionary counter-cyclical buffer", allowing national regulators to require up to an additional 2.5% of capital during periods of high credit growth. (Basel

Committee on Banking Supervision, Basel III: A global regulatory framework for more resilient banks and banking systems 2011)

#### **4.1.2 Leverage Ratio**

The Basel III also mandated banks to maintain a leverage ratio of at least 3%. This leverage ratio is non-risk based and is calculated by dividing Tier 1 capital by the bank's average total consolidated assets (sum of the exposures of all assets and non-balance sheet items). (Basel Committee on Banking Supervision, Basel III: A global regulatory framework for more resilient banks and banking systems 2011) Learning from the contagion that occurred after Lehman's bankruptcy, the US Federal Reserve also mandates the leverage ratio to be 6% for 8 Systemically Important Financial Institutions (Bank of America, Bank of New York Mellon, Citigroup, Goldman Sachs, JP Morgan Chase, Morgan Stanley, State Street and Wells Fargo) and 5% for their insured bank holding companies.

#### **4.1.3 Liquidity Coverage Ratio**

The Liquidity Coverage Ratio (LCR) is another key reform to strengthen capital adequacy and liquidity regulations. Mathematically, the LCR is the ratio between High quality liquidity assets of the bank and the total net outflow of liquidity over the last 30 days. As the ratio suggests, the LCR ensures that a bank has an adequate stock of unencumbered high-quality liquid assets (HQLA) that can be converted into cash easily and immediately in private markets to meet its liquidity needs for a 30 calendar day liquidity stress scenario. It helps track a bank's ability to absorb shocks arising from financial and economic stress. (Basel Committee on Banking Supervision, Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools 2013)

The aim of the banks will be to achieve an LCR of 100%. It was introduced on 1 January 2015 with the minimum requirement at 60%, scheduled to rise in equal annual steps of 10 percentage points to reach 100% on 1 January 2019. (Basel Committee on Banking Supervision, Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools 2013)

#### **4.1.4 Net Stable Funding Ratio**

The Net Stable Funding Ratio (NSFR) mandates that the available amount of stable funding must exceed the required amount of stable funding over a one-year period of extended stress. In essence, the bank should have stable funding for:

- short-term exposures to banks and other financial institutions;
- derivatives exposures; and
- assets posted as initial margin for derivative contracts. (Basel Committee on Banking Supervision, Basel III: the net stable funding ratio 2014)

#### **4.2 Financial Stability**

In 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act was signed into a federal law by President Obama, as a response to the financial crisis of 2008-09. One of the biggest responsibilities of the Act was to promote financial stability and reduce systemic risk. Under this Act, The Financial Stability Oversight Council was formed. The Council, which is attached to the Treasury Department, is formed to identify threats to the financial stability of the United States, promoting market discipline, and responding to emerging risks to the stability of the United States financial system. According to the Act, the Council has three main purposes:

- Identification of risks to the financial stability of the United States from both financial and non-financial organizations
- Promotion of market discipline, by eliminating expectations that the Government will shield them from losses in the event of failure. This means that taxpayer money would no longer be expected to be used for bailing out troubled financial institutions.
- Response to emerging threats to the stability of the US financial system (Tahyar 2010)

In addition to this, in order to promote stability of the financial system and mitigation of risks, the Dodd-Frank Act also introduced the “Volcker Rule”, an amendment to the Bank Holding Company Act of 1956. This rule puts restrictions on speculative investments undertaken by banks that do not benefit their customers. The rule specifically prohibits a bank from engaging in proprietary trading that is not at the behest of its clients, and from owning or investing in a hedge fund or private equity fund, and also limits the liabilities that the largest banks can hold. (Financial Stability Oversight Council 2011)

### **4.3 Orderly Liquidation**

The biggest issue with the failure of Lehman Brothers, Bear Stearns and Merrill Lynch was the risk of contagion associated with these firms. The need for orderly liquidation of such firms was voiced by Ben Bernanke, chairman of the Board of Governors of the Federal Reserve System on multiple occasions.

*“In most cases, the federal bankruptcy laws provide an appropriate framework for the resolution of nonbank financial institutions. However, the bankruptcy code does not sufficiently protect the public’s strong interest in ensuring the orderly resolution of a nonbank financial firm whose failure would pose substantial risks to the financial system and to the economy. Indeed, after Lehman Brothers and AIG’s experiences, there is little doubt that we need a third option between the choices of bankruptcy and bailout for such firms.”* (Bernanke, Testimony of Ben S. Bernanke, Chairman of the Board of Governors of the Federal Reserve System, to the U.S. House of Representatives Committee on Financial Services 2009)

*“The government instead must have the tools to resolve a failing firm in a manner that preserves market discipline—by ensuring that shareholders and creditors incur losses and that culpable managers are replaced—while at the same time cushioning the broader financial system from the possibly destabilizing effects of the firm’s collapse”.* (Bernanke, Remarks on “The Squam Lake Report: Fixing the Financial System” 2010)

In order to counter this systemic risk, the Dodd-Frank Act included the provision of an Orderly Liquidation Authority (OLA). The OLA's provisions were aimed at simultaneously addressing two conflicting goals – mitigating systemic risk, while also minimizing moral hazard, which arises when investors believe that firms are likely to be granted a government bailout to save them from bankruptcy and prevent systemic problems. (Pellerin and Walter 2012)

### **4.4 Board Oversight**

Besides the policy actions discussed above, the board of directors at financial institutions must remain independent, and not just be friends of the CEO or the Chairman. The boards need to have

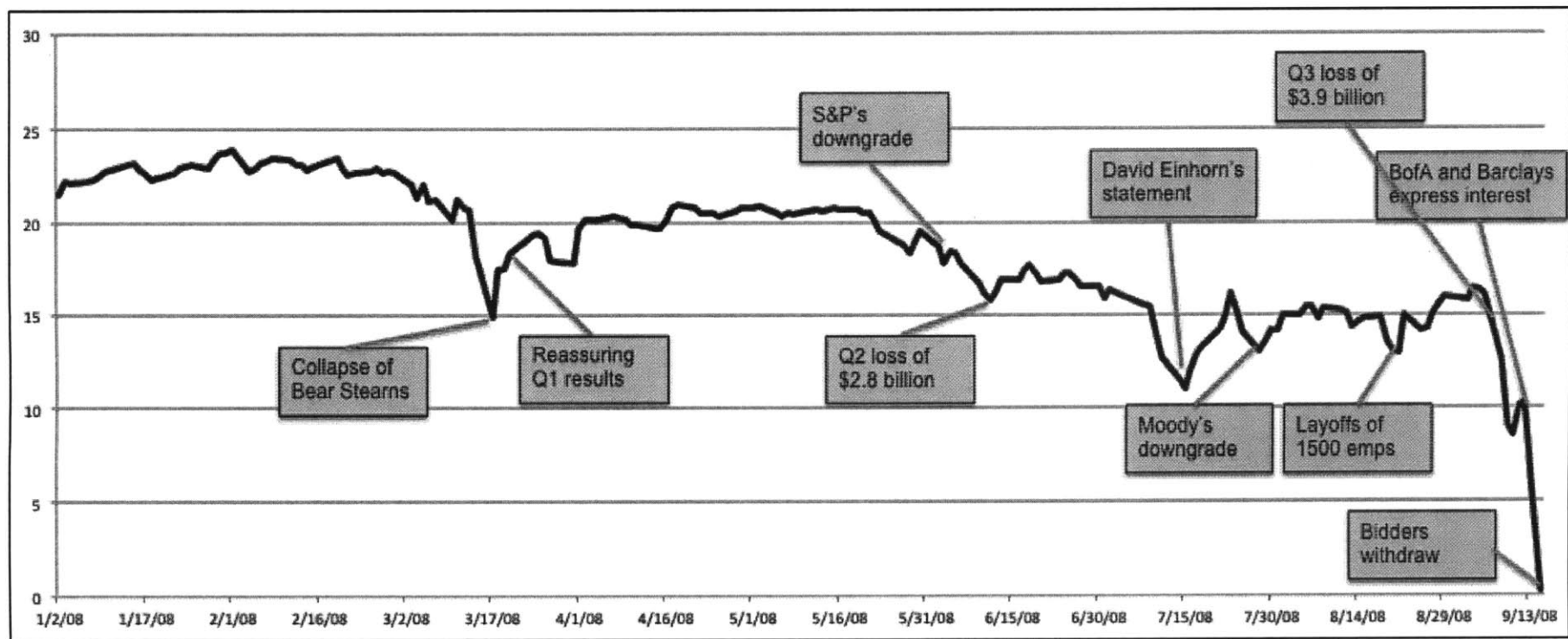
current and updated knowledge of the risk-taking products and strategies employed by their organizations, and should have the freedom to seek help from outside advisors and consultants when they do not possess adequate information. They should measure the firm's performance based on risk-adjusted metrics.

In addition to this, the regulator must conduct thorough and more rigorous examination of boardroom activities. The services of independent corporate governance agencies should also be sought by firms and regulators to ensure proper and complete oversight of the board's activities. (Williams 2010)

#### **4.5 Compensation Schemes**

It is a popular belief that the financial crisis of 2008 was brought upon by the most basic human nature – greed. The high-risk-high-return compensation policies of many Wall Street investment banks spelled doom for the financial world. Instead of being based plainly on the highest amount of money earned for the firm, the compensation schemes should also be adjusted for risk. Low risk and high profits should be rewarded more than high profits based on oversized bets. As we saw in 2008, when the investment banks had to shut shop, the firms' shareholders were the biggest losers. So it might not be a bad idea to peg the executive compensation to the share price of the firm through measures such as employee stock options, etc. This would also pave the way for better executive accountability. (Williams 2010)

Exhibit 1 Lehman Brothers Stock Price Jan 2, 2008 - September 15, 2008



(Morningstar 2008)



Exhibit 2 Accounting for Transfers and Servicing of Financial Assets: SFAS 140 Paragraph 9

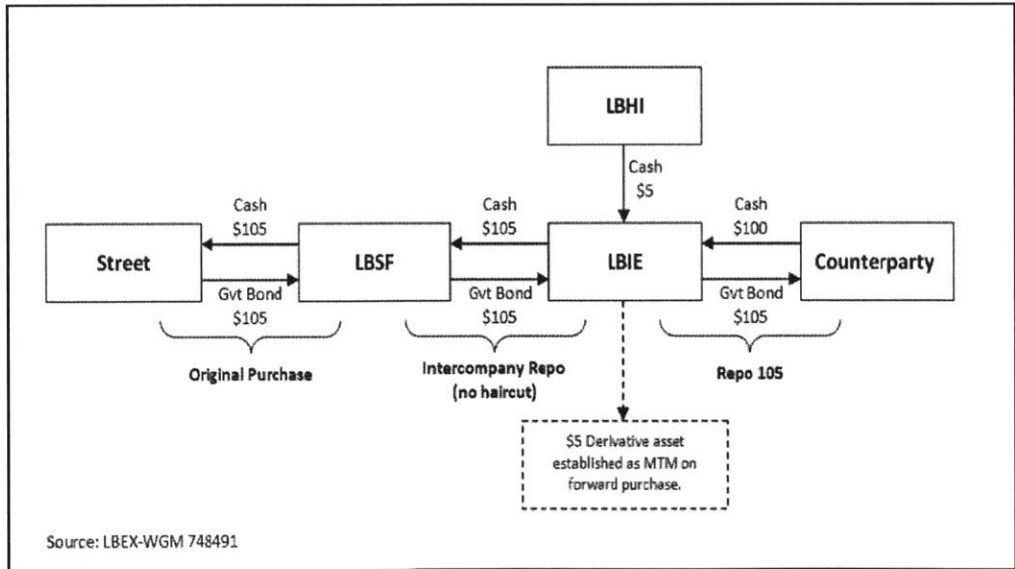
**Accounting for Transfers and Servicing of Financial Assets**

9. A transfer of financial assets (or all or a portion of a financial asset) in which the transferor surrenders control over those financial assets shall be accounted for as a sale to the extent that consideration other than beneficial interests in the transferred assets is received in exchange. The transferor has surrendered control over transferred assets if and only if all of the following conditions are met:

- The transferred assets have been isolated from the transferor—put presumptively beyond the reach of the transferor and its creditors, even in bankruptcy or other receivership (paragraphs 27 and 28).
- Each transferee (or, if the transferee is a qualifying SPE (paragraph 35), each holder of its beneficial interests) has the right to pledge or exchange the assets (or beneficial interests) it received, and no condition both constrains the transferee (or holder) from taking advantage of its right to pledge or exchange and provides more than a trivial benefit to the transferor (paragraphs 29 – 34).
- The transferor does not maintain effective control over the transferred assets through either (1) an agreement that both entitles and obligates the transferor to repurchase or redeem them before their maturity (paragraphs 47 – 49) or (2) the ability to unilaterally cause the holder to return specific assets, other than through a cleanup call (paragraphs 50 – 54).

(Financial Accounting Standard Board, Statement of Financial Accounting Standards No. 140 2000)

Exhibit 3 Circumvention of legal issues around Repo 105



(Valukas 2010)

**MATTHEW LEE**

May 16, 2008

**PERSONAL AND CONFIDENTIAL**

**BY HAND**

Mr. Martin Kelly, Controller  
Mr. Gerard Reilly, Head of Capital Markets Product Control  
Ms. Erin Callan, Chief Financial Officer  
Mr. Christopher O'Meara, Chief Risk Officer  
Lehman Brothers Holdings, Inc. and subsidiaries  
745 7<sup>th</sup> Avenue  
New York, N.Y. 10019

Gentlemen and Madam:

I have been employed by Lehman Brothers Holdings, Inc. and subsidiaries (the "Firm") since May 1994, currently in the position of Senior Vice President in charge of the Firm's consolidated and unconsolidated balance sheets of over one thousand legal entities worldwide. During my tenure with the Firm I have been a loyal and dedicated employee and always have acted in the Firm's best interests.

I have become aware of certain conduct and practices, however, that I feel compelled to bring to your attention, as required by the Firm's Code of Ethics, as Amended February 17, 2004 (the "Code") and which requires me, as a Firm employee, to bring to the attention of management conduct and actions on the part of the Firm that I consider to possibly constitute unethical or unlawful conduct. I therefore bring the following to your attention, as required by the Code, "to help maintain a culture of honesty and accountability". (Code, first paragraph).

The second to last section of the Code is captioned "FULL, FAIR, ACCURATE, TIMELY AND UNDERSTANDABLE DISCLOSURE". That section provides, in relevant part, as follows:

"It is crucial that all books of account, financial statements and records of the Firm reflect the underlying transactions and any disposition of assets in a full, fair, accurate and timely manner. All employees...must endeavor to ensure that information in documents that Lehman Brothers files with or submits to the SEC, or otherwise disclosed to the public, is presented in a full, fair, accurate, timely and understandable manner. Additionally, each individual involved in the preparation of the Firm's financial statements must prepare

those statements in accordance with Generally Accepted Accounting Principles, consistently applied, and any other applicable accounting standards and rules so that the financial statements present fairly, in all material respects, the financial position, results of operations and cash flows of the Firm.

Furthermore, it is critically important that financial statements and related disclosures be free of material errors. Employees and directors are prohibited from knowingly making or causing others to make a materially misleading, incomplete or false statement to an accountant or an attorney in connection with an audit or any filing with any governmental or regulatory entity. In that connection, no individual, or any person acting under his or her direction, shall directly or indirectly take any action to coerce, manipulate, mislead or fraudulently influence any of the Firm's internal auditors or independent auditors if he or she knows (or should know) that his or her actions, if successful, could result in rendering the Firm's financial statements materially misleading"

In the course of performing my duties for the Firm, I have reason to believe that certain conduct on the part of senior management of the Firm may be in violation of the Code. The following is a summary of the conduct I believe may violate the Code and which I feel compelled, by the terms of the Code, to bring to your attention.

1. Senior Firm management manages its balance sheet assets on a daily basis. On the last day of each month, the books and records of the Firm contain approximately five (5) billion dollars of net assets in excess of what is managed on the last day of the month. I believe this pattern indicates that the Firm's senior management is not in sufficient control of its assets to be able to establish that its financial statements are presented to the public and governmental agencies in a "full, fair accurate and timely manner". In my opinion, respectfully submitted, I believe the result is that at the end of each month, there could be approximately five (5) billion dollars of assets subject to a potential write-off. I believe it will take a significant investment of personnel and better control systems to adequately identify and quantify these discrepancies but, at the minimum, I believe the manner in which the Firm is reporting these assets is potentially misleading to the public and various governmental agencies. If so, I believe the Firm may be in violation of the Code.

2. The Firm has an established practice of substantiating each balance sheet account for each of its worldwide legal entities on a quarterly basis. While substantiation is somewhat subjective, it appears to me that the Code as well as Generally Accepted Accounting Principles require the Firm to support the net dollar amount in an account balance in a meaningful way supporting the Firm's stated policy of "full, fair, accurate and timely manner" valuation. The Firm has tens of billions of dollars of unsubstantiated balances, which may or may not be "bad" or non-performing assets or real liabilities. In any event, the Firm's senior management may not be in a position to know whether all of these accounts are, in fact, described in a "full, fair, accurate and timely" manner, as required by

the Code. I believe the Firm needs to make an additional investment in personnel and systems to adequately address this fundamental flaw.

3. The Firm has tens of billions of dollar of inventory that it probably cannot buy or sell in any recognized market, at the currently recorded current market values, particularly when dealing in assets of this nature in the volume and size as the positions the Firm holds. I do not believe the manner in which the Firm values that inventory is fully realistic or reasonable, and ignores the concentration in these assets and their volume size given the current state of the market's overall liquidity.

4. I do not believe the Firm has invested sufficiently in the required and reasonably necessary financial systems and personnel to cope with this increased balance sheet, specifically in light of the increased number of accounts, dollar equivalent balances and global entities, which have been created by or absorbed within the Firm as a result of the Firm's rapid growth since the Firm became a publicly traded company in 1994.

5. Based upon my experience and the years I have worked for the Firm, I do not believe there is sufficient knowledgeable management in place in the Mumbai, India Finance functions and department. There is a very real possibility of a potential misstatement of material facts being efficiently distributed by that office.

6. Finally, based upon my personal observations over the past years, certain senior level internal audit personnel do not have the professional expertise to properly exercise the audit functions they are entrusted to manage, all of which have become increasingly complex as the Firm has undergone rapid growth in the international marketplace.

I provide these observations to you with the knowledge that all of us at the Firm are entrusted to observe and respect the Code. I would be happy to discuss any details regarding the foregoing with senior management but I felt compelled, both morally and legally, to bring these issues to your attention. These are, indeed, turbulent times in the economic world and demand, more than ever, our adherence and respect of the Code so that the Firm may continue to enjoy the investing public's trust and confidence in us.

Very truly yours,



MATTHEW LEE

cc: Erwin J. Shustak, Esq.

(Valukas 2010)

## Bibliography

Asset Securitization Report & Source Media Inc. "Card ABS Teaches Lessons Subprime MBS Could Learn." 2007.

Bank for International Settlements. "77th Annual Report." Bank for International Settlements, 2007.

Basel Committee on Banking Supervision. "Basel III: A global regulatory framework for more resilient banks and banking systems." Bank for International Settlements, 2011.

Basel Committee on Banking Supervision. "Basel III: The Liquidity Coverage Ratio and liquidity risk monitoring tools." Bank for International Settlements, 2013.

Basel Committee on Banking Supervision. "Basel III: the net stable funding ratio." Bank for International Settlements, 2014.

Berman, Dennis K. "Where was Lehman's Board?" *The Wall Street Journal*, September 15, 2008.

Bernanke, Ben. *Monetary Policy and the Housing Bubble*. Annual Meeting of the American Economic Association, 2010.

—. "Remarks on "The Squam Lake Report: Fixing the Financial System?." *Squam Lake Conference*. 2010.

—. "Testimony of Ben S. Bernanke, Chairman of the Board of Governors of the Federal Reserve System, to the U.S. House of Representatives Committee on Financial Services." 2009.

*BIS Quarterly Review*. "Developments in Repo Markets During the Financial Turmoil." December 2008.

Blanchard, O. *The Crisis: Basic Mechanisms, and Appropriate Policies*. IMF Working Paper, 2009.

Brewster, Deborah, and Ben White. "Betting against Lehman at Record Levels." *Financial Times*, June 4, 2008.

Chang, Jow-Ran, Che-Chun Lin, Ting-Heng Chu, and Larry J Prather. *Sizing and Performance of Fixed-Rate Residential Mortgage Asset-Backed Securities Tranches*. Vol. 16. World Scientific Publishing Co. and Center for Pacific Basin Business, Economics and Financial Research, 2013.

Cho, M. "Subprime Mortgage Market: Rise, Fall and Lessons for Korea." (KDI School Working Paper) 2008.

*Economist*. "Fuld of Experience." April 2008.

Einhorn, David. "Accounting Ingenuity." *Ira W. Sohn Investment Research Conference*, May 2008.

Einhorn, David. "Private Profits and Socialized Risk." *Grant's Spring Investment Conference*, April 2008.

Federal Deposit Insurance Corporation. *Expanded Guidance for Subprime Lending Programs*. 2001.

Fibozzi, Fj. *The Handbook of Mortgage-Backed Securities*. McGraw-Hill Professional, 2005.

Financial Accounting Standard Board. "Statement of Financial Accounting Standards No. 140." September 2000.

Financial Accounting Standard Board. "Statement of Financial Accounting Standards No. 157." September 2006.

Financial Stability Oversight Council. "Study & Recommendations On Prohibitions On Proprietary Trading & Certain Relationships With Hedge Funds & Private Equity Funds." Dodd-Frank Wall Street Reform and Consumer Protection Act, 2011.

Fineman, Josh, and Yalman Onaran. "Lehman Brothers' Corporate History and Chronology: Timeline." *Bloomberg*. September 15, 2008. <http://www.bloomberg.com/apps/news?pid=newsarchive&sid=a63mWc3ILITo>.

Gorton, G. "The Panic of 2007." *Kansas City Fed Economic Policy Symposium*. 2008.

Green, R, and S Wachter. *The American Mortgage Market in Historical and International Context*. Vols. 19, no. 4. *Journal of Economic Perspectives*, 2005.

Hennessey, Keith, Douglas Holtz-Eakin, and Bill Thomas. *Dissenting Statement of Commissioner Keith Hennessey, Commissioner Douglas Holtz-Eakin and Vice Chairman Bill Thomas*. US Financial Crisis Inquiry Commission, 2010.

Hindmoor, A, and A McConell. *Why Didn't They See It Coming? Warning Signs, Acceptable Risks and the Global Financial Crisis*. Vol. 61. Political Studies Association, 2013.

International Monetary Fund. *Combining Systemic Risks and Restoring Financial Soundness*. Global Financial Stability Report, 2008.

Jones, Bryce, and Theresa Presley. "Law and Accounting: Did Lehman Brothers Use of Repo 105 Transactions Violate Accounting and Legal Rules." *Journal of Legal, Ethical and Regulatory Issues* 16(2) (2012): 55-91.

Kensil, Sean, and Kaitlin Margraf. "The Advantage of Failing First: Bear Stearns v. Lehman Brothers." *Journal of Applied Finance*, 2012.

Lawson, T. *The Current Economic Crisis: Its Nature and the Course of Academic Economics*. Vol. 33 (4). *Cambridge Journal of Economics*, 2009.

Lehman Brothers Holdings Inc. "2008 Financial Plan Summary Presentation to Lehman Board of Directors." January 2008.

Lehman Brothers Holdings Inc. "Annual Report to Security Holders for fiscal year ended November 30, 2007." 2007.

—. "Earnings Call Transcript Q2 2008." 2008.

—. "Earnings Call Transcript Q4 2007." 2007.

—. "Proxy Statement." *SEC Archives*. March 2008. [http://www.sec.gov/Archives/edgar/data/806085/000104746908002261/a2183244zdef14a.htm#cu76801\\_audit\\_committee\\_report](http://www.sec.gov/Archives/edgar/data/806085/000104746908002261/a2183244zdef14a.htm#cu76801_audit_committee_report).

Lins, Gerald, Marie Picard, and Thomas Lemke. *Mortgage Backed Securities*. Thomson West, 2013.

Mikes, Anette, Gwen Yu, and Dominique Hamel. "Lehman Brothers and Repo 105." (Harvard Business School Publishing) 2013: 2-4.

Moore, Heidi. "Congress Grills Lehman Brothers's Dick Fuld: Highlights of the Hearing." *Deal Journal*, October 6, 2008.

Morningstar. "Lehman Brothers Holdings Capital Trust IV Pref Share LEHLQ." *Morningstar*. 2008. [http://performance.morningstar.com/stock/performance-return.action?p=price\\_history\\_page&t=LEHLQ&region=USA&culture=en-us](http://performance.morningstar.com/stock/performance-return.action?p=price_history_page&t=LEHLQ&region=USA&culture=en-us).

Murphy, D. *Unravelling the Credit Crunch*. Chapman & Hall/CRC financial mathematics series , 2009.

*National Home Ownership Strategy*. Department of Housing and Urban Development, 1995.

Paletta, Damian, Susanne Craig, and Deborah Solomon. "New York Fed Holds Emergency Meeting On Lehman's Future." *Wall Street Journal*, September 13, 2008.

Pederson, Jay. *Lehman Brothers Holdings Inc*. Vol. 99, in *International Directory of Company Listings Volume 99*. Gale, 2009.

Pellerin, Sabrina R., and John R. Walter. "Orderly Liquidation Authority as an Alternative to Bankruptcy." *Economic Quarterly* 98 (2012): 1-31.

Piketty, T, and E Saez. *Income Inequality in the United States 1913-1998*. NBER Working Paper 8467, National Bureau of Economic Research, 2001.

Presley, Theresa J., and Bryce Jones. "Lehman Brothers: The Case Against Self-Regulation." *Journal of Leadership, Accountability and Ethics* 11(2) (2014): 11-28.

Rajan, Raghuram. *Fault Lines: How Hidden Fractures Still Threaten the World Economy*. Princeton University Press, 2010.

*Remarks by the President on Homeownership*. Department of Housing and Urban Development, 2002.

Selling, Tom. "Could Lehman's Audit Committee Have Done Better?" *The Accounting Onion*. March 14, 2010. <http://accountingonion.typepad.com/theaccountingonion/2010/03/audit-committee-common-sense-was-it-present-or-absent-at-lehman.html>.

Stiglitz, J. *The Anatomy of a Murder: Who Killed America's Economy?* Vol. 21 (3). Critical Review, 2009.

Tahyar, Margaret E. "Summary and Implementation Schedule of the Dodd-Frank Act." Davis Polk & Wardwell LLP, 2010.

Valukas, Anton R. "Report of Anton R. Valukas, Examiner on Lehman Brothers Holdings Inc. Chapter 11 Proceedings." United States Bankruptcy Court Southern District of New York, 2010.

Williams, Mark T. *Uncontrolled Risk: The Lessons of Lehman Brothers and How Systemic Risk Can Still Bring Down the World Financial System*. McGraw-Hill, 2010.

