

# Lehman Brothers' rise and fall: From hero to dust

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## 0. Abstract

*Lehman Brothers collapse was the event that spread worldwide the shakes of the financial system' stability as a crisis of confidence had already occurred. It was the fourth largest investment bank in US as of 2007 and its bankruptcy was the biggest ever known by society. What started as a dry goods 'store of a 23-year old Bavarian emigrant settled in Montgomery, Alabama, would be transferred throughout years on the giant fourth investment bank with nearly 25,000 employee staff. However, the colossal failure was the event who changed the rules of the so-called game of "Being too big, to fail".*

The aim of this paper is to analyze the case of Lehman Brothers; the reasons of the glory and the root of evils towards the demise. Lehman's' risk management procedures, their accounting tricks and maneuvers under Repo 105 & 108 and corporate governance as well, are discussed to provide insights of the crash. Whether the demise was destined to occur or it was pushed, this will be another issue to be reviewed in the paper. Finding the qualitative reasons for the demise and ranking them according to the importance, we try to provide a quantitative analysis by studying with a simple regression model the role of short sale and investors' sentiments on the Lehman's demise. In this last part, through an empirical model of undergraduate level of knowledge, we test for Lehman Brothers case "A Fuller Theory on short Selling" to conclude whether the demand for share at Lehman is a greed-motivated demand curve or a fear-based one.

**Key words:** bankruptcy, credit default swaps, fraud, government policy and regulation, investment banking, risk management, short sales

## 1. Introduction

The story of Lehman Brothers begins with the struggles for a better life of a 23-year old Bavarian emigrant, Henry Lehman and it is with the arrival of Richard Fuld, the greedy, power hungry and the irresponsible, where the story ends. In America, during 2000s a new market of subprime was booming and high returns could be ripped from it. Lehman couldn't resist it and soon began to specialize in subprime mortgages combined with a number of other instruments which aim to mask the risk and boom the returns. On the other hand a mentality of "untouchable" as they were too big to fail was constructed. However, the failure already showed that no one can beat the market. Failure of Lehman Brothers brings out important lessons to be taught, but firstly one has to understand the reasons for such a failure.

The aim of this paper is to discuss the case of Lehman Brothers by looking at the glorious past to the current collapse. The main question that it is reviewed is "Why did Lehman Brothers fall?" After making a qualitative analysis, we review the second question which is part of the large debate "Was its failure pushed or fated?" Lastly, by building a regression model, we try to provide a quantitative analysis for the question "To what extent did short sale and investors' confidence contributed to the Lehman's collapse?"

It is worth mentioning that the paper may be regarded on the series of review papers about the Lehman demise. However, what we contribute with in this list of earlier papers is the simple, yet relevant quantitative model of OLS (Ordinary Least Square) about the impact of short sale and the role of investors' confidence in Lehman stock price. It is worth highlighting three limitations with the paper: First, we draw on a wide array of useful analysis of Lehman collapse from newspapers' articles, books, scientific journals, testimony on New York bankruptcy court and other research papers. There

is no new data or example we provide. Second, we do not conduct an extra examination of us in regard to Lehman's failure. Rather in reexamining selective pieces of evidences, we provide a simplified qualitative & quantitative framework of the professional public view on what went wrong for Lehman. Third, policy makers, financial regulators or influential economists do not share a uniform view in that Lehman decision triggered the global financial panic. While some prominent Lehman skeptics including John Taylor, John Cochrane and Luigi Gonzales (2009) have made the case that the Lehman decision did not trigger the fall panic, William Sterling (2009) argues in his paper that Lehman bankruptcy represented a massive financial shock that clearly triggered the panic. However our goal is to collect simple and relevant summary of evidences as a channel for framing and motivating our assessment of what went wrong for Lehman and how much did it go wrong for the rest of the system.

## **2. Literature review**

Lehman Brothers bankruptcy had devastating effects for the financial markets and economies worldwide. It was not just a banking failure, it was a human failure, and it was the face of the financial crisis. Approximately four years later from their bankruptcy on 15 September 2008, a number of papers and analysis has evolved to find the root of such event, causes of failure, consequences to the economy, as well as to suggest lessons from every dimension in order to prevent another Lehman case in the future.

Starting from what it could have been done, a number of authors agree on that Lehman collapse could have been anticipated (Christopolus, Mylonakis, Diktapanidis 2011; Maux, Morin 2011). Using CAMELS rating system, Christopolus, Mylonakis, Diktapanidis (2011) find that "their credits were bad and doubtful while its management appeared to be unwilling and unable to reverse its declining course". They suggest that "management was not complying with the rules set by supervisory authorities, while the risk management methods followed is regarded as insufficient proportionally to its size". They conclude that given its vulnerability against the risks or unstable conditions, the supervisory authorities and US Federal Reserve should have anticipated signs of a decline. Similarly, Maux and Morin (2011) find out that Lehman Brothers failure could have been predicted. Their analysis shows that there were clear signs of financial distress detectable in Lehman Brothers' 2005-2007 financial statements such as: chronic inability to generate cash from operating activities, massive and systematic investments in working capital items, and even more intense investments in financial instruments, systematic use of external financing to offset operating deficits and steady deterioration of the cash situation over the three consecutive years. They argue that Lehman Brothers financial statements of cash flows from 2005-2007 were very strong predictors of its bankruptcy.

Concerning the reasons of failure, a complex of reasons can be seen as contributors to its failure starting from: excessive exposure on subprime market, excessive use of derivatives such as CDO-s, CDS, MBS etc., failure of credit rating agencies to assign risk properly, company business strategy, fraud and other miscellaneous factors. Dutta, Caplan and Lawson (2010), based on the bankruptcy report of Anton Valukas, examiner of Lehman (2010), examine some of the practices at Lehman such as aggressive higher-growth business strategy, Repo 105 and 108 transactions, compliance with GAAP and IMA's values and ethics. They reexamine Lehman as a case to provide insight regarding challenges to corporate governance that firms face during financial distress. A deeper insight into Lehman's fraud is provided by Jeffers (2011) which examines whether Repo 105 transactions were properly recorded and disclosed in Lehman's financial statements and whether Lehman's executives behaved ethically by comparing the compliance of the Lehman with GAAP, Sarbanes-Oxley Act and Institute of Management Accountants Standards. Jeffers's findings suggest that Lehman behaved unethically. Steinberg and Snowdown (2009) blame on the complex structure of the organization along with numerous other issues leading to the bankruptcy. Caplan et al., (2010) mention that in 2006, Lehman made a deliberate decision in pursuing a higher-growth business strategy. To achieve their goal "they switched from a low-risk brokerage model to capital-intensive banking model that required them to buy assets and store them as opposed to acquiring assets to primarily moving them to a third party". An interesting finding is that of the effect of short sale on Lehman Demise. Petukh (2009) conclude that short sales played a significant role in the demise of the company. As of him,

short sales contributed to devaluing Lehman Brothers' stock, which in turn led to the loss of investors' confidence.

There is much debate about the topic regarding the decision not to rescue Lehman Brothers. While some see it as a wrong decision since Lehman's failure triggered the panic and the crisis, there are others who argue that Lehman's decision did not trigger the fall panic (Taylor 2008, Cochrane 2009, Gonzales 2009). Rather these Lehman's skeptics (Taylor, Cochrane, and Gonzales) see the fall panic as having the root in many other government failures. Their argument is that "Lehman's failure itself was not necessarily trigger since measures like the three month Libor-Overnight interest swaps (OIS) spread did not move immediately in response to the Lehman news". Employing an event study, they suggest that the government announcement of the TARP plan (Troubled Asset Relief Program) contributed to take off main risk indicators. Economist John Taylor has argued that "the role of Lehman in unleashing the crisis has been exaggerated and that it was instead the panic-stricken behavior by Bernanke and Paulson that made the greatest contribution to the crisis" (Taylor 2009). Jamie Dimon, the CEO of JP Morgan Chase, is of this opinion: "After Lehman's collapse, the global financial system went into cardiac arrest. There is much debate over whether Lehman's crash caused it - but looking back, I believe the cumulative trauma of all the aforementioned events and some large flaws in the financial system are what caused the meltdown. If it hadn't been Lehman, something else would have been the straw that broke the camel's back" (Carney 2009). Mark Zandi has made a similar argument as Taylor, but he pinpoints the decision by the Fed to put Freddie Mac and Fannie Mae in conservatorship as the trigger that transformed the 2007 crisis into a full-scale panic in 2008 (Zandi 2009). Lehman did operate as a "jolt", according to Taylor, while Zandi considers Lehman to have been the Fed's second big mistake. Adrian Pop and Nicolas Dumontaux (2009) through the use of stock market data, examine the investors' reaction to Lehman's collapse in an attempt to identify a contagion effect on the surviving financial institutions. Overall, their findings suggest that "the observed contagious effects were rational/discriminating rather than panic-driven/undifferentiated and tend to weaken the case for the bailout of Lehman Brothers".

On the other hand, Swedberg (2009) in his paper applies the confidence factor to the case of Lehman's collapse and analyses how it helped to turn the credit crunch of 2007 into the panic of 2008. His argument is that confidence has played a key role in the financial system though it has not attracted enough analytical attention until so far (Swedberg 2009). While Taylor, Cochrane and Zingales deny that the decision not to rescue Lehman did trigger the fall panic, Sterling (2009) argues that the Lehman bankruptcy represented a massive financial shock that clearly triggered the panic. Using a broad-based assessment of financial conditions: a composite index of financial conditions called BFCIUS Index (Bloomberg Financial Condition Index), rather than a selective focus on some potentially misleading indicators, he shows that the immediate market reactions to the Lehman event represented the most severe shock to financial conditions in the history. Inspired by the bankruptcy of Lehman Brothers and its consequences on the global financial system, Pawel Sieczka, Didier Sornette, Janusz A. Holyst suggests a model regarding the effect of decision to not rescue Lehman. Sieczka, Didier and Holyst (2010) develop a simple model in which the Lehman default event is quantified as having an almost immediate effect in worsening the credit worthiness of all financial institutions in the economic network. They show that bailing out the first few defaulting firms does not solve the problem, but does have the effect of alleviating considerably the global shock, as measured by the fraction of firms that are not defaulting as a consequence.

Lehman Brothers collapse as the biggest bankruptcy known by society until now represents broad lessons to all of us. Greenfield, a chief talent officer at Lehman for seven years, suggests that Lehman's experience offers a lesson about the corporate culture. "For Lehman, the mistake lay in putting too much faith in an outmoded culture and failing to see how its very strength undermined the business" (Greenfield 2010). Henry Barkhausen, a law student at Yale law School suggests lessons from Lehman Brothers concerning the derivatives in bankruptcy (Barkhausen 2009). Horatio Boedihardjo, a doctorate mathematician at Oxford University while explaining the complex structure of CDO instrument, brings to us a simple yet crucial lesson: do not use something that you do not understand (Boedihardjo 2009). Richard Fuld is often blamed for this fact. Fuld's personal experience was mainly as a bond trader and he had little technical understanding of such new financial

instruments such as collateralized debt obligations (CDOs), credit default swaps (CDSs), and the like (McDonald & Robinson 2009). Arturo Bris, a Professor of Finance at IMD, conclude that Lehman Brothers was not a failure of financial markets. Rather it was a failure of corporate governance. According to him, “fraud is the bottom of all failures. Lehman Brothers has so many similarities with all of the past cases at Enron, Worldcom, and Parmalat” (Bris 2009). To conclude, human memories are so short-term. There is one more crucial lesson to be learned and perhaps the most important one: to learn from past history, experience and mistakes.

### **3. The glorious history of Lehman Brothers**

The history of Lehman Brothers traces its roots back to 1844, when the 23-year old Henry Lehman, a young emigrant from Bavaria, Germany, settled in Montgomery, Alabama to open a dry goods store. In 1850, The Lehman Brothers was founded with the arrival of two other brothers Emanuel and Mayer Lehman. It started as a merchandise business, but soon capitalizing on cotton's high market value, the brothers focused on commodities trading and brokerage operations. In 1858, a first branch office was opened in New York, creating the opportunity to have a larger presence in the commodities trading business and in the financial community. In 1887, the membership of Lehman Brothers in New York Stock Exchange marked the evolution of it from a commodities business to a merchant-banking firm.

In 1899, the initial public offering of International Pump Company was underwritten by Lehman Brothers. In 1906, Philip Lehman (the son of Emanuel) and Henry Goldman (a dominant partner of Goldman Sachs), partnered to underwrite the issue of securities of some famous retail companies for the following two decades such as: Sears, Roebuck & Co., F.W.Woolworth, May Department Stores, Gimbel Brothers, B.F Goodrich and Endicott Johnson Corp. After Philip Lehman retirement, in 1925 his son, Robert Lehman led the firm until 1969, when he died. This period is remarked as a period of significant expansion and growth for the firm, which became active in financing of airlines and motion pictures companies, and in supporting the retail industry. In 1960, especially through commercial papers issuance, the firm significantly expanded its capital markets trading capabilities, designated as an official dealer for US. Treasuries. Through 1960-1970, by opening offices in Europe and Asia, Lehman Brothers increased significantly their global presence. In 1969, Robert Lehman, the last leader of member family died, bringing hard time to the firm. In 1973, Pete Peterson became Chairman and CEO and the firm acquired Abraham & Co. in 1975, while two years later, merged with distinguished investment bank, Kuhn, Loeb & Co. which further enhanced the firm's international stature. Under Peterson, the firm experienced five consecutive years of record profits with a return on equity among the highest in the investment bank industry. Notwithstanding the success of the firm, internal increasing tensions, pressures and struggles, brought the sale of the firm to American Express in 1984, for \$360 million and Lehman Brothers merged with Shearson under the name Shearson Lehman/American express. In 1986, Lehman seats on the London Stock Exchange and two years later in 1988 on the Tokyo Stock Exchange. In 1988, a newly merged firm was born: the so-called Shearson Lehman Hutton Inc. with Dina Merrill being the director. After spinning- off from American Express, she continued to serve as a director of Lehman Brothers Holding Inc. In 1993, American Express divested Shearson and sold its retail brokerage and asset management to the Primerica. In 1994, through a public stock offering Lehman Brothers holding Inc. became independent and soon began trading common stocks on the New York and Pacific Stock Exchanges, under the ticket symbol “LEH”.

In 1994, Richard Fuld becomes the top head of Lehman. Following the 1994 IPO, the company was repeatedly subject to rumors. In 1998, Fuld fought off the rumors that LTCM has caused a cash crunch at Lehman. In 1999, an alliance with Bank of Tokyo – Mitsubishi was established. During 2000s, pressures and tensions were raised once again in the company. In 2001 Fuld, decided to pay staff less and in stock rather than lay off employees. In 2002, Lehman which has established its wealth and asset management division, acquired Lincoln Capital Management's fixed income business. Having a glorious past story with remarkable successes and achievements, but not at least with plenty of challenges over the years, Lehman prospered over the decades and survived to all of the hurricanes: the railroad bankruptcies of the 1800s, the Great Depression of the 1930, the two world wars, a capital shortage. Then it was spun off by American Express in 1994, and the Long Term Capital Management collapse and Russian debt default of the 1998. However, the latest bubble of housing market in USA

brought it under knees. This recent headlong rush into the subprime mortgage market proved to be a step.

#### **4. A qualitative analysis: Causes of failure of Lehman Brothers**

To explain how all did it started, the illustration of Horatio Boedihardjo, a doctorate student in probability at Oxford University, is cited: “On a sunny morning in 2001, a piece of investment plan landed on the desk of Richard Fuld, the then Chief Executive of Lehman Brothers. The document, compiled by a team of mathematics and physics PhDs, included a calculation to show how the bank will always end up with a profit if they invested on real estate markets. Fuld was impressed. The next five years saw the bank borrowing billions of dollars to invest in the housing market. It worked. The housing market boom had turned Lehman Brothers from a modest firm into the world’s fourth largest investment bank” (Boedihardjo 2009).

With easing credit conditions policy set by Alan Greenspan, after the terrorist attack of 2001, housing market was flourished in USA. Soon Lehman tried to rip profit from this feasible investment by acquiring 5 mortgage lenders and by becoming a leader in the production of securitized mortgage (Hudson 2007). However acquisition of Aurora Loan Services in Colorado and BNC Mortgage in California was its disastrous step: they had excessively lent Alt-A loans to unqualified borrowers without full documentation. Numerous lawsuits were initiated against Lehman by 2007, when the housing market brought the cracks. “Lehman had made anything to make the deal work, encouraging borrowers that could not afford in taking loans”(Hudson 2007). When the subprime crisis deteriorated, Lehman began to suffer huge losses. This chapter makes it possible to make a qualitative assessment of the causes of Lehman Brothers’ failure. For ease of exposition, the causes are classified and listed. There are a number of contributing factors which led to the collapse such as SIV products and their valuation problems, misrepresentation of financial statements, complex structure of the company, managerial problems and low ethical standards, but not at least the failure can be attributed to agents which were responsible for the house market crisis such as: greedy and reckless traders, mortgage houses, credit rating agencies, deregulation and Fed’s actions. For the purpose of our study, we base on Shelagh Heffernan’ framework to classify the main factors that caused Lehman collapse as: poor risk and asset management, managerial problems and fraud (Heffernan 2005, Modern Banking, pg.390).

##### **4.1. Poor assets and risk management**

The old saying “do not put all of your eggs in the same basket” is always relevant and true. What Lehman did when the housing market was booming, was borrowing excessively and investing all the proceeds in the mortgage market. Because of securitization process, subprime or NINJA loans were granted by mortgage houses that Lehman had already purchased. Greed and reckless pushed it so far that soon Lehman established itself as a leader in the market for subprime-mortgage backed securities according to Wall Street Journal (Hudson 2007). From 2006 till mid-2007, Lehman pursued a very aggressive strategy of expansion in commercial real estate, private equity and leveraged lending using its own capital (Valukas 2010). In 2007 by underwriting even more mortgage backed securities, Lehman accumulated a portfolio of \$85 billion four times larger than its shareholders’ equity (Investopedia 2009). However, the overconcentration in the mortgage market made it especially vulnerable and sensitive to a downfall in housing price. In addition, what it seemed as a safe investment under the protection of CDOs and CDSs turned out to be disastrous when the crisis erupted.

Putting simply, a CDO is a pool of mortgages backed securities which are classified into three tranches according to the risk level: senior, mezzanine and junior tranches. The deal under CDSs involve selling a part of the CDO under the agreement that if for example more than 10 borrowers go default, I need to pay only for ten of them while the other party have to pay for the rest, while if less than ten borrowers default the other party have to pay everything. The above example corresponds

respectively to a senior tranche and a mezzanine tranche of a CDO. The deal under CDS comes at the expense of paying a certain premium to the party with which you engage in the contract agreement. However, as Horatio Boedihardjo explains, there are two common fallacies associated with CDO investment: the probability of default on CDO rather than the probability itself, it depends on the square of probability default and second, there is an additional risk involved in this model due to high dependence of CDO on the market. The probability of default is calculated based on historical data of a normal market; however a sudden downturn might change it significantly. So if the probability of borrowers going default quadrupled, the probability of going default on CDO investment increases by a factor of 16. Therefore the camouflaged risk under CDO made Lehman loose huge (Boedihardjo 2009).

In addition, CDOs were part of the story of liquidity problems in 2007 and in 2008. Funding for these SIVs (structured investment vehicles) comes from the issuance of commercial papers which is continuously rolled over, and the proceeds are invested in longer term-maturity assets such as CDOs or CDSs which have less liquidity, but pay a higher return. As long as these assets have a high credit rating and the market is liquid, there is no concern regarding the maturity mismatch between short-term funding and long-term investment. However from summer 2007, when US subprime mortgage defaults increased, CDOs and MBSs investors became nervous about their exposure to such assets and stopped investing in commercial papers. Withdrawal of their funds adversely impacted the sector, as SIVs were unable to roll over or renew their commercial paper. Moreover, their credit rating downgraded significantly. When the borrowers began to call back the loans, as they lost the confidence, Lehman put in trouble: it had borrowed much more than it could afford. Its leverage ratio increased from 24 in 2003 to 31 (Blackburn 2008). "If a ratio of 20, it is considered to be fine when the assets consists of easily valued ones such as commercial papers, bonds or stocks, a scaled ratio to 31 means asking for trouble when moreover the assets mix include hard to value assets such as: investment real estate, private equity stakes, credit default swaps and other derivatives position which do not even show up on the balance sheet" (Hutchinson 2008). Having a leverage ratio of 31, means that a 3.3% decline in the value of Lehman assets was enough to wipe out its capital (Hutchinson 2008).

The irony of fate in what Lehman called as "a culture of risk management at every level of the firm", was sealed when only seven months later it filed for bankruptcy. The criticism here lies on putting too much faith on VaR model, when a model is just a model, nothing more than a series of assumptions and mathematical calculations which often go far from reality. VaR measures the fluctuations of risk under normal market conditions at a 99% confidence level and it does not account for that 1 % that might have so much importance during troubled markets period. VaR model based on a number of statistical assumptions simply neglect the fact that risk volatility might be zoomed when things go wrong and that when price movements are calculated on a daily basis, the 1% probability accounts a lot. As a conclusion, Lehman Brothers used to manage poorly its assets and used to have poor risk management. Their overexposure in subprime market, use of SIV products, liquidity problems, red flags on leverage ratio, magnified losses and blind faith put on mathematical model of risk calculation, were identified on the above as contributing factors to the demise.

## **4.2. Managerial problems**

"Lehman Brothers, like the great city beyond the massive glass windows, never slept. When the trading bell sounded on the New York Stock Exchange at four o'clock in the afternoon, a lot of equity guys packed up because there was nothing more for them to do. Bank debt and high-yield debt often went till seven o'clock or later. Most days the traders had normal-looking balance sheets, not too drastic one way or the other. But, losses were never loved at Lehman. And if you turned in a sheet with a drop of \$500,000 on the day, that was a trouble. In a way, Lehman was run by a junta of platoon officers.-they would all learn the basics, but they would also spend a lot of time in combat..." (McDonald, 2009, A colossal failure of common sense - The inside story of Lehman Brothers).

In such a way describes the mechanism of work at Lehman Brothers, McDonald, an insider who for four years has served as vice president of distressed debt and convertible securities. While coming at

the collapse, he keeps it so short by describing it into a single phrase “24,992 people striving hard, making money and about eight guys losing it”.

Richard Fuld, CEO of Lehman, was the leader on the top, having its mysterious office on the 31-st floor of Wall Street. “This aggressive former CEO, who embraced the “Gorilla” nickname to characterize his fierce and intimidating business style have brought a bank to bankruptcy”. So writes The Times in December 2010. Characterized to be as “an unapologetic mogul of Wall Street, straight talker, but not so practiced at straight listening, he deluded 25,000 all over the world striving for Lehman”. At Lehman’s annual general meeting in April 2008, he said: “The worst of the impact of the financial services industry is behind us”. However, two months later, his bank revealed \$2.8 billion in quarterly losses. Love for money and aggressive greed for high returns, makes this CEO irresponsible and reckless towards the game of playing with massive risks. One reason why Lehman would go bankrupt has to do with the fact that anyone who was perceived as a threat by Fuld was quickly eliminated including a number of critics who early on realized that Lehman was headed for serious trouble (McDonald & Robinson 2009; Tibman 2009). In addition, Fuld’ personal experience was mainly a bond trader and he had little technical understanding of such new financial instruments as CDOs, CDSs, and the like (e.g., McDonald & Robinson 2009, p.91, 234-236). Fuld had a personal attachment to Lehman. While many people on Wall Street believed that Lehman was the next bank to go after Bear Stearns, CEO Fuld failed to realize the severity of the situation. He still continued that they were too big to fail so that a rescue plan would come to their help. In an e-mail to his employees, after a meeting with Paulson, former secretary of the U.S Treasury on April 12, he expressed his self-confidence that they would have the full backing of Paulson, as he put “We have huge brand with treasury” (Fuld, 2008). Until the end, Fuld insisted on that it was rumors and short sale that brought down Lehman, not its huge losses and its failure to find a deal. Fuld neither succeeded in selling Lehman as an infusion of capital from Warren Buffet, nor arranged a deal with Morgan Stanley, Goldman Sachs and Bank of America (e.g., Story & White 2008, Sorkin 2009). He told a journalist that “I will never sell this firm” (Gowers 2008). So, one of the reason of failure may be attributed to the Lehman CEO for his overconfidence, greed for money and failure to recognize and accept the momentous crisis.

Though Lehman Brothers had a complex structure and was conducting business internationally having about 3000 legal entities (Steinberg and Snowdown 2009), its board of directors was composed of only ten individuals. Richard Fuld held the position of CEO since 1994. Many managerial aspects may be seen as contributors to Lehman’ demise. Overall culture, interaction between board of directors and senior management, and lack of accountability and transparency are important to be discussed. Corporate culture of Lehman was a risk-oriented one: the risk appetite was set from the top and Richard Fuld, its CEO was extremely motivated by greed of money and power hunger (McDonald & Robinson 2009). Fuld used to eliminate those who did not agree with him. Any warnings from talented researchers and managing directors fell into deaf ears. There was a lack of communication and common understanding in the company. Greed for money had made Fuld lose the limits and common sense. Putting a blind faith at the VaR approach, all risk management department failed to use the common sense and they missed the signs of the bubble that was about to burst. Mike Gelband, the Managing director and Global Head of Fixed Income, was among the first to set the warnings of the massive risks under mortgage transactions, which was, as he put “unsustainable and bound to meltdown”. However upper management dismissed his voice, deciding that he had “developed some kind of attitude problem (McDonald & Robinson, 2009). As McDonald highlights in his book, Lehman’s management team had no enterprise risk management system, no concept of risk management, no common language to address risk, no any desire to listen to or to learn from risk related concerns raised by anyone. The organization was a top-down one where perspective and risk culture were missing. While Greenfield emphasize the notion of family, resilience , underdogs pride and competitiveness as the bedrock culture of Lehman, it criticizes the strength and rigidity of that culture which shut out diversity , especially diversity of perspectives (Greenfield, 2009,p.35). Lehman failed to induce a culture of diversity.

In addition, it had an ineffective corporate structure. As McDonald put “There was a theory that Dick and Joe liked to move people around because it weakened them, at least for several months that it took

them to learn their new business. But it stopped people from becoming dangerous” (McDonald & Robinson 2009). Lehman Board of Directors was composed from a number of members who did not have the past financial markets expertise: nine of them are retired, four of them are over 75 years old, one is a theater producer, another a former Navy admiral and only two have direct experience in the financial services industry. Most of this staff belonged to a different era and they lack knowledge and experience from the era of massive securitization, credit default swaps, derivatives trading and all others structured products of finance. Lehman Board of Directors failed to comply with the COSO requirements. Company’s appetite for risk management, strategies, goals and objectives, were all imposed by CEO Richard Fuld. No oversight from the board, risk committee or Risk Management Department occurred. Moreover, Risk Management Department seemed to just execute the marching orders from the top and continued to buy even more commercial real estate, collateralized debt obligations or credit default swaps. Board of Director’s role in case of Lehman was limited to signing off of the Fuld’s decisions. There was an inherent self-interest risk and independence risk, as long as the chairman of the board and the head of risk committee was one in the same, Richard Fuld. In addition, the executive committee was a two person committee with Fuld also chairman. Such operations were considered relics of the past, and not well embraced by most modern corporate governance experts (Finlay 2008).

### **4.3. Fraud**

In 2007 the housing market began to crumble with the increasing number of defaults (Jeffers & Young 2008). Lehman started to suffer losses and was forced to write down billions of dollars of bad debt, which deteriorated its financial position. Lehman Brothers did not adequately manage its financial leverage and took on too much risk. To hide its unhealthy situation, Lehman resorted to the use of REPO 105 transactions (Jeffers 2011). However until it collapsed, Lehman could maintain a positive grading from rating agencies due to artificially showing a rosy picture. A window dressing technique called Repo 105, let Lehman remove roughly \$50 billion in commitments from its balance sheet in June 2008, and artificially reduce its net debt level (Valukas 2010, pg.42).

Repurchase agreement is a short-term loan, commonly used by financial institutions as a means of short-term borrowing. Under a repo agreement, the borrower transfers overnight securities and receives in exchange cash. The contract is settled when the borrower pays back the borrowed amount together with the interest and repossesses the securities. “Haircut” is the amount by which the security amount exceeds the borrowed amount which is generally 2%. If the investment bank does not honor the terms, the lender keeps the securities, sells them and receives the proceeds. In case of Lehman, these transactions were recorded as sales rather than loan (Jeffers 2011, pg.46). The usual scheme for manipulation and fraud by big companies is through use of special purpose entities or its subsidiaries: due to complex structure that a big company might have, it is difficult for financial regulators to monitor and control the activities of its subsidiaries. Such entities are part of the shadow system, largely beyond the reach of regulators. Therefore, the mother-company uses a small one to shift the risk off its balance sheet. A New York Times story revealed on April 2010, the case for Lehman: Lehman had used a small company, Hudson Castle, to move a number of transactions and assets off Lehman’s books as a means of manipulating accounting numbers of Lehman’s finances and risks. Hudson Castle is characterized as an “alter ego” of Lehman. According to the story, Lehman remained its largest shareholder, Hudson board was controlled by Lehman and most Hudson staff was former employees of Lehman. Though Hudson Castle was central to Lehman deals until it went bankrupt, it was never disclosed. As the article reveals, Hudson created at least four separate legal entities to borrow money and use the proceeds to make loans to Lehman via repos. One of these special purpose vehicles was Fenway, which was often used to lend to Lehman (Dash & Story 2010).

In reference to Wilchins, Dan & Dasilva, Silvio (2010) the scheme of Repo 105 functioned as follows: A government bond of another bank would be purchased by Lehman using its special financing units in US. Just before the end of the quarter, the bond would be transferred in Europe to a London affiliate, known as Lehman Brother International. Under a Repo 105, the London affiliate would give the securities to its counterparties and receive cash, while agreeing to buy back the bonds at a 5%



haircut. The money that it would receive, would be used to pay a large amount of Lehman's liabilities, which would show a healthier picture of quarterly financial position of Lehman and consequently better leverage ratio. Lehman would issue these fictitious results to regulators, investors, credit rating agencies and large public, by providing a rosy situation. At the beginning of the new quarter, Lehman would seek for funds being armed with these healthy but manipulated financial statements. Few days later, Lehman Brothers holding company would repurchase these bonds from its London affiliate at 105% of their initial value. By doing so, Lehman Brothers would remove the troubled assets from their books, would record the transaction as a sale when in fact was just a secured borrowing, and hence would show a more liquid financial position with less risky assets and less liabilities. Jeffers showed that using Repo 105, Lehman significantly overstated all its ratios from what they could be if proper accounting procedures had been followed. Using Repo 105, the company seemed to be well-capitalized, less leveraged, with enough good liquidity to meet its short-term obligations and with good profitability and asset utilization (Jeffers 2011, pg.49). Perceived as being healthy, at the beginning of new quarter Lehman Brothers would receive more lending from financial institutions.

Bankruptcy's examiner of Lehman Brothers Case, Anton R. Valukas stated that Lehman's representation of a low leverage as positive news to investors created a misleading portrayal of Lehman's true financial health. Dutta, Caplan and Lawson stated that "it is clear that Lehman's reported leverage ratios misstated the company financial position, and arguably, the amount of misstatement was material (Dutta, Caplan, Lawson 2010, pg.27). Concerning the principle "Substance over form", they argue that even Lehman accounting technique for Repo 105 was correct under SFAS No.140, it did not fairly reflect the substance of transactions, which was to obtain short-term financing even though in the form of a sale and a separate repurchase agreement (Dutta, Kaplan, Lawson 2010,pg.28). Lehman took advantage from the loophole in SFAS 140 related to "Accounting for Transfers and Servicing of Financial Assets and Extinguishment of Liabilities" and recorded these transactions as sales, so Repo 105 was a legal procedure. However, it failed to disclose any information regarding the sales of their receivables and other transactions under Repo 105. According to Jeffers and Mogielnicki "failure to disclose an alleged material fact is a potential actionable fraud and does not excuse a clear violation of the anti-fraud provisions of the SEC Act of 1933 and 1934 due to the omission of material facts or misleading statements" (Jeffers & Mogielnicki 2010). Concerning the SOX act, it is clear that Lehman Brothers failed to comply with it. As Caplan, Dutta and Lawson stated Lehman's managers were abiding by law, yet they were behaving unethically. Lehman managers intentionally reported favorable leverage ratios and engineered a course of action to do so-Repo 105, neglecting ethical issues. On the other hand, Lehman's auditors and accountants fell short of the higher standards to which all management accountants and auditors should aspire (Dutta, Caplan, Lawson 2010, pg.29).

## **5. The role of government in Lehman demise**

The Lehman Brothers collapse brought a worldwide question part of the large debate: Why Lehman was allowed to fail while other financial institutions weren't? Was its failure pushed? Two competing arguments exist: the one that government did not have the legal authority to intervene and the other government consciously let Lehman fail (Final hearings of financial crisis commission "Too big to fail" 2009). Fed and Treasury claimed that the gap of infrastructure of financial regulation did not provide them the legal authority to rescue Lehman as they did for Bear Stearns and AIG. Lehman did not have the adequate collateral that Fed requires to provide a guarantee. It became apparent that Fed wouldn't use the taxpayer money to prevent a Lehman collapse. As Alvarez, the central bank's board of governors put "Fed could not make loans that it believed would never be paid", while Baxter, General Counsel of New York Fed said "A Fed loan would have been a bridge to nowhere". Lehman was meant to go bankrupt considering its excessive leverage, huge losses, liquidity drain, and low level of market confidence, speculative investments, and the accounting gimmicks under Repo 105.

However, on the other hand, are the critics of the arguments that Lehman failure was a conscious political decision. As Lawrence McDonald writes in his book "A Colossal failure of common sense", Lehman Brothers was just put to sleep (McDonald 2009). Such critics claim that Lehman was the

sacrificed lamb in a political game which certainly involved more global players (Brown 2009). Phil Angelides, a commission member said that Lehman failure seems to have been “a conscious political decision”. Gordon Brown in April 2009 in a speech about financial crisis in London with the G20 summit as host, put in this way “Sometimes it takes a crisis for people to agree that what is obvious and should have been done years ago, can no longer be postponed...We must create a new international financial architecture for the global age” (Brown 2009). Lehman Brothers was a good example to be used as an opportunity for changing and enhancing the global legislation and regulation. Alan Blinder, the former Federal Reserve member and professor at Princeton University argue that Lehman had a shock value that caused everything to fall off a cliff (Foley 2009). Lehman Brothers significantly causes a systemic risk in the rest of the economy which for sure was not taken into account when the decision was made. However, at that time it was needed a turning point so as to re-establish the moral hazard, to hoist the banks on the petard of hazardous activities and speculative gambles. Someone would have to give a lesson of moral hazard in order to halt the banks from using public money and engaging in risky activities. As Alan Blinder put “People argue that if it wasn’t for Lehman, it would have been something else”. Lehman was the sacrificed lamb so as to combat moral hazard, or the risk that banks will act recklessly if they know that they will be bailed out when their bets turn bitter sour. James Peck, a Manhattan court bankruptcy judge, after a 7-hour hearing the Lehman case, ruled “Lehman Brothers became a victim, in effect the only true icon to fall in a tsunami that has befallen the credit markets. This is the most momentous bankruptcy ever hearing I’ve ever sat through” (BBC news 2009, Judge approves \$1.3 bn Lehman deal).

## **6. A quantitative analysis: The role of short sale and investors ‘confidence on Lehman demise**

Holme and Solvang describe an approach as an instrument in solving problems and in arriving at new knowledge of the subject in question. Part of the approach is considered everything that serves as a mean to the end. The method chosen should be consistent with the reality that is being researched and the output produced should further contribute in enhancing the comprehension and explanation of the subject matter (Holme and Solvang 1996).

### **6.1. General approach and choice of method**

Wiedersheim, Paul and Erikson link the chosen general method to a researcher overall knowledge, norms and values, which serves as a frame of reference (Wiedersheim-Paul and Erikson 1997). In this chapter, a theoretical model of short selling activity is employed. This is done with the purpose of studying the quantitative effect of the trade volume and short sale activity on the Lehman fall of stock price. The aim is both to describe qualitatively and to conduct quantitatively a test on what factors pushed far the short sales at Lehman. The method used falls into both deductive and inductive framework. The deductive method that it is applied in the first part is based on a rationalist perspective which allows to base the research on the theoretical framework and to test our empirical findings and data about Lehman with the existing “Fuller theory of short selling”. Later on, our specific evidence findings in Lehman Case are linked to general conclusions where we relate our study with other research such that of Swedberg “The structure of confidence and the collapse of Lehman”. The method rather than purely based on numerical data is characterized by use of verbal description in order to create a common understanding of the matter being studied.

### **6.2. Previous studies**

There exists an extensive literature of previous studies done on short selling effects. Boehmer and Wu (2008) conducted an empirical analysis on the effect of short sale on price efficiency using a large data sample of NYSE and their major finding was that a greater shorting flow reduces deviations of stock prices from a random walk and for large negative earnings, short selling specifically contributes to the elimination of post-earnings announcements drift. Safi and Sigurdson (2008) by collecting data

on weekly stock lending transactions across 26 countries for two and a half years found that the short sale constraints are associated with lower price efficiency and they negatively affect the distribution of weekly stock returns. Figelwsky (1981) linked the short selling activities to emotional driven factors and found that its volume arises when investors anticipate that a company's stock is overvalued. However Platt (2002) in his research paper "A Fuller Theory of short Selling" suggested a different point of view by attributing motivation on short selling to fear. He found that short selling activities rises when traders anticipate the near bankruptcy of a distressed company. Shkliko (2008) in the line of research studies of short selling influence on price, suggested empirical evidence of episodic price-destabilizing effects of aggressive short selling. He showed that aggressive abnormal short selling activities accompany the initial stages of large negative intraday price reversal. The same subject matter is studied in more detail earlier in 2005 in the work of Brunnermeier and Pederson, and later on by Goldstein and Guembel (2008). These two ones, by investigating the issue of manipulation presence in the theory of allocation role of prices, showed through a financial model that because prices signals information allocation, this opens up opportunities for manipulation. To conclude the list, Petukh (2009), studied the effects of high-volume short sales on Lehman Brothers Holdings Inc., by comparing the results of the existing theories with the results of his quantitative analysis of the last three years of Lehman Brothers' operations.

### **6.3. Data Collection**

To test the hypotheses that are generated from "Fuller theory of short selling activities", the relevant data about Lehman case are needed. Note that, in this paper secondary data sources are used. As of Wiedersheim-Paul and Erikson, 1997, secondary data sources refers to the existing collected and summarized material of the subject in question and it originates from sources such as databases, literature, journals and the internet. In this paper, regarding Lehman stock price and trade volume, data are collected from Yahoo Finance, while regarding the short sale volume, the modified data sample of research by Kirril (2009) are taken for granted. The data for his study was retrieved from Bloomberg Professional information system on April 15, 2009. The data were collected for the period starting on the 1-st of January, 2006 up to the date when the company filed for bankruptcy chapter on the 15-th of September.

### **6.4. Statement of Theoretical Framework**

This research study is conducted based on "Fuller theory of short selling" as a referring framework. This theory explains the trading activity based on two ingredients of intellectual basis: greed and fear. The demand for shares to short sell is based on two independent sentiments of investors: one based on future price expectations and one based on financial distress. By a simple definition, short selling means selling a security that you do not own and then repurchasing it later at a lower price. The greed sentiment describes short sales where an investors based on its own beliefs, expects a future price below the current price. Therefore a greed-based short seller seeks to profit from the discrepancies between current overstated price and its own expectations about lower shares future prices. The fear-based short-seller attempts to profit from falling share prices of financially distressed vulnerable companies. The short sale demand is the aggregate of the fear and demand curves. So, some investors are selling short because they think that the share price is too high, other do so because they think the company is financially distressed. The greed-motivation short selling as identified by Figelwsky (1981) and others (Dechow 2001) arises when investors feel that a company stock price is overestimated. Investors believe that the stock price will converge towards their mean expectations. In sum, if there is a greed-motivation of short selling activity, *ceteris paribus*, the slope of demand curve is positive: at higher market prices there is a larger aggregate demand for short sales. In contrast, the fear motivation of short selling activity suggests a negative slope of the demand. The greater is the belief that a company is in a financial distress and near to bankruptcy; the larger is the demand for borrowed stock to be sold as future stock price is anticipated to decline. The downward sloping of the fear-based demand curve suggests that short interest demand increases as the price decreases. As it was mentioned on the above the total demand curve of short selling activity is the sum of greed-based

demand curve and fear-based demand curve. Therefore, the slope of the aggregate demand curve will depend on the extent to which each of the investors' sentiments dominate or offset the other. If the decline in fear-based demands exceeds the rate of growth in the greed-based demands as prices rise, the slope of the total demand curve will be negative. If the reverse situation occurs, the aggregate demand curve is upward sloping.

Regarding the above mentioned dual emotions, three hypotheses are derived from theory of short selling based on "A fuller theory on short selling":

- 1) According to what Plat suggests, differently from the traditional theory of short selling, there are three possibilities in regard to the number of shares as the bankruptcy nears: the number of stocks shorted may increase decrease or remain constant. This contrasts the very traditional theory which argues that the number of shares sold short decline at very low prices.
- 2) In the range where the total demand curve includes fear-based demands, as stock price falls, more stock is shorted. When companies are financially distressed and near bankruptcy, stock price is an important indicator of company health. As the price declines at very low levels, there is no more greed-based demands and the only fear-based demands increases. This hypothesis, which is very restricted, contradicts Filewski's theory.
- 3) The third hypothesis which is even more sophisticated in terms of being empirically tested, suggests that the lower the price target (the price which describes the average investors' expectations about future price levels and is assumed to be the actual post-bankruptcy equity value per existing common share) the higher is the maximum shorted stock-position. The lack of empirically testing this hypothesis arises from the difficulty encountered in estimating the target price. Therefore, the test of this hypothesis in our case is neglected, and the attention of the research is totally focused on the first two hypotheses.

## 6.5. Statement of Research questions and methodology

Based on the above literature review on the subject matter, here the research questions of this study are stated. Note that the aim of this research is twofold: First using a simple model of regression analysis, we aim to quantify the effect of short sale on stock price and second, taking for granted that such correlation between stock price and short selling activity exists, we aim to identify the sentimental-factors driving the short-selling activities and therefore the stock price change. Referring to the "Fuller theory of short selling" as guiding framework, we decompose the short selling effect on the stock price as either a greed-driven motivation or a fear-based motivation. More specifically, the research questions of the study are as follows: Are stock prices and short sale volume correlated? If so, to what extent the short sale volume causes a change in stock price *ceteris paribus*? Is the short sale demand in case of Lehman a greed-based demand curve, a fear-based or a combination of both? If so, is the aggregate demand trend upward or downward sloping? To what extent the greed/fear-based motivations under short sale affect the price? These are the three questions that this research study considers.

## 6.6. Specification of the Econometric Model

Next step is to develop an empirical model capable of testing these claims. With the modest level of undergraduate statistical knowledge, we employ a linear regression model as follows:  

$$\text{Stock Price} = B_0 + B_1 * \text{Short Sale Volume} + E$$

This equation is the empirical counterpart to the theoretical claims. Using Data Analysis tools in Excel, we generate a scatter plot diagram showing the slope of short sale demand and the correlation parameter between the two variables. Whether there is a downward or upward tendency on the short sale volume as the stock price of Lehman falls, this will definitely decide for the type of short sale

demand in case of Lehman. For this purpose, we disaggregate it to identify the investors' sentiments as either a greed-based or a fear-based motivation respectively. Next, for specific parts of the scatter plot diagram where each of these motivations factors is identified, an additional correlation test is conducted to test the validity of and reliance on such evidence. Lastly, we draw some specific conclusions based on the finding evidence of the Lehman case in regard to Fuller theory of Short Selling and we relate these results to evidences of other research studies and theories to see how they fit into the whole.

### 6.7. Analysis of the results

The first two hypothesis of "A fuller theory of short selling" were tested through direct observation in the chart 1, chart 2 and chart 3. It appears that both hypotheses are true for the case of Lehman Brothers. As the bankruptcy approaches and the stock price continues steadily to fall, the volume of trade increases and most important the number of stocks being shorted increases. In order to prove the reliability of this observation, regression data analysis is conducted which lead to the summarized results as in the table 2. Multiple R parameter or coefficient of correlation shows that a strong correlation between the two variables short sale and stock price exists for the data set from Jan.06 to Sep.08 and also for the fragmented data set from Aug.07 to Sep.08. The results show weaker correlation between stock price and short sale in the period from Jan.06 to July.07. Because the parameter Multiple R is generated by Excel in absolute value, we check in table 2 for the sign of slope, which is negative for the three cases. This proves that there exists a negative comovement between the two variables: increases in short interest volume, causes a decline in stock price. Relating the above results to the "A Fuller Theory of short selling", we conclude that the short sale demand curve is a downward sloping curve, which means that fear-based motivation on short sale dominates over greed-based short sale motivation. The correlation coefficient of 0.43 for the period from Jan.06 to July.07 (compare to 0.88 for the aggregate short sale demand and to 0.82 for the fragmented demand for the period Aug.07-Sep08) shows that the role of fear sentiment among investors during this time-period is weak and insignificant. However, the other part of demand from Aug.07 to Sep.08 is characterized by a strong correlation coefficient: multiple R is 0.82. This shows that starting from Aug.07, fear and loss of confidence were the market's sentiments; therefore traders were motivated by fear to short the Lehman's shares.

In many statistical tests, a common fallacy of a model is lack of significance of explanatory variable: that is the two variables might be strongly correlated, yet this does not mean that X causes Y (short sale causes the change in stock price). For this reason, we refer to  $R^2$  in table 2, which is 0.78, 0.18 and 0.68 corresponding respectively to the aggregate demand, fragmented demand from Jan.06 to July.07 and fragmented demand from Aug.07 to Sep.08. There is a strong causation between the two variables in case of aggregate demand and fragmented demand from Aug.07 to Sep.08. 78% of changes in stock price can be attributed to changes in short sale volume for the aggregate demand and 68% of variation in stock price between Aug.07 and Sept.08 can be attributed to fluctuations in short selling activity. However, this does not hold true for the period from Jan.06 to Jul.07. While short sale and stock price are weakly correlated, no significant causation exists. As of  $R^2$  parameter, only 18% of movements in stock price are attributed to changes in short sale volume.

While so far, we find that the relation between stock price and short sale holds, and the demand curve is obviously a fear-based demand at least for the period from Aug.07 to Sep.08, another important parameter to be considered is the quantitative effect of short sale on price, which is the slope of each demand curve. We have regressed the stock price and short sale data expressed in monthly % change basis. Regarding the aggregate demand curve, its slope is -0.44. This means that a 1% increase in short sale volume causes a decrease of 0.44% in stock price in the aggregate demand. Regarding the segmented demand curve for the period from Jan.06 to Jul.07 and from Aug.07 to Sep.08, the slope is -0.22 and -0.45 respectively. This means that a 1 % increase in short sale volume would cause a 0.22% reduction in stock price until July 2007, but a larger decrease of 0.45 % will take place from August 2007 till the day the company collapses. The sign and size of the slope, serves for another purpose as well; to compare the degree of downward sloping at each demand. The higher the slope in absolute value, the more the demand is downward sloping which means the more the fear-sentiment is present.

So by comparing the two fragmented demand, we can conclude that from Jan.06 to July 07, there are no signs of market trouble and panic. The short sale and stock price are weakly related, further weaker is the causation, and short sale change in volume have a low impact on change in stock price. But, when it comes to Aug.07 and on, the correlation becomes stronger, the causation increases significantly and a 1% change in stock price has a potential of 0.45% decrease in stock price. This characterizes the fear-driven demand for this period, where the company shows signs of a being under financial distress. Overall, the so-called “A Fuller theory on short selling” fits perfectly in explaining the investors sentiments under short sale activity and it proves to be true the hypothesis that when investors’ s overall perception is that the company is financially distressed and near bankruptcy, the short sale demand curve is a fear-based demand. Rather than selling stocks because of thinking the stock is overpriced, the investors short stocks because of lack of confidence, panic and fear of losses. So far, we have followed a deductive guideline to test the general conclusions of “A Fuller theory of short selling” on specific case of Lehman. Results suggest a fear-motivation demand curve and confirm for the important role of confidence and investors’ sentiments in the bank failure. However to not miss the whole picture, we link these specific findings to other evidences and conclusions.

Bagehot is an outstanding author on the role of the investors’ confidence on a financial panic. According to Bagehot, banking industry is of special importance because it requires an unprecedented trust between man and man (Bagehot 1922, pg.15). The two main reasons for this are related to liquidity and solvency. The fact that banks tends to borrow short and lend long, makes banks especially vulnerable to a sudden demand withdrawal. If a bank is unable to meet the demand in time, rumors can be spread about the financial health of that bank, and the panic can even lead to that bank insolvency. Bagehot also pinpoints hidden losses as especially dangerous in loss of trust and confidence. Though investments banks are different from traditional commercial banks, they are similar when it comes to vulnerability related to trust and confidence (e.g., Gorton & Metrick 2009). Investment banks are part of the shadow banking system, where information availability is of poor quality, there is poor transparency and monitoring, and regulations on maintaining reserves lack. Investment banks as part of shadow banking system are in fact “non-banks that functionally do just what a bank does” (Akerlof & Shiller 2009, p.82). They have their equivalent to customers’ deposits which is the overnight financing in the repo market. Therefore, confidence is considered as extra volatile and vulnerable in the shadow banking system (Swedberg 2009). According to bankruptcy examiner Anton R. Valukas, quoting D.Hinton in Standards & Poor’s Ratings Direct, “Lehman was one of the actors heavily reliant upon wholesale financing sources” to use overnight repos as major funds for its balance sheet (Valukas, p.1402, Hinton 2007). According to the report of the bank examiner, “Lehman was widely regarded as the investment bank second most dependent on short-term secured financing” and “Lehman acknowledged this point in its public filings” (Valukas, p.1406-1407, Morgan Stanley Report 2008). The crisis is generally agreed to have starts by the mid of 2007, when the first losses were recorded on subprime mortgage markets. However, due to interconnectivity between this market and investment banks, the trouble was spread in other parts of financial sector. Gary Gorton, the author of the paper “The panic of 2007” argues that the opaque, non-transparent and complex structure of CDOs made impossible for the losses to be fragmented and quantified (Gorton 2009). In addition, the ABX indices played an important role in fuelling the panic. While it showed a clear downturn trend on subprime mortgage securities, it did not allowed investors to track which securities were involved. This resulted into a fear about hidden losses that spread to institutions owning these as well. Swedberg suggest here as another reason of fear for hidden losses the financial fraud and various accounting tricks, as was the revealed case of Lehman (Swedberg 2009). In Lehman case, the confidence was crucial for rolling over or renewing its debt. As the bankruptcy examiner, Anton R.Valukas stated, by mid-2007 Lehman losses and illiquid assets were beginning to get out of control and by this time, Lehman’s dependence on the short-term repo market has increased dramatically and was twice that of peer banks (Valukas 2010, p.1407). The heavy reliance of Lehman upon wholesale financing sources made it especially vulnerable to trust and confidence. The moment that repo counterparties were to lose confidence in Lehman and decline to roll over its daily funding, Lehman would be unable to fund itself and continue to operate (Valukas 2010,p.3).The fall of Bear Stearns was the event which sealed the fate of Lehman as well. After it, many people in Wall Street would believe that Lehman was the next bank to fail. Though Lehman reported a fictitious profit of several hundred millions dollars for the first quarter of 2008, markets sentiment was not positive for

Lehman. David Einhorn, the head of a hedge fund called Greenlight Capital, at an investors' conference in April, ended his speech with a poisoning attack on Lehman, saying that Lehman does not provide enough transparency and there are potential red flags on its leverage ratio. In late May, he publicly declared that his hedge fund was shorting Lehman, explaining the reasons behind this (Einhorn 2008, p.9). In early June, Lehman announced a loss of \$2.8 billion, but rumors grew even stronger that Lehman was about to collapse. With the panics growing stronger and loss of confidence, Lehman experienced shortage of liquidity, shortage of funding and their counterparties demanded even more collateral. What was the role of short sale in Lehman stock price decline? Under this climate of fear and uncertainty, short sellers would take advantage of distressed financial institutions like Lehman Brothers and they would bet on their falling stock price. While short sellers argue that they merely spotted problems at financial institutions ahead of everyone else, critics believe that they have contributed to the speed of the decline of any number of financial shares (Dealbook, New York Times 2008). David Einhorn speech about Lehman "accounting ingenuity and denial of its losses" had a considerable impact on the public perception about Lehman. As of a New York Times article, short sale played a role in the erosion in the four months after David Einhorn public speech. According to McAfee & Johnson, while critics have claimed that Lehman painted a rosy picture, when in fact its real financial position was quite grim, some other experts and Lehman Executives blame Lehman's quick decline on short sales (McAfee & Johnson 2010, p.7). Lehman Brothers CEO, Richard Fuld continued to be self-defiant blaming false rumors and short sales for bringing the company down.

However, Lehman Brothers' problems with short sellers and the crisis of confidence was an ante post event coming as a consequence of Lehman Brothers' extensive use of leverage and significant mortgage-related security holdings. Our personal view is that short sale played a significant role in Lehman demise. As our simple model of undergraduate knowledge level shows the two variables were strongly correlated. Moreover, the causation holds true in that short sale caused a decrease in stock price. As our model suggested, starting from August 2007 till the day the company would collapse, a 1% increase in the volume of short sale would cause a 0.45 % decrease in stock price which is approximately two times more than the effect that short sale had on stock price from Jan.07 till august 2007 when the worst had not yet arrived. However, while these results shows for the importance of investors' confidence in finance, it would be a naïve argument to attribute totally to short sale the reason of stock price decline and hence Lehman Brothers demise. The case shows that a complexity of issues such as poor assets management, poor risk management procedures, managerial problems and complex structure of bank organization, when combined with a loss of confidence in market, can bring a company down, no matter how big is too fail. In addition, Lehman Brothers changed the rules of the game "too big to fail" because the Fed deemed it as "too troubled" to be eligible for the rescue plan and government safety net programs. Because moral hazard was of primary importance, there was nothing than could have been done to save it.

## **7. Conclusions**

Lehman Brothers collapse presents both macro and micro lessons. From a macro perspective, it shows what devastating effect might have a too large and too interconnected institution to the rest of the financial system. Therefore quoting Ben Bernanke, Chairman Board of Governors of the Federal Reserve System on his testimony (Testimony before the Committee on Financial Services 2010) , regulations should be defined in such a way so that to not allow large, complex and interconnected firms like Lehman to escape from robust consolidated supervision and monitoring and second, a new resolution regime is needed in order, rather than to avoid the choice between bailing out or letting fail, to create an analogous regime to that already established for failing bank.

From a micro perspective, a lot of lessons which circles around the moral hazard issue are to be taught. Here the most important lesson is to not become a slave of greed to get money back while losing it by engaging in even more speculative investments. When seeing any stock price downwarding, keep your original investment and don't try to recover through gambling. Second, do not put your money in complex, complicated investment that you do not understand. Keep your common sense; be realistic and down to earth in that there are no free lunches. Lastly, never assumes too big to fail. Even the most sophisticated financial tools, cannot predict or time the market properly. No one and nothing

guarantees you that having past successes, you can be granted the same in the future. Profit is just a matter of chance, luck rather than a skill or a prediction. No one can beat the market unless the market beats you.

## **8. References**

Agrawal, A. (2010) "Why did Lehman fail? Facts vs. Myths", Mostly Economics blog, accessible on <http://mostlyeconomics.wordpress.com/2010/09/10/why-did-lehman-fail-facts-vs-myths/>, last retrieved 28 May 2012

Alman, R. & Cudmore, R. & Mcveigh, N. (2008), "Lehman Brothers: An exercise in risk mismanagement", New England College of Business, accessible on [http://www.necb.edu/resource\\_lehman-brothers-an-exercise-in-risk-management.asp](http://www.necb.edu/resource_lehman-brothers-an-exercise-in-risk-management.asp) last retrieved 29 May 2012

Articlebase, (2008), "The causes for the collapse of Lehman Brothers Holdings Inc", accessible on <http://www.articlesbase.com/business-articles/the-causes-for-the-collapse-of-lehman-brothers-holdings-inc-664202.html>, last retrieved 29 May 2012

Ashkenas, R. (2010), "Learning from Lehman: the director's role in curbing complexity", NACD Directorship, Vol. 35 Issue 6, p68-71, 4p

Azadinamin, A. (2012), "The bankruptcy of Lehman Brothers: Causes of failure and recommendations going forward", Swiss Management Center, accessible on [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=2016892](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2016892) , last retrieved 29 May 2012

Bahena, A. (2010), "What role did credit agencies play in the credit crisis?", Center for International Finance and Development, The University of Iowa, accessible on <http://ebook.law.uiowa.edu/ebook/uicifd-ebook/part-5-iii-what-role-did-credit-rating-agencies-play-credit-crisis> , last retrieved 29 May 2012

Barkhausen, H. (2010), "Derivatives in bankruptcy: Some lessons from Lehman Brothers", The Journal of Structured Finance, Vol. 15 Issue 4, p7-10, 4p

Beales, R. & Cox, R. (2010), "Inconsistencies in Lehman Case", Reuters Breakingviews, The New York Times, accessible on <http://www.nytimes.com/2010/09/02/business/02views.html>, last retrieved 29 May 2012

Berman, D. (2009), "Where was Lehman's board?", The Wall Street Journal, accessible on <http://blogs.wsj.com/deals/2008/09/15/where-was-lehmans-board/> , last retrieved 28 May 2012

Berr, J. (2010), "Why did Lehman die and AIG live?" 24/Wall street, accessible on <http://247wallst.com/2010/09/02/why-did-lehman-die-and-aig-live/>, last retrieved 29 May 2012

Blackburn, R. (2008), "The subprime crisis", New Left Review 50, accessible on <http://faculty.washington.edu/sparke/blackburn.pdf>, last retrieved 29 May 2012

Boedihardjo, H. (2009), "How maths killed Lehman Brothers", Plus Magazine, University of Cambridge, accessible on <http://plus.maths.org/content/os/issue51/features/boedihardjo/index> , last retrieved 28 May 2012

Brown, E. (2009), "Economic 9-11: Did Lehman Brothers fall or was it pushed", Web of debt, accessible on <http://www.webofdebt.com/articles/economic9-11.php> , last retrieved 29 May 2012



Chan, S. (2010), "Financial Crisis Panel Lends Sympathetic Ear to Lehman's Ex-Chief", *The New York Times*, accessible on <http://www.nytimes.com/2010/09/02/business/02commission.html>, last retrieved 28 May, 2012

Chan, S. (2010), "Financial crisis panel lends sympathetic ear to Lehman's Ex-chief", *The New York Times*, accessible on <http://www.nytimes.com/2010/09/02/business/02commission.html>, last retrieved 28 May 2012

Christopoulos, A. & Mylonakis, J. & Diktapandis, P. (2011), "Could Lehman Brothers' Collapse be anticipated? An examination using CAMELS Rating System", *International Business Research*, Vol.4, No.2, Canadian Center of Science and Education

Dash, E. & Story, L. (2010), "Lehman channeled risks through 'Alter Ego' firm", *The New York Times*, accessible on <http://www.nytimes.com/2010/04/13/business/13lehman.html?pagewanted=all>, last retrieved 29 May 2012

Dutta, S. & Caplan, D. & Lawson, R. (2010), "Lehman's shell game poor risk management", *Strategic Finance*, Vol. 92 Issue 2, p23-29

Elliot, L. & Treanor, J. (2009), "Lehman's fall to earth: the last hours of a Wall Street giant", *The Guardian*, accessible on <http://www.guardian.co.uk/business/2009/sep/03/lehman-brothers-rescue-bid>, last retrieved 28 May 2012

Evening Standard, (2008) "How did Lehman Brothers fall apart?", *This is Money*, accessible on <http://www.thisismoney.co.uk/money/news/article-1641770/How-did-Lehman-Brothers-fall-apart.html>, last retrieved 29 May 2012

Giannone, J. & Bansal, P. & Eder S. & Chasan, E. (2009), "CEO of Failed Lehman Bros. Looks Back", *REUTERS*, accessible on <http://abcnews.go.com/Business/ceo-failed-lehman-bros-back/story?id=8510834#.T8RWylIuebp>, last retrieved 29 May 2012

Greenfield, H. (2010), "The decline of the best: An insider's lessons from Lehman Brothers", *Leader to Leader*, Vol. 2010 Issue 55, p30-36

Heffernan, Sh. (2005), *Bank Failures*, "Modern Banking", John Wiley & Sons Ltd, England, ISBN 0-470-09500-8, pg.351-406

Henning, P. (2009), "In Lehman's demise, a Dwindling Chance of Charges", *Dealbook*, accessible on <http://dealbook.nytimes.com/2011/03/15/in-lehmans-collapse-a-dwindling-chance-of-charges/>, last retrieved 29 May 2012

Herszenhorn, D. (2008), "Administration Is Seeking \$700 Billion for Wall Street." *The New York Times* <http://www.nytimes.com/2008/09/21/business/21cong.html?pagewanted=1&r=1>

Hoening, T. (2009), "Too big has failed", *Federal Reserve Bank of Kansas City*, accessible on <http://www.kc.frb.org/speechbio/hoenigpdf/omaha.03.06.09.pdf>, last retrieved 29 May 2012

Hutchinson, M. (2008), "How Lehman Brother's own risk management strategy may cause it to fail", *Money Morning*, accessible on <http://moneymorning.com/2008/09/12/lehman-brothers-holdings/>, last retrieved 29 May 2012

Jacoby, J. & Landes, J. (2009), "House of Cards", *CNBC video*, accessible at <http://video.cnb.com/gallery/?video=1145392808&play=1>, last retrieved 28 May 2012

Jeffers, A. (2011), "How Lehman Brothers used Repo 105 to manipulate their financial statements", *Journal of Leadership, Accountability and Ethics* vol.8 (5)

Lehman Brothers Records, 1868-2007: A Finding Aid", Bakery Library, Harvard Business School, accessible on <http://www.library.hbs.edu/hc/lehman/history.html> , last retrieved 27 May, 2012

Levine, R. (2010), "An autopsy of the US financial system: accident, suicide, or negligent homicide", Journal of Financial Economic Policy Vol.2 No.3, Emerald Group publishing Limited 1757-6385

Levy, G. (2008), "End of the Master of the Universe: Rise and fall of the Lehman Brothers - and its boss dubbed 'The Gorilla'", Daily mail, Associated Newspaper Ltd  
<http://www.dailymail.co.uk/news/article-1056411/End-Master-Universe-Rise-fall-Lehman-Brothers--boss-dubbed-The-Gorilla.html>, last retrieved 26 May 2012

Fall of Lehman Brothers, (2009), Love of Money, A Money programme production, BBC, accessible on <http://www.youtube.com/watch?v=aPOtQkSiCk8>, last retrieved 28 May 2012

Maux, J. & Morin, D. (2011), "Black and white and red roll over: Lehman Brothers' inevitable bankruptcy splashed across its financial statements", International Journal of Business and Social Sciences, Vol.2, No.20

Mcafee, L. & Johnson, N. (2010), "Major financial institutions in the crisis: What happened and governments' responses", Center for International Finance and Development, The University of Iowa, accessible on <http://blogs.law.uiowa.edu/ebook/uicfd-ebook/part-5-iv-major-financial-institutions-crisis-what-happened-and-governments%E2%80%99-responses> , last retrieved 29 May 2012

McDonald, L. (2009), "A Colossal Failure of Common Sense", Ebury Publishing A Random House Group Company, ISBN 9780091936150

Meadway, J. (2010), "Lehman Brothers Two Years On", Counterfire Org., accessible on <http://www.counterfire.org/index.php/articles/51-analysis/6638-lehman-brothers-two-years-on> , last retrieved 28 May 2012

Murphy, D. (2011), "Maintaining confidence: Understanding and preventing a major financial institution failure mode", accessible on [http://blog.rivast.com/wp-content/uploads/Confidence\\_paper\\_DRAFT.pdf](http://blog.rivast.com/wp-content/uploads/Confidence_paper_DRAFT.pdf) , last retrieved 29 May 2012

Nightmare mortgages", (2008), Bloomberg Business Week, accessible on [http://www.businessweek.com/magazine/content/06\\_37/b4000001.htm](http://www.businessweek.com/magazine/content/06_37/b4000001.htm), last retrieved 28 May, 2012

Platt, H.(2010), "A fuller theory of short selling", Journal of Asset Management, Vol. 5, No. 1, Northeastern University, accessible on [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=301321&http://www.google.com/url?sa=t&rct=j&q=a%20fuller%20theory%20of%20short%20selling&source=web&cd=2&ved=0CFEQFjAB&url=http%3A%2F%2Fpapers.ssrn.com%2Fsol3%2Fdelivery.cfm%3Fabstractid%3D301321&ei=ylnET8iQB sXMtAa25\\_SgCg&usg=AFQjCNGvheW6aZ9VAvhcOjQL8wFFup0\\_Zg](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=301321&http://www.google.com/url?sa=t&rct=j&q=a%20fuller%20theory%20of%20short%20selling&source=web&cd=2&ved=0CFEQFjAB&url=http%3A%2F%2Fpapers.ssrn.com%2Fsol3%2Fdelivery.cfm%3Fabstractid%3D301321&ei=ylnET8iQB sXMtAa25_SgCg&usg=AFQjCNGvheW6aZ9VAvhcOjQL8wFFup0_Zg) , last retrieved 29 May 2012

Siris, P. (2008), "Explaining the fall of Lehman Brothers", New York Daily News, accessible on [http://articles.nydailynews.com/2008-09-13/news/17907151\\_1\\_lehman-brothers-fannie-and-freddie-freddie-mac](http://articles.nydailynews.com/2008-09-13/news/17907151_1_lehman-brothers-fannie-and-freddie-freddie-mac) , last retrieved 29 May 2012

Sorkin (a), A. (2009), "The Race to Save Lehman Brothers", The New York Times, accessible on <http://www.nytimes.com/2009/10/20/business/economy/20sorkin.html?pagewanted=all> , last retrieved 29 May 2012

Sorkin (b), A. (2010), "Lehman's Last Hours", The New York Times, accessible on <http://dealbook.nytimes.com/2010/09/07/sorkin-lehmans-last-hours/> , last retrieved 29 May 2012

Story, L. & Dash, E. (2008), "Banks fear next move by Shorts", The New York Times, accessible on <http://www.nytimes.com/2008/09/15/business/15short.html> , last retrieved 29 May 2012

Swedberg, R. (2010), "The structure of confidence and the Collapse of Lehman Brothers", Markets on trial : The Economic Sociology of the U.S. Financial Crisis: A part of the research in the Sociology of Organizations, Volume 30A, 71-114, Emerald Group Publishing Ltd.

Taylor, J. & Cochrane, J. (2009), "Looking back at Lehman: An empirical analysis of the Size and Timing of the Shock and Effectiveness of Countermeasures", William P. Sterling- Trilogy Global Advisor, accessible on <http://www.trilogysadvisors.com/worldreport/200910.Lehman.pdf> , last retrieved 29 May 2012

The Economist, (2010), "The collapse of Lehman Brothers- Fall of man: A partisan inside view", accessible on <http://www.economist.com/node/15814756> , last retrieved 29 May 2010

The Economist, (2008), "Rethinking Lehman Brothers: The price of failure", accessible on <http://www.economist.com/node/12342689> , last retrieved 29 May 2008

The Guardian, (2010) "Defiant Dick Fuld blames false rumors and the Fed for collapse of Lehman", accessible on <http://www.guardian.co.uk/business/2010/sep/01/dick-fuld-lehman-collapse> , last retrieved 29 May 2012

The Guardian, (2008), "Banking crisis: Lehman Brothers files for bankruptcy protection" accessible on <http://www.guardian.co.uk/business/2008/sep/15/lehmanbrothers.creditcrunch> , last retrieved 29 May 2012

The independent, (2009), "Crash of a titan: The inside story of the fall of Lehman Brothers", accessible on <http://www.independent.co.uk/news/business/analysis-and-features/crash-of-a-titan-the-inside-story-of-the-fall-of-lehman-brothers-1782714.html> , last retrieved 29 May 2012

The last days of Lehman Brothers, (2009), BBC accessible on <http://www.youtube.com/watch?v=RLWIPyQXcRE>, last retrieved 29 May 2012

The New York Times, (2012), "Lehman Brothers Holdings Inc.", accessible on [http://topics.nytimes.com/top/news/business/companies/lehman\\_brothers\\_holdings\\_inc/index.html](http://topics.nytimes.com/top/news/business/companies/lehman_brothers_holdings_inc/index.html) , last retrieved 29 May 2012

Ward, V. (2010), "The devil's casino: Friendship, betrayal, and the high-stakes games played inside Lehman Brothers", John Wiley & Sons, Inc., Hoboken, New Jersey, ISBN 978-0-470-54086-2

White, B. (2008), "Investigators Said to Take Closer Look at Lehman", The New York Times. Accessible on <http://www.nytimes.com/2008/10/18/business/18lehman.html> , last retrieved 29 May 2012

Zingales, L. (2008), "Causes and Effects of the Lehman Brothers Bankruptcy", Testimony before the Committee on Oversight and Government Reform , accessible on <http://www.scribd.com/doc/11096014/Causes-and-Effects-of-the-Lehman-Brothers-Bankruptcy> , last retrieved 29 May 2012

## 9. Appendix

Table1\_Lehman Brothers' stock price, trade volume, and short interest

Observation	Lehman Stock Price \$	Short Interest
Jan-06	70.22	17,158,110
Feb-06	72.97	14,104,144
Mar-06	72.26	14,064,350
Apr-06	75.57	13,275,178
May-06	66.61	13,235,770
Jun-06	65.15	11,755,686
Jul-06	64.95	10,875,012
Aug-06	63.81	9,450,924
Sep-06	73.86	8,834,817
Oct-06	77.84	8,903,226
Nov-06	73.67	7,448,941
Dec-06	78.12	7,445,060
Jan-07	82.24	7,726,113
Feb-07	73.31	8,031,594
Mar-07	70.07	10,944,905
Apr-07	75.28	11,088,533
May-07	73.38	10,674,619
Jun-07	74.52	10,562,471
Jul-07	62	13,587,829
Aug-07	54.83	24,190,540
Sep-07	61.73	24,665,692
Oct-07	63.34	26,713,160
Nov-07	62.63	34,055,324
Dec-07	65.44	37,126,588
Jan-08	64.05	38,470,408
Feb-08	50.99	43,252,332
Mar-08	37.64	56,673,704
Apr-08	44.24	61,228,528
May-08	36.81	76,071,760
Jun-08	19.81	70,312,680
Jul-08	17.34	82,087,768
Aug-08	16.09	76,855,712
Sep-08	0.21	217,545,184

Source: Bloomberg (Petukh: 2010)

Chart 1\_Lehman Brothers' stock price until it collapsed

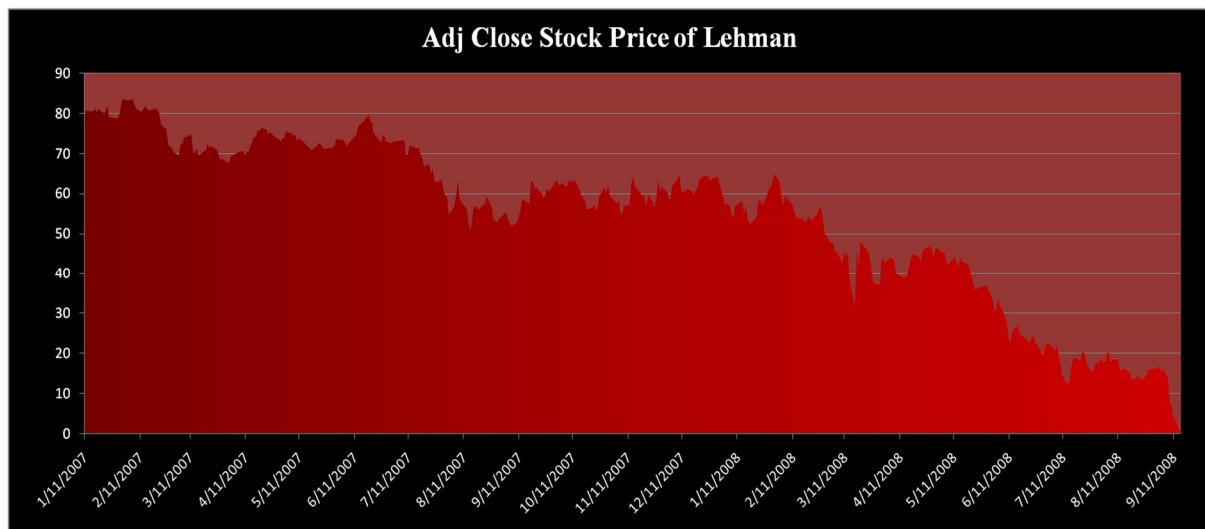


Chart 2\_Lehman Brothers' trade volume

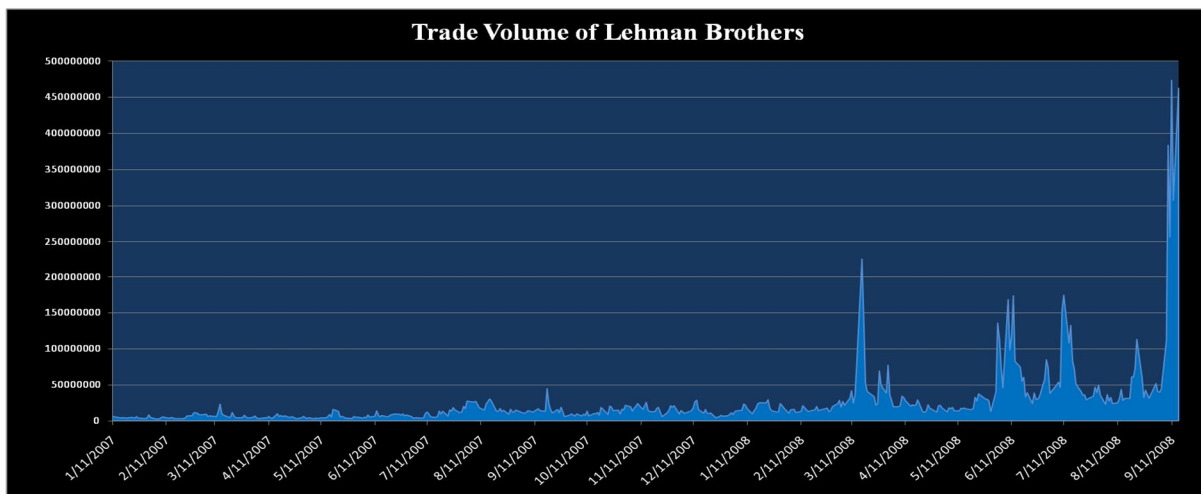


Chart 3\_Lehman Brothers' short interest

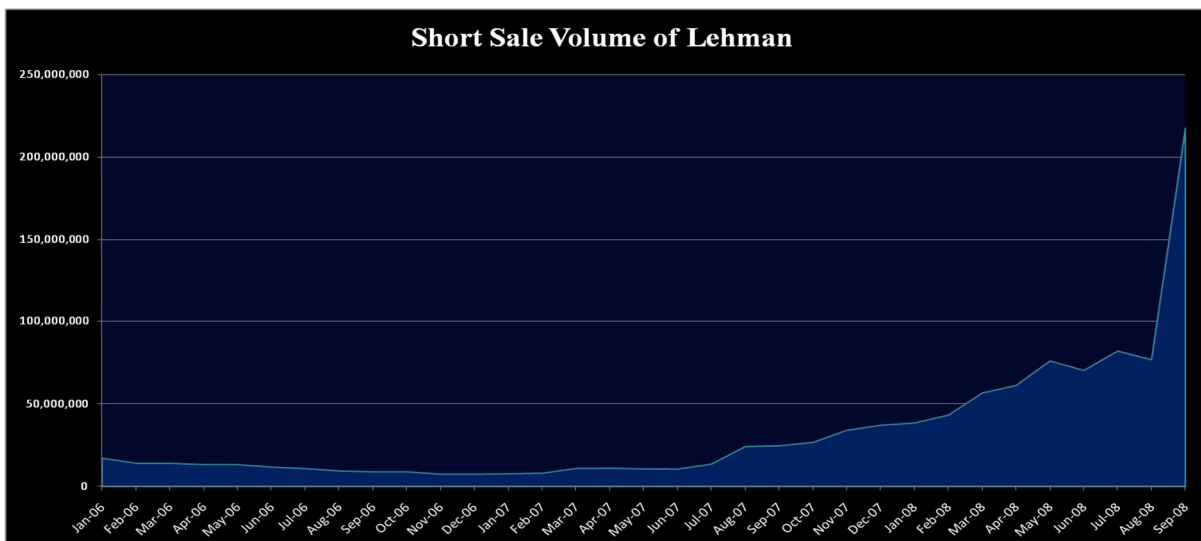


Chart 4\_Short sale demand curve

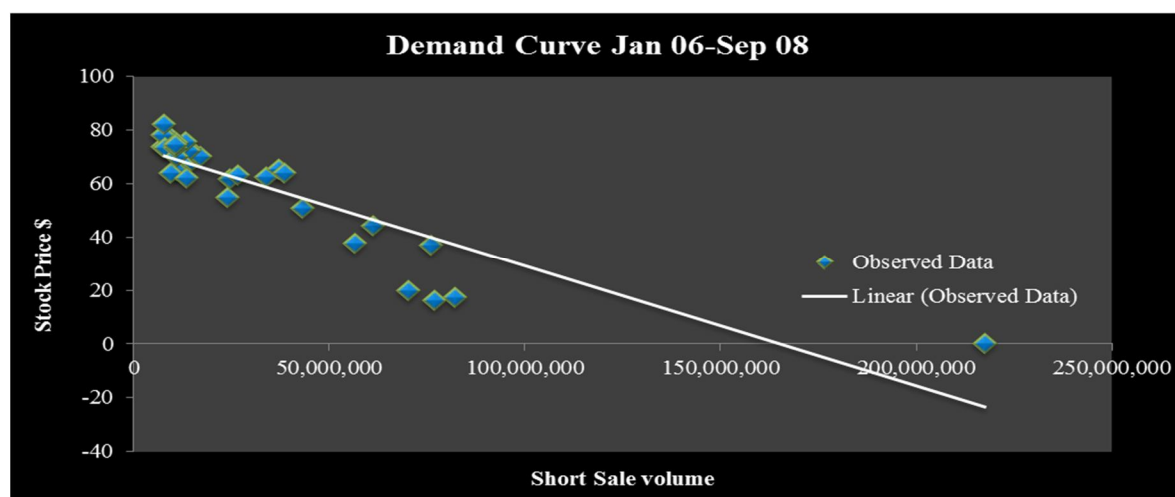


Chart 5\_Fragmented demand curve 1

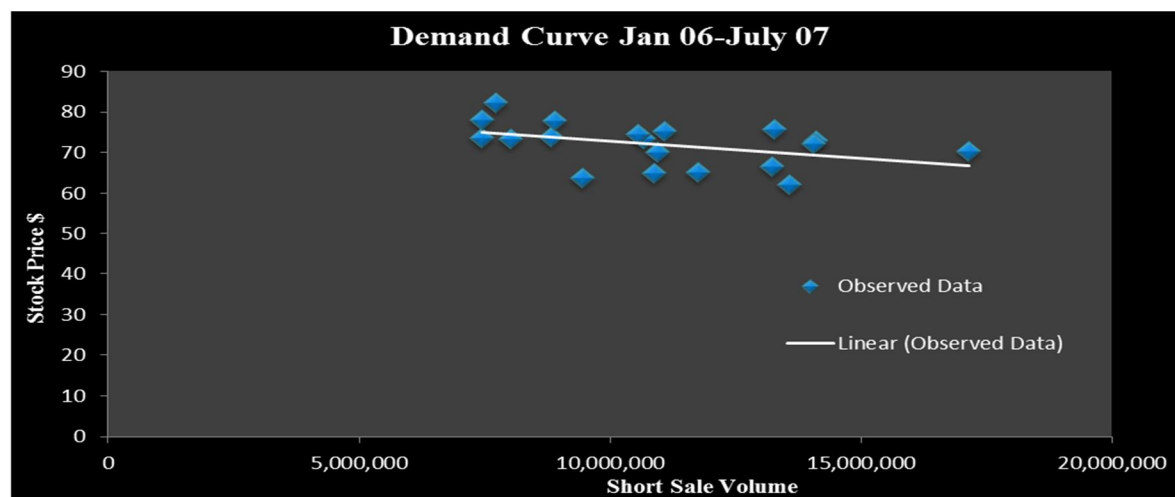


Chart 6\_Fragmented demand curve 2

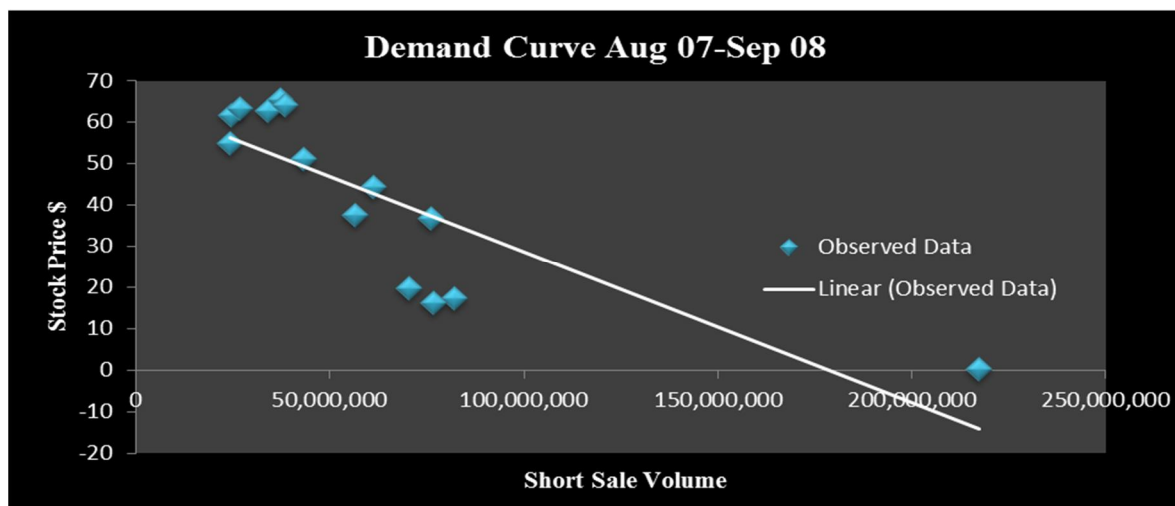


Table 2\_Summarized regression analysis results

<b>Parameters</b>	<b>Aggregate Demand Jan 06-Sep 08</b>	<b>Fragmented Demand Jan 06-July 07</b>	<b>Fragmented Demand Aug 07-Sep 08</b>
<i>Multiple R</i>	0.8839763	0.4270445	0.8242199
<i>R2</i>	0.7814141	0.1823670	0.6793385
<i>Adj.R2</i>	0.7743629	0.1342710	0.6526167

Table 3\_The impact of % change in short interest to % change in stock price

	<b>Aggregate Demand</b>	<b>Fragmentd demand curve Jan.07-Aug.07</b>	<b>Fragmented demand curve Aug.07-Sep.08</b>
<b><i>Slope</i></b>	-0.441261157	-0.220587052	-0.450910043