FINANCIAL CRISIS AND CREDIT DEFAULT SWAPS

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7 January, 2011

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Acknowledgement

With the help from Almighty Allah, we have been able to complete this project to the fullest of our potential.

We are obliged to FAST-NU Administration for providing us with a rich knowledge source of international financial journals and books. We are thankful to our faculty for extending us the opportunity to work on this subject of great significance. This activity had been a great learning experience and provided us with the chance to study Current Financial Crisis and the significance of Credit Default Swaps in detail. We are greatly indebted to our faculty advisor Mr. Muhammad Raheem for guiding us through the whole process.

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List of Abbreviations

AIG	American International Group, Inc.
CDS	Credit Default Swaps
CDO	Collateralized Debt Obligations
MBS	Mortgage Backed Securities
MPS	Mortgage Pass-through Securities
UBS	Premier Global Financial Services Firm
GDP	Gross Domestic Product
NINJA	No Income, No Job, & No Assets
CLO	Collateralized Loan Obligations
D/E	Debt/Equity
REIT	Real Estate Investment Trusts
FDIC	Federal Deposit Insurance Corporation
ISDA	International Swaps and Derivatives Association
FD	Financial Derivatives
CFTC	Commodities Future Trading Commission
CMBS	Commercial Mortgage Backed Securities

RMBS	Residential Mortgage Backed Securities
ABS	Asset Backed Securities
CEO	Chief Executive Officer
OTC	Over the Counter Market

Executive Summary

The purpose of the project was to study Credit Default Swaps (CDS) and its role in current Financial Crisis. Global Financial Crisis 2007 was a result of needless risk taking by financial institutions who had taken massive positions in CDS market as an insurance seller of Mortgage Backed Securities (MBS). In exchange of fixed periodical payment, financial institutions guaranteed to recover losses of MBS in the event of default. Banks were anticipating that mortgage prices would keep on increasing and continue its historical trend. As a result, banks started to offer mortgage loans to individuals on very ease terms and consequently huge amount of money was loaned. Banks repackaged pool of mortgage loans into pass-through securities which were sold to institutions and individual investors in order to meet the risk requirements, imposed by central bank. The majority buyers of Mortgage Pass-through securities had taken long positions in CDS on MBS to protect themselves. American International Group and Lehman Brothers had taken huge short position in CDS. In the start of year 2007 when mortgage prices started to decline, causing a chain reaction and turned whole banking system upside down.

In order to accomplish this project, we used data from journal publications, books, and web based articles. To have better understanding of the topic, we started from a brief historical introduction of financial crisis and then moved towards the recent one. Firstly we have tried to study and uncover major causes of Global Financial Crisis 2007 and then allocated more attention to role of financial derivatives particularly its most specialized form i.e. Credit Default Swaps (CDS) in current crisis. We have also discussed in detail the collapse of giant financial institutions i.e. American Insurance Group, Inc. and Lehman Brothers Holdings Inc., who had

taken huge positions in CDS market. At the end of the report, we came up with some proposed solutions to avoid similar kind of crisis in future.

Introduction

Background

"Financial crisis" is one of those magical, two letter terms that embody in them a massive restructuring and a major phase shift with far reaching consequences. Add the word 'international' and the effects aggravate. Perhaps this is where we see the power of globalization; hardly have we seen any region in the world that had managed to escape the aftermath of a crisis that was born out of reckless lending in one country, the United States. Whether this reflects the structural weakness of a global financial system that has had its proponents for the last few decades, or an inherent dependence of global economy on a particular region where an outbreak of a disease proves epidemic spreading the poison in the whole system, is yet to be seen.

A financial crisis is typically marked with following events: collapse of banks, assets prices plunging, currencies under attack and their values falling, and output severely affected (Franklin Allen, 2007). The surprising fact is that a crisis like the recent one is not a new phenomenon. Financial crises have been occurring in economies of all kinds at different stages of development like South Korea, Thailand, Indonesia, Hong Kong, Singapore, (Asian Crises of 1997), Norway, Sweden, France (Scandinavian crises of early 1990's), Brazil (1962), stock market crash of 1929, banking crises and the following Great Depression of 1930s (Franklin Allen, 2007). To corroborate the above fact, Kindleberger in his book about financial history of Western Europe points out that financial crisis have occurred at an interval of ten years roughly over the last 400 years (Kindleberger, 1993).

A detailed account of various financial crises i.e. banking crisis, currency crises, twin crises since 1880s is found in Bordo et al. (2000,2001) They have identified the following periods:

- Gold Standard Era 1880 – 1913
- The Interwar Years 1919 – 1939
- Bretton Woods Period 1945 – 1971
- Recent Period 1973 - 1997

By studying similarities and differences in financial crises in these eras, important implications can be drawn for the underlying factors and effects of financial crises. In the research, they have defined banking crises as 'financial distress that is severe enough to result in the erosion of most or all of the capital in the banking system' and currency crises as 'forced change in parity, abandonment of a pegged exchange rate or an international rescue' (Bordo et al. 2000, 2001). Further, the duration of crises is measured first by computing the trend rate of GDP growth for five years, and then finding the amount of time before GDP growth settles to its trend rate. Depth of crises is estimated by finding the output loss relative to trend for the crisis duration.

A number of valuable implications can be drawn from the above result. The most benign era was the time when Gold standard was followed globally and financial systems were fairly open. This implies that globalization does not always leads to crises. Worst was the time period of interwar years when Great Depression struck. In this period, industrial countries were specifically hardly hit by financial crises. The time period after Great Depression saw strict regulations and state control of financial markets which led to banks facing less risk, and hence outstands as the period with hardly a single occurrence of twin crises in Brazil in 1962.

Currency crises did occur, but they were mainly attributed to inconsistent macroeconomic policies with Bretton Woods's system. Frequency of crises has risen considerably after the abandonment of Bretton Woods's system, and when the data set includes emerging economies, results are even more disappointing, showing that emerging economies are more vulnerable to financial crises, particularly the currency crises (Bordo et al. 2001).

Similar findings are stated in a study cited by Martin Wolf, according to which there were 139 financial crises between 1973-1997, which is double the level of financial crises before 1914, the same period when the world economy could be called as 'liberal' and there were easy monetary flows between national borders under the British hegemony. However, there were only thirty-eight financial crises in the post war period i.e. 1945-1971 when Bretton Woods's system was followed and capitalism was regulated nationally (Wolf, 2009).

However, this should not have the impression that highly regulated financial markets were the ultimate solution to financial crises problem. As governments intervened and regulated the systems extensively, different inefficiencies developed in the financial system that hampered it from performing the basic function of allocation of investment. Thus we saw the wave of deregulation starting in 1980s where market reforms were advocated. But, crises have also returned with the free market approach in financial markets (Franklin Allen, 2007). Now we'll briefly discuss the recent financial crisis and how financial derivatives, particularly CDSs led to the downfall of large financial institutions which dragged the economy into recession.

The recent global financial crisis of 2007 had turned the whole banking system upside down. The world leading economies went into recession as situation worsened and banks began falling one after another. A thorough investigation into the underlying cause of financial crisis revealed that

the economic disaster was the outcome of unnecessary risk taking by the large U.S. banks. U.S. banks took huge positions in the CDS market by selling insurance to mortgage-backed securities (MBSs) issuers in return for premium, with the promise that they will cover losses of MBS issuers in the event of default. Large U.S. banks carried out excessive lending to sub-prime borrowers to buy homes. These borrowers lacked the ability to make interest and principal payments on their mortgage loans, so banks offered them very lenient terms to encourage borrowing. 2/28 adjustable rate mortgage loans and NINJA (No Income, No Job & No Assets) loans are two classic examples of sub-prime mortgage loans. Banks offered loans at zero down payment and very small interest payments with the option of negative amortization for first two years of the loan term. After two years, the interest rates went up by 500 basis points. These sub-prime borrowers kept on making payments until the house prices were going up. Once the house prices started to decline, the borrowers stopped making payments. The mortgage-backed securities issuers, which were simply collecting payments from the mortgage borrowers and passing on to the MBS holders, could not make payments to MBS holders and had to call upon the insurance writer (CDS seller) to make the payments to cover losses (McCulley, 2010).

When more and more sub-prime borrowers started to default on their interest and principal payments of mortgage loans, the MBS issuers had to ask their insurance writers to make the payments. CDS sellers (insurance writers) which were previously enjoying premiums had to make payments to cover huge defaults by sub-prime borrowers. The CDS sellers, which were large U.S. banks, could not meet the promised payments because required payments were manifold their liquid assets, so they eventually defaulted on their promised payments and began collapsing one after another. The failure of large financial institutions put strain on the amount of funds available to new borrowers (investors, large corporations etc.) because banks were

reluctant to make loans. This led to decrease in liquidity available to borrowers/investors and hence decreased the economic activity, so economy was forced into recession.

Literature Review

The Recent Financial Crisis

In his book 'Financial Crises and Recession in the Global Economy' Roy E. Allen has categorized the period from 1980 to 2006 as the boom period, characterized by deregulation, globalization and information technology dominance in every sphere of business (Allen, 2009). This time period saw growing dominance of US dollar in international financial markets, growth of off-shore financial markets, tax havens, introduction and explosion of derivative products and wonders of financial engineering[1].

The Great financial crisis of 2008 which reflects market prevailing practices of 2007 and structure which differs between banks and nonbanks, or in classic sense named as shadow banking system (McCulley, 2007). The shadow banking systems includes hedge funds, conduits, structured investment instruments, REIT's, Collateralized loan obligations, Collateralized debt obligations and Credit derivative swaps and so on. All these financial products are levered investment vehicle. In that sense, they are similar to banks but traditional banks are also very different.

Globalization of financial markets and factors stated above led to a positive net inflow of investments into United States to such a high level that in 2006, investment inflow in the US was $800 billion, or 6 % of GDP (Allen, 2009). This was the basis of lax standards in loaning that led to widespread subprime lending in the United States, which were primarily adjustable rate mortgages coupled with innovative financial products that passed the risks of default to third

[1] It is a field relating to the formation of novel financial instruments and approaches like exotic options and interest rate derivatives through the use of financial theory and applied mathematics.

parties. It was profitable for lenders and borrowers both as long as housing prices continued to rise, which they did, from $100,000 in late 1990 to $ 250,000 in 2005 (Allen, 2010). However, once the housing bubble burst[2] in fall 2006, there were series of borrowers defaulting and rising foreclosures. There is a general consensus that US Subprime mortgage crises lies at the heart of the crippled global financial system of today.

The fall in US housing prices and rising defaults of subprime borrowers implied a liquidity crises for banks at first thought, but given a wide range of securitization products linked to mortgage payments, and products like Credit Default Swaps (CDS) that passed the risk of default from one party to other, the victims of these defaults were widespread in the financial system, to be more precise: the global financial system. Precarious

Thus the finance industry experienced unanticipated changes like: the takeover of Bear Sterns by JP Morgan, failure of Lehman Brothers, bail out of AIG and takeover of mortgage companies Fannie Mae and Freddie Mae by US government. On the parallel, British government took majority equity stake in Royal Bank of Scotland and Lloyds Banking Group, which is world's largest company by assets. Similarly, Deutshce Bank and UBS (Premier Global Financial Services firm) that were not directly involved into the subprime mortgage business were victimized because of their participation in the global financial system through exotic products like Credit Default Swap (Callinicos, 2010). They had taken short positions in the CDS and we know that seller of the CDS assumes the long position in the underlying security. When housing bubble busted in 2006, MBS investors started to claim their losses excessively from banks. Such

[2] Before 2006, housing market was at boom and individuals were buying them. The excessive buying trend in the housing market created a bubble i.e. houses were being sold at inflated prices. However, when individuals began to default, the housing bubble burst.

actions directly strike the risk aversion of investors worldwide, leading to bank runs. Fear of bank runs at the part of banks prevents banks from further lending and this sudden decreased liquidity in the system further aggravates the risk aversion of investors. Stock markets face selling pressure as investors feel more comfortable holding base money rather than stock that no longer present earning potential. The vicious circle continues to the detriment of any confidence left in the overall financial system, as categorized by IMF that the current crises is partly a crisis of confidence in the financial markets (Alasrag, 2010). Thus, where developed countries suffered directly from decreased lending, crashing stock markets, pessimistic business prospects and thus falling output, developing countries like China, India, Turkey, Korea, Malaysia had to bear the second round effects of decreased demand of their exports, but also face the hit of dried up liquidity that proves to be a significant component of growth for emerging economies.

Roots of the Crisis

Mortgages, credit boom, and leverage

The phase shift in financial markets from 1980s onwards that was characterized with globalization of financial markets and that led to commercial finance as an industry in its own gave birth to along episode of credit boom during which even those with lowest credit ratings (subprime) became worthwhile of taking risk and earning profit by charging high interest rates. This credit boom of mid 2000s which is understood as one of the roots of the current crises has much to do with the excessive growth of financial sector. Various banks and financial market players borrowed excessively during the credit boom period to make short term profits. Individuals had taken excessive mortgage financings from banks at very relaxed terms because banks were anticipating the continuation of historical trend of increasing mortgage prices. In order to eliminate the risk, banks created pass-through securities against the pool of mortgages

and sold them to institutional and wealthy investors, who had further taken a long position in Credit Default Swaps to hedge their risk. Surprisingly when mortgage prices dropped in year 2007, it had resulted a credit bust, affecting all the parties involved in this chain and significantly AIG and Lehman Brothers who had taken huge selling positions in CDS portfolios.

In a crisis that sprouted from the subprime borrowers defaulting and fear of bank runs, behavior of these financial market actors whereby they sell assets rapidly to meet obligations, contributes further to liquidity crises. Thus the initial increased leverage in various forms, followed by an enhanced maturity transformation by banks, and ultimately an 'increased liquidity through marketability' by the banks and shadow banks is considered to be a basic driver of recent financial collapse of global markets (Turner, 2009).

Shadow banking sector and role of regulation

Shadow banking sector includes private equity firms, hedge funds and other structured investment vehicles. Shadow banks have been found to be involved in 'proprietary trading' i.e. engaging in speculation on their own rather than on clients' behalf. The primary difference is that commercial banks are regulated, whereas the non banking financial institutions are not under strict regulations. There is a capital requirement in the traditional banking system in which regulators have put the maximum amount of leverage a bank take on its balance sheet. Regulated banks have been given access to Fed's discount window and offered deposit insurance to its customers (Goldstein, 2007). The Fed's discount window gives banks a continuous source of liquidity. Deposit insurance give relieve of mind to depositors because they don't care what bank is doing with their money because they are rest assured that, in the event of default federal deposit insurance corporation (FDIC) is going to take care of their money. Depositors have no

worries of taking their money out of the bank because they are not lending to bank rather to third party insurer. If the depositors decide to withdraw their liquidity, regulated banks can take the assets that they were holding on leverage down to the Fed, rediscount them and get the desired liquidity. This is the traditional old fashion banking system.

Traditional banks due to strict regulations were not allowed to take extra risk and so they were not marginal source of liquidity growth in the last half of decade. Marginal liquidity growth has come from the shadow banking system (Goldman Sachs, 2009). The group of levered intermediaries who took a lot of risk and are not regulated. These levered intermediaries have no regulation compliance and they do not have any capital requirements, which forbid them to take on undue risk. They were allowed to work with as little capital as market can digest and they can leverage most of their capital to great amount. The only drawback to this shadow banking systems was that they didn't have the access to deposit insurance and Fed discount window as compare to traditional commercial banks. Therefore these levered intermediaries are more susceptible to change in the risk appetite of their deposit base or the source from where they used to obtain the funding.

Non banking financial institutions primary sources of funding are the reverse repo and asset backed commercial paper (McCulley, 2007)**.** When the market risk appetite is strong the liabilities of the shadow banking systems look very stable and people were happy lending their money to shadow banks. Brokers mark to market investor's collateral at face value, require reasonable margins and never hassle the non banks for more collateral. Everything on the table looks in good health and customary. Every 45-90 days brokers roll over the asset backed commercial paper, and effectively the system has the same desired liquidity to satisfy their

liabilities as the traditional banking system (McCulley, 2007). The only regulation which these shadow system facing was from the credit rating agencies such as Moody's investor services, Standard & Poor's and Fitch Ratings (McCulley, 2007). Before the beginning of this great financial crisis the shadow banking system had high rating from these rating agencies and they had no problem of funding their excessive leverage ratios. Nonbanks were able to hold the asset even for much tighter margin as compare to traditional banks because they were so heavily levered that even a small margin earns a lot of money for them. This way they were able to reach their desired return, which they have marketed to their investors.

The problem occurs when majority of these financial players like hedge funds are not regulated as much as the commercial and investment banks are. Moreover, according to Basel Accord settled by Bank for International Settlements, banks have to hold a certain proportion of capital as security in the event of borrowers defaulting. This should have served as the maximum risk exposure banks could take, and regulatory bodies should have monitored how banks perceive the set limits. However, these limits which meant maximum risk exposure by banks were taken as the target to be achieved rather than an outer limit of risk to be minimized, (Gowan, 2009) and the lax regulatory mechanism let the banks play with the wealth of depositors recklessly until it was swallowed by the wave of subprime mortgages and the like.

Growth of derivatives, excessive risk taking and lack of liquidity

It was an infallible belief in free markets three decades back that laws like "US Depository Institutions Deregulatory and Monetary Control Act of 1980" were passed to catch up with the new order of the day i.e. financial markets liberalization and deregulation (Allen, 2009). This act conferred financial markets the power to charge any interest rate they deem fit in coherence with

market trends and according to the credibility of the borrower. This meant that banks could make profit commensurate with the risk they take by lending even to less credit worthy customers. Ron Chernow in writing J. P. Morgan and Co.'s history projects

> "Far from standing guard over scarce resources, bankers would evolve into glad-handing salesmen, almost pushing the bountiful stuff on customers." (Chernow, 2001)

As if this reckless approach of banks was not sufficient, the financial markets at the same time were fueled by rapid financial engineering and complicated products that sliced, distributed, repackaged these risks and sold it to investors around the globe, thus spreading the risks to a much wider level. Credit derivatives, especially the Credit Default Swaps that provide insurance against borrowers' default are said to play a crucial role in the current crisis. As per Bank of International Settlements, the total notional value of outstanding contracts in the over-the-counter derivatives reached an apex of $683,700 billion in mid 2008, which is more than eleven times the world output (Mackenzie, 2009). This divergence in size of financial and real assets started after 1980s, and in 2007 financial assets had a volume of $194 trillion, 343 percent of global GDP (Global Capital Markets: Entering a New Era, 2009).

As astonishing as it seems now, this was reality at the beginning of the 2007. Those who raised fingers on the reasonableness of the spreads and amount of leverage were told that it was all a result of an enormous pool of liquidity. In fact that pool of liquidity was a union of risk seeking states of mind between the nonbanks and their providers of liquidity (Minton, 2009.). The non-bank financial institutions were able to disguise the rating agencies, repo broker and they supported greatly to these non-bank levered institutions to obtain continuous liquidity. The worst situations started when the asset backed commercial paper market were willing to lend to

most levered, less transparent and more conflicted nonbank entities. It should have taken as a sign that the game was coming to an end when structured investment began to issue extendable asset backed commercial paper, which gives the issuer the option to extend the maturity for a fixed time period. This effectively made the buyer of that paper a lender of last resort, all for a mere 2-4 bps (Minton, 2009.)

In February 2007, the news came on the market that some of the assets that the shadow banks owned in the mortgage sector were under problems. What can be worst that financial market didn't try to look at the problem and continued the existing practices until the spring 2007 (McCulley, 2007). In spring 2007 atrocious news came in the market when Bear Stearns hedge fund revealed that its reverse repo lenders had asked for more collateral to ensure that they would not lose money on their investment (McCulley, 2007). When Bear Stearns which is one of the largest financial institutions in the United States conceded that it did not have more collateral, the lenders decided to sell off the collateral that they have with them. The non banks could not sell assets fast enough to satisfy the increased risk aversion of their lenders. The liquidity dissipated and volatility returned to the market because investor state of mind changes their risk appetite drastically. In the 1st quarter of the 2007, the subprime mortgages issued in 2006 had a surge of early payment defaults. The percentage of borrows not making the 1st payment on their mortgages rose quickly which was signaled that property market bubble had busted (Minton, 2009). This was the start of the great financial crisis which put under severe recession to lot of countries.

Thus, it was an unstable and unbalanced global financial system in which West not only dominated in policy formulation, receiving investment inflows, and consuming major part of

world's output but also had lethal connections to the rest of the developing and emerging world, that could not sustain the shocks of what started as a subprime mortgage crisis in the United States.

Impact on World Economies

Given the wonders of globalization, a financial crisis in the most powerful region of the world was sure to have repercussions for the rest of the world. Developed nations suffered from credit crunch, decreased volumes of global trade, slow economic activity, and rising unemployment. United States and United Kingdom faced more or less similar instability in economic and political instability, and a hunt for more sustainable regulatory regime (Jackson, 2009).

Countries like Iceland, Ukraine, Hungary and the Baltic States had to fall back on IMF or EU help to revitalize their economies. The recent European Sovereign Debt crisis where Greece, Ireland, Portugal, Italy and Spain suffered primarily is also said to be a continuation of the wider global financial crisis of 2008. Other developing countries suffer because of decreased demand of their exports, less FDI, capital flight, exchange rate volatility and ultimately decreased demand and rising inflation and unemployment (Alasrag, 2010). Nevertheless, IMF projects healthy forecasts (5 percent for emerging economies of China, India and other Asian countries and 4% for Middle East and African economies in 2010 due to recovery in commodity prices. Also, emerging markets are projected to be particularly attractive for investors and financial intermediaries because of their increasing share of global capital markets. Now in the next section we will discuss the origin and functions of financial derivatives, particularly credit default swaps (CDSs).

The Evolution of Financial Derivatives

Financial markets have gone through substantial change over the last two decades. Advancement in financial theory and increased digitization has led to a plethora of complex derivatives instruments that have essentially revolutionized the working of the financial system. What follows is a study of evolution of derivatives usage over time period.

Futures contracts on interest-bearing government securities were introduced in mid-1970s. The Federal Reserve Board changed its policy measure from setting interest rates target to money supply targets in 1979. This policy change caused interest rate volatility in the market. This increased uncertainty in interest rates led to increased sense of risk management against adverse movements in the financial and macroeconomic environment.

Derivative market finds in origin in Chicago back in 1965 when farmers wanted to hedge the price risk in Corn transactions. However, these futures contracts were claimed to be a significant source of financial distress in American's agricultural sector during the Great depression, owing to the large amount of speculative activities involved. Commodity exchange act was introduced in 1936 and history records President Roosevelt's words in 1934: "It should be our national policy to restrict, as far as possible, the use of these futures exchanges for purely speculative operations." This act had to deal with a plethora of market issues that served to demoralize the producer, consumer and the exchange itself. Perhaps we can trace some replicas of recent financial crisis by studying what led the regulators regulate the commodities derivatives century ago.

Commodities Exchange Act of 1936 required all derivative contracts to be traded on regulated exchanges and disclosure of trading parties so as to provide complete transparency of trading

behavior and prices. Swaps were born in 1980s, and went through a number of regulatory requirements until the standardization of swaps under the ISDA Master Agreement in 1992. By 1988, financial system had experienced rapid growth of over-the-counter derivative market (Greenberger, 2010). Same trend extrapolated in the 1990s and according to ISDA, the notional value of new transactions reported by ISDA members in interest rate swaps, currency swaps, and interest rate options during the first half of 1997 increased 46% over the previous six- month period. The notional value of outstanding contracts in these instruments was $28.733 trillion, up 12.9% from year-end 1996, 62.2% from year-end 1995, and 154.2% from year-end 1994. ISDA's 1996 market survey noted that there were 633,316 outstanding contracts in these instruments as of year-end 1996, up 47% from year-end 1995, which in turn represented a 40.7% increase over year-end 1994 (Fed Reg. 1998).

Financial derivatives usage differs among various regions of the world depending on number of factors, but overall international derivatives usage was found similar to that of U.S. In a study of 48 countries, from a sample of 7,039 non-financial firms, it was found that 54.3% of the firms use derivatives to hedge various risks. The biggest use was found to be of currency derivatives 35.9%; close was the use of interest rate derivatives 32.0%, and only 9.2% companies used commodity price derivatives. However, the enhanced usage of derivatives can be judged from the fact that in 2009, 93.6% companies surveyed in a global study of derivatives usage report using these contracts to hedge foreign exchange risk, 88.3% use them to hedge interest rate risk, 50.9% for commodity risks, 30. 3% for equity risks and 21.4% for default risk (ISDA)

Also, usage of financial derivatives differs from sector to sector. Almost entire financial services sector uses 98.4% derivatives, basic materials industry uses 97%, technology Sector uses 95%,

health care, industrial goods, and utilities industries uses 92% each. Services sector report the lowest usage rates 88% (ISDA, 2009). It was also found that derivative usage was primarily for the purpose of shareholder wealth maximization, although there were some rare cases of managers acting in their own interest (Bartram, Brown, Fehle, 2003). Also, derivative usage was not found to be influenced by the size of the company. Rather, it was uniformly distributed (ISDA, 2009).

A number of factors influence the choice of derivative usage but they can be broadly classified into firm specific and country specific factors. Country specific factors include the macroeconomic measures like economic size, stage of development, and legal origin but firm specific factors significantly determine the level of derivative usage of the firm. Firm specific factors imply the economic rationale for financial risk management. For example, statistical analysis showed that firms that use derivatives are levered, less liquid and own fewer tangible assets as they had significantly longer debt maturity, lower quick ratios and current ratios, and higher dividend yields. Also, firms with multiple share classes and management stock options use derivatives more than those with single share class. Country specific factors and investors' behavior together were related to derivatives' usage by noting that small, developed countries and countries with lower level of international trade or countries where creditor's rights protection is not reliable are more likely to have hedgers using derivatives. One more finding worth mentioning was that firms with more than average interest rate exposure can use interest rate derivatives to lead to a higher firm value.

As for a cross country comparison, it was found that 100% of the sample of companies surveyed in Japan, France, Britain, Canada, Netherland, and Switzerland used derivatives for risk

management, while the ratio was 97% for Germany and 90% for United States. China and South Korea ranked the lowest, with South Korea having 87% usage and China only 67% usage of derivatives (ISDA, 2009).

Results of a study integrate all of the above findings. Usage of financial derivatives in emerging economies like Peru illustrates many intricate details of how financial systems that in process of refinement adjust to emerging trends in financial engineering. To check the development degree of financial derivatives in developing countries, Peru and non-financial firms were chosen as a reference. The basic focus of the research was on the use of interest rates and current derivatives and other variables that would affect their development in order to explore the degree and type of hedging by non-financial firms in Peru. The primary objectives were to determine the level of financial derivatives usage in a representative sample comprised from the Peruvian TOP 1000 firms, and, based on this information, to identify the reasons that encourage businesses to use, or not, financial derivatives to minimize risk exposure. The traded volume of financial derivatives in Peru has remained stable in recent years. (Martin, 2009)

Two factors were identified during the study. The first factor is the degree of market knowledge and training level on financial instruments; the second factor is regarding regulations influence (tax, legal and accounting issues) about the use of financial derivatives. Results of the study showed that only 33% of non-financial firms allow these factors. (Martin, 2009)

As for the specifications of the study, a questionnaire regarding these factors was mailed to the financial managers. A 90% confidence band was considered to determine the sampling dimension and to obtain a valid size of 65 observations necessary to represent statistically the chosen population and the selection was performed by random sampling then.

The questionnaire result showed that 46% firms reported to be effected by the interest rate and 66% reported that foreign exchange risk also affected them. But, concerning financial derivatives usage, only 33% of the firms confirmed using derivatives. In response to the frequency of usage, only 6% of the responding firms always used financial derivatives, 11% of the firms responded that they used them frequently, 20% use it sometimes and 9% rarely used it somewhere in past. 44% companies reported that due to the financial policy of the corporation, they did not use derivatives while 44% responded that they were exploring the financial derivatives. (Martin, 2009)

With respect to the main difficulties, the main factor was the lack of knowledge with 42% of agreement. It follows the scarce supply in the local market; the absence of an organized market; the difficulty in evaluating these instruments and the little clarity on tax regulations showed 20% (Martin, 2009). The most important issues that affect the use of financial derivative instruments considered by the responding firms were the market risk; evaluating and monitoring hedge results; credibility in the operation and secondary market liquidity (Martin, 2009).

This outcome suggests that there should be patterns of behavior for market agents and government entities to promote the use of derivatives, as well as provide information for future research that might contribute to establish the most adequate mechanisms for market-development purposes (Martin, 2009).

Swaps were not fully regulated till 1988, and CFTC (Commodities Future Trading Commission) reported that besides a number of economic benefits from derivatives transactions, these complex financial instruments pose substantial risks for the system if misunderstood or misused. The concept paper claimed that the last few years have seen large, well-publicized financial

losses, and hence attracted attention of financial services industry, regulators, derivative end users and general masses on issues like potential issues and abuses in the OTC derivative markets. It was also stated that these losses occurred due to some exemptions from regulators in early 1990s (Markham, 1997).

The beginning of twenty first century saw the size of financial derivatives (unregulated Over the Counter market) grows from $80 billion in 1988 to excess of $600 trillion. Out of which $ 35-65 trillion was estimated to be the amount of Credit Default Swaps, and around $393trillion notional amount of interest rate swaps (Greenberger, 2010). Interest rate swaps are relatively simple products used for hedging and will lead to distress only if interest rates on inflation rise to unexpectedly high levels. However, the total market value of these derivatives was around $15 trillion approximately of the size of U.S. economy. (Sheridan, 2008)

Orange County's bankruptcy due to poor execution of interest rates swap and resulting massive levels of debt in 1994 was a case in point (Greenberger, 2010). 1998 saw the collapse of country's most successful hedge fund, LTCM (Long Term Capital Management). Monetary loss was of the magnitude of approximately 90% of the fund's capital, and loss was said to arise from massive positions on OTC derivatives market (Greenberger, 2010). To save the entire financial system from contagion, fourteen of the largest financial institutions that were stakeholder in LTCM contributed $ 3.6 Billion to prevent the fund from failing (President's Working Group on Financial Markets, 1997). It was later stated that faulty supervision at LTCM's swaps' desks led to the crisis and that with a collapse of such financial institution, the health of the entire financial system gets disturbed.

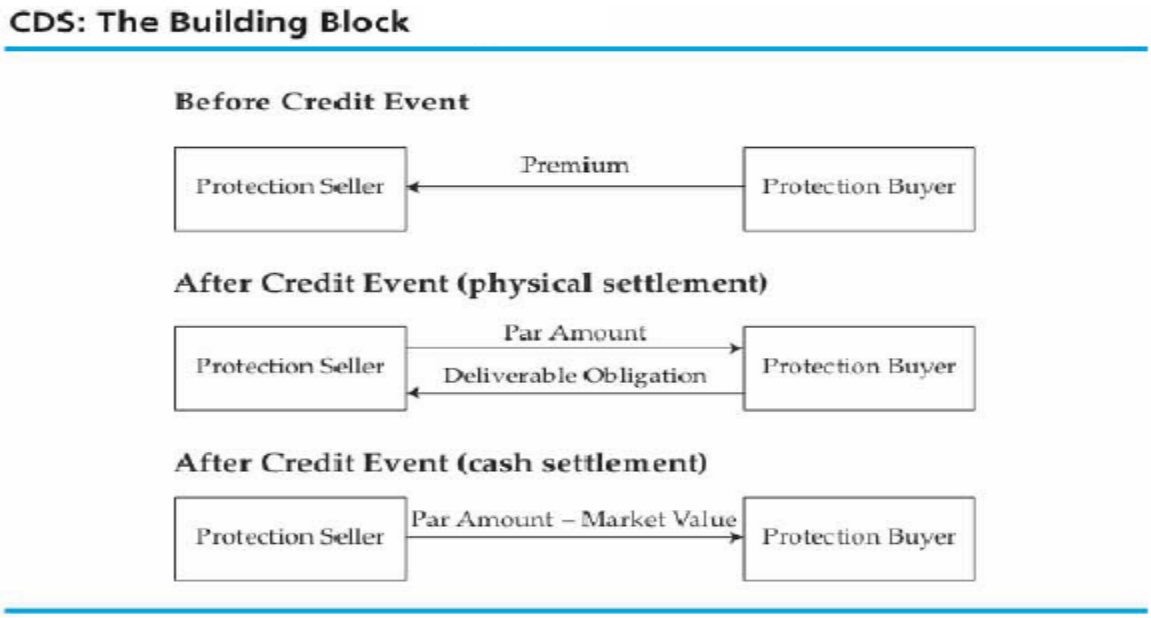
No doubt financial derivatives help in price determination and hedging existing asset price risk and cash flows risk. But their excessive use can result in huge losses due to their complex nature. Many investors don't have good understanding of the inherent risks in derivatives trading and use them for speculation in order to make easy profits but end up losing money. Hence if used carefully derivatives can be a very effective tool for hedging. In the next section, we are going to discuss credit default swap (CDS), a very specialized form of financial derivatives which is essentially an insurance contract written to protect the bond issuers against losses from default.

Credit Default Swap

Credit default swaps are thought to have substantial ambivalence. In a layman term Credit derivative swaps are used to serve a customary purpose i.e. the ability to independently manage default risk and interest rate risk. CDS is being primarily used because of its advantage of the portability of pure risk. It allows market participant to take exposure in the credit risk. The usage of CDSs allowed banks to make loans at relaxed terms, which they would never be able to do otherwise. (Rene M. Stulz, 2010)

Credit default swaps (CDS) are the main pillars in the credit derivatives market and represent about half of its volume. A CDS is a bilateral contract between a protection buyer and a protection seller that exchanges the credit risk of a specific issuer. A CDS is very much similar to an insurance contract. The reference obligation is a fixed income security on which swap is written. The reference obligation could be a bond or loan. If the default occurs on the reference asset, the buyer of the swap receives the payment from the seller. The protection buyer pays a premium to the protection seller who assumes the risk associated with a particular credit event. Credit event are defined to include but not limited to debt restructuring for particular reference asset, bankruptcy, or a material default. See the figure below for graphical explanation.

Figure 1



Source: CFA Institute Curriculum – Derivatives Volume

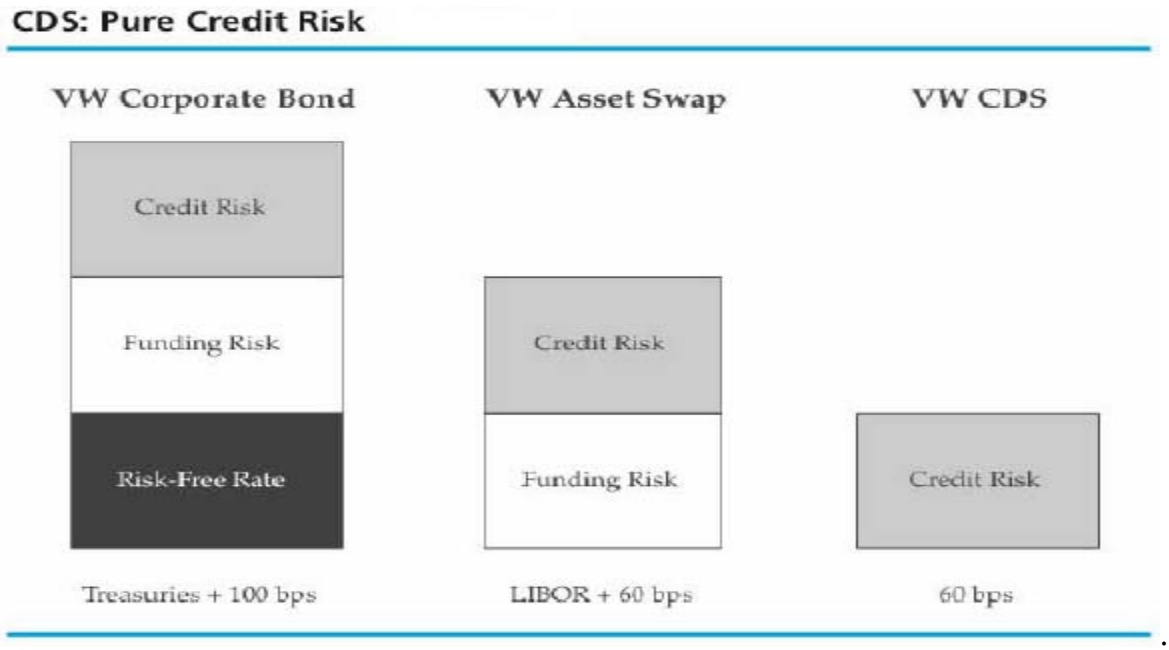
The CDS creates a short position in the reference asset for the buyer of the swap because the value of the CDS to the buyer increases as the credit quality decrease and market price of the reference obligation declines. The default swap become more and more valuable to the buyer as the credit quality of the obligation goes downhill. However from the seller's perspective the CDS is used to take a long position in the reference obligation/asset. The seller of the swap will be better-off, if the credit quality of the reference asset improves.

The functioning of CDS is identical to insurance contract, where in the event of any default, the amount of losses is being guaranteed by the insurer. As promised to cover losses, the difference between the market value of the security and the actual notional principal amount is paid to the buyer of the CDS, if the default event takes place. The contract can also include an option to

deliver the reference asset to the seller of the CDS and in return buyer gets the full notional principal. CDS in its essence was designed to use for municipal bonds, corporate debt and mortgage securities to take bet only on credit risk (Greenberger, 2010).

Similar to bonds, yield spread on CDS widens when markets reflect more credit risk and tightens when market reflect less credit risk. Corporate bond yields are composed of risk free rate, funding risk and credit risk. Credit risk is the idiosyncratic default risk associated with the company. However the differentiating factor between the corporate bond and the CDS is that, CDS is not a spread over anything; it is simply the credit risk. The default swap premium is also referred to default swap spread. It is an unfunded contract between two counterparties willing to take opposite position on a same security and thus is the purest form of credit risk in the market (Greenberger, 2010). See the figure below for graphical explanation.

Figure 2

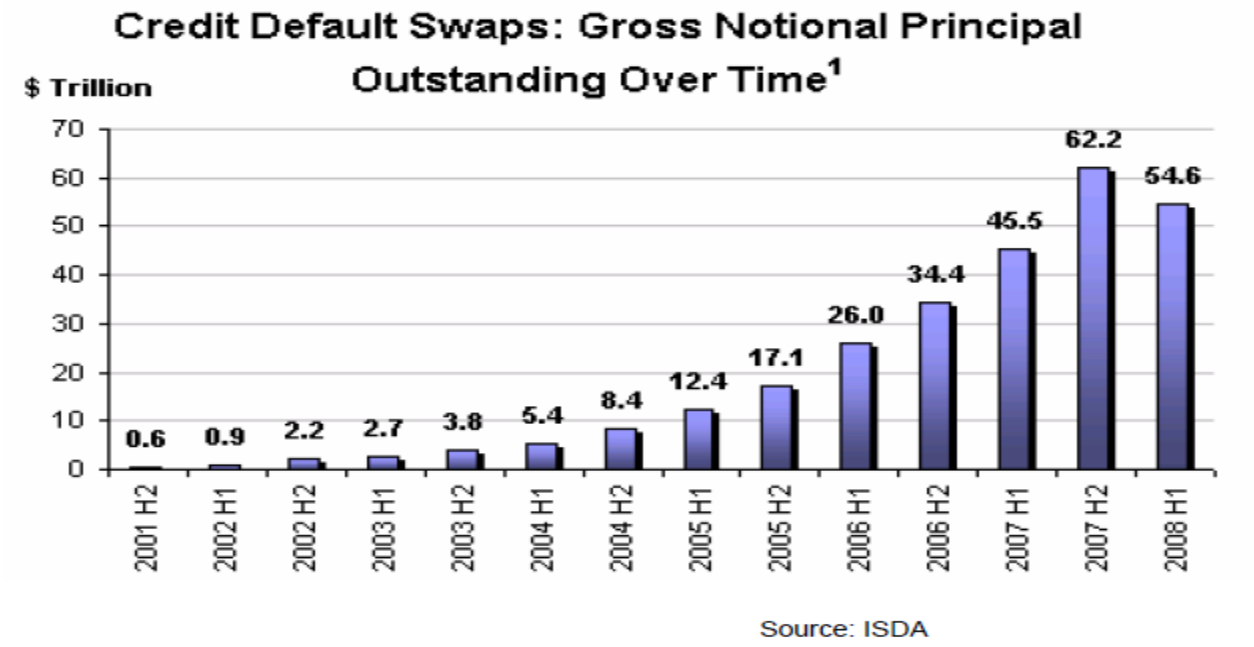


Source: CFA Institute Curriculum – Derivatives Volume

Evolution of credit derivative swaps

The credit derivative market began in the mide-1990s. The first credit derivative swap agreement was made between the European Bank for Reconstruction and Development and JP Morgan. JP Morgan was the protection buyer on the Exxon where as the European bank took the opposite side of the trade. The first contact took about six months to actually settle. The summative size of the credit default swap market was a comparatively small standing at $180 billion (Acharya, Engle, Figlewski, Lynch, and Subrahmanyam, 2009). The growth in the CDS market is extraordinary. The market has reported double digit growth in its value of gross notional principal outstanding every year till 2007 as seen in figure.

Figure 3



Source: International Swaps and Derivatives Association

In late 1990s some key developments in the CDS have occurred when the ISDA (International Swaps and Derivatives Associations) came out with much needed standardize documents which are designed to address the key contract items like, maturity, premium, definition of credit events, legal jurisdiction, reference name etc. The marketplace has acquainted itself with these new products. The documentation has improved and legal risks can now be quantified and better managed. The volume of trade has increased rapidly and the trend is expected to continue as new financial engineering leads to the development of new and innovative product structures (Ellen Brown, 2008). In last decade market participants have seen enormous development in CDS market with the introduction of CDS indices. The world's most active indices are Dow Jones iTraxx (Europe) and Dow Jones CDX Indices (United States of America).

The volume (in notional amount) of CDS was estimated to be $0.9 trillion in 2002 which exceeded $62.2 trillion in 2007 and reduced to $54.6 trillion in 2008 after the crisis emerged. The widening is credit spreads one of the reasons behind this huge increase in the volume; the widening of spreads in lower rated classes of asset-backed securities in particular is responsible for the huge increase in volume; these classes of securities has been of special interest to sellers because they can earn a higher yield by selling protection than they can buy buying bonds because the purchase of a bond requires an outlay of cash and in some cases yield lower returns. Just like other financial markets, the liquidity and efficiency of matching buyers' needs and sellers' needs is dependent on the consistent, reliable and understandable legal documentation. The International Swaps and Derivates Association (ISDA) has a great role to play in stabilizing the uniformity of CDS products' documentation; the ISDA has played it role through the support and assistance of its members, the dealer community primarily. Currently for single-name corporate CDS, basket trades or single-names, and CDS on Commercial mortgage-backed securities (CMBS) and Residential mortgage-backed securities *(*RMBS) securities, there are settled forms of template documents available (Schetman and Southwick, 2006).

The CDS market is evidently a huge market in term of value gross notional principal contract outstanding. The credit default swaps market has attracted the interest from all across the financial market participant including dealers, investors, regulators and lately, and the general public. The CDS market has grown rapidly over the last seven years. Seven years ago, the market was nascent with only a few dealers and end-users. Today it is a multi-trillion dollar market in which people from every sector actively participate. The first CDS products were relatively simple single-name trades. There were two parties in a single-name trade: buyer of protection and seller of protection. The buyer of protection received a payment if certain "credit

events" took place and the buyer had to make either upfront payment or payments over the life of the CDS to the seller of the protection. The range and sophistication of products have expanded a lot since then. The expanded range of sophisticated products includes:

- "Nth" to default
- CDS on mortgage- backed securities (MBS)
- CDS on asset-backed securities (ABS)
- CDS index trades

According to the figures provided by ISDA (International Swaps and Derivatives Association), the CDS market cultivated in last one decade to over $45 trillion in mid-2007. The size of CDS market approximately represents the twice the size of world's largest equity and debt market. The US equity bourse had on average market capitalization of $22 trillion in year 2007 and $4.4 trillion U.S. treasuries market. CDS market was multiple times bigger as compared to the most crippled market segment of $7.1 trillion mortgage industry.

The next section of literature review would focus on the real case studies of two giant financial institutions, which collapsed due to the excessive trading of exotic financial instruments such as credit default swaps. We will illustrate the role of Credit Default Swaps (CDS) in the down fall of American International Group and Lehman Brothers Holdings Inc.

American International Group, Inc. (AIG)

American International Group (AIG) is an American insurance corporation, based in New York. AIG is one of the world's largest conglomerates and has operations over 130 countries and jurisdictions. AIG most prominent business is in insurance industry. Its insurance products include property and casualty, commercial, as well as retirement products. It is the part of Dow Jones Industrial Average index.

How a big insurance corporation like AIG ended up at the verge of bankruptcy? What went wrong? Well, unlike most other insurance companies, AIG entered into the credit default swaps market to make some extra profits. Credit default swaps (CDS) are insurance contracts that protect investors from default in the underlying assets which usually include the subprime mortgages and corporate bonds. Swap buyers are the one buying the insurance. They make regular payments to swap sellers like AIG, who in turn have to make payments only if a default or bankruptcy occurs on the underlying assets. On the surface, a CDS seems like a totally reasonable financial tool. One can easily be lure into selling the contract because of the prospects of huge gains as the probability of default of bond issuers was very low. As a result many banks and hedge funds speculated that they could make a fortune by selling CDSs, in this way they would keep the insurance premium, and almost never have to pay out anything because default was improbable. During the past few years, the excessive use of CDSs have

transformed the bond trading into a highly leveraged, high-velocity business. Banks and hedge funds thought that it was a lot cheaper, easier and faster to just buy or sell CDS contracts rather than buy or sell actual bonds. CDS allows the protection buyer to buy the insurance contract on the specific asset/obligation without even owning it in personal through the creation of synthetic CDOs. For the year ending 2007, CDSs market had grown to roughly $60 trillion in global business. A large chunk of these CDSs was sold as insurance to cover those collateralized debt obligations[3] (CDOs) that created and spread the subprime housing crisis. As those mortgage-backed securities (MBSs) and collateralized debt obligations (CDOs) became nearly worthless because people stopped paying mortgage loans, the seemingly unlikely event of bond issuer's default started happening everywhere and the CDSs sellers, the banks and hedge funds including AIG were no longer taking in free cash but they had to pay out huge money to cover those losses. However, all banks were not that badly affected because they were simultaneously on both sides of the trade. They were trying to make money through difference of buying and selling spreads and they were so levered that even mere 4-5 basis point margin can make huge profits for them. They sell CDS to one party and buy CDS from other party on the same issue, so when bonds started defaulting their positions were netted out. AIG was only on one side of these trades unfortunately. It sold CDSs as it was the major insurance company but never bought any to hedge its position because it thought that the probability of default was extremely low. They were also very confident of their in-house risk management system (Cohan, 2010). But once the house prices started to fall, homeowners

[3] Collateralized Debt Obligation (CDO) is a kind of debt security which is backed by a large pool of loans and other assets. CDOs do not concentrate in one type of debt. CDOs are distinctive in that they signify different types of debt and credit risk. These different types of debt are often referred to as 'tranches' or 'slices'. Each tranche has a different maturity and risk associated with it.

refused to make any payments so the bond issuers who issued securities issued against these mortgage loans couldn't pay their investors and started defaulting. At that time, the CDS seller, AIG was approached to make the promised payment as default became probable.

AIG wrote sold insurance on $440 billion worth of bonds (Cole, 2008). Many of these bond issuers asked AIG to cover their losses. AIG has not enough cash and credit rating agencies were skeptical of its ability to make payments to cover even the fractional losses, so they downgraded AIG's rating to "AA". It underwent a severe liquidity crisis when its credit ratings were downgraded below "AA" in September 2008. It was one of the important institutions that were bailed out by the U.S. Government. The U.S. Federal Reserve Bank created an $85 billion credit facility to allow AIG to meet the increase in collateral obligations after its credit rating was downgraded in September 2008 and in return AIG issued a stock warrant to the Federal Reserve Bank for 79.9% of its equity. By May 2009, the U.S. Federal Reserve Bank and the United States Treasury had increased their financial support to AIG by making available a total amount of $182.5 billion, which included an investment of $70 billion, a credit line of$60 billion and an amount of $52.5 billion to buy mortgage-based assets owned or guaranteed by AIG. Consequently AIG had to sell a number of its subsidiaries and other assets to pay back the huge debt, and it went through restructuring and is still cutting costs so that it can keep up with the schedule for interest and principal payments. (Cohan, 2010)

It had drastic effect on AIG's stock. AIG could not convince investors and banks to put in funds because of plummeting stock prices. It even had to place more collateral to support its existing loans. So under these dire circumstances, AIG had to seek out government's help. Since many large banks all over the globe had bought insurance protection from AIG, government couldn't

let it fail that easily. If it were to fail, the whole banking industry would turn upside down. They had to instantly buy new insurance protection at much higher rates. Thus the banks' profits would have suffered and in order to cover those losses, banks would have lent out less money. Small banks would not have been able to get loans from large banks so they would have failed easily. Most likely these small banks would have issued MBSs and CDOs as well, their failure would imply another round of CDSs payout and hence more banks would have failed. (Davidson, 2008)

Generally changes in the global financial markets occur over time and this slow adjustment process saves us from financial turmoil. But in the case of CDSs, there was so much confusion going around. Banks were not sure how much they would have to pay. CDS are largely traded in over-the-counter markets[4]. That means they're not traded on an exchange. One bank just agrees with another bank to do a CDS deal. There's no reliable central repository of information as the contracts were just between two parties and there was no guarantor in the contract. There's no way to know how exposed a bank is. Banks would have no way of knowing how badly other banks have been affected. Without any clarity, banks will likely simply stop lending to each other and it was possible that AIG, alone, could bring the global economy into recession.

[4] Over The Counter (OTC) is a decentralized market of securities not listed on an exchange where market participants trade over the telephone, facsimile or electronic network instead of a physical trading floor. There is no central exchange or meeting place for this market.

Lehman Brothers Holdings Inc.

Lehman Brothers was a renowned global financial services firm which declared bankruptcy in 2008. Its business expertise included investment banking, equity and fixed-income sales, research and trading, investment management, private equity, and private banking. It was a primary dealer in the U.S. Treasury securities market. Its primary subsidiaries included Lehman Brothers Inc., Neuberger Berman Inc., Aurora Loan Services, Inc., SIB Mortgage Corporation, Lehman Brothers Bank, FSB, Eagle Energy Partners, and the Crossroads Group. The firm's worldwide headquarters were in New York City, with regional headquarters in London and Tokyo, as well as offices located throughout the world. (Investopedia, 2010)

In 2001 a team of mathematics and physics PhDs presented an “amazing” investment plan to Dick Fuld, the then Chief Executive of Lehman Brothers. This plan was based on mathematical calculation which clearly showed that the bank will always end up with a profit if they invest on the real estate markets. Fuld was really moved by the notion. So for the next five years bank borrowed billions of dollars to invest in the housing market and they earned huge returns on their investments.

In 2003 and 2004, with the U.S. housing boom well on the move, Lehman acquired five mortgage lenders, including subprime lender BNC Mortgage and Aurora Loan Services, which specialized in Alt-A loans (which are the loans made to borrowers without full documentation). Lehman's acquisitions at first seemed visionary because the high revenues from Lehman's real estate businesses enabled its revenues from the capital markets unit to increase by 56% from 2004 to 2006, a much faster pace of growth than other businesses in investment banking or asset management. The firm securitized $146 billion of mortgages in 2006, a 10% increase from 2005.

Lehman reported record profits every year from 2005 to 2007. In 2007, the firm reported net income of a record $4.2 billion on revenue of $19.3 billion. The acquired firms bought Credit Default Swaps on Mortgage Backed Securities from their parent company i.e. Lehman Brothers. Like others Lehman's management was not anticipating that housing market would fall in the future and in order to bring more profits on their financial statements the company took excessive short position in the CDS (Investopedia, 2010).

The housing market boom had turned Lehman Brothers from a modest firm into the world's fourth largest investment bank. But when the housing prices started to decline, the assumptions that the PhDs made began to break down one by one (Horatio, 2009). The investment now seemed like a huge mistake, resulting in a stunning loss of $613 billion. On September 15, 2008, Lehman Brothers filed for bankruptcy. With $639 billion in assets, Lehman's bankruptcy filing was the largest in history, as its assets far surpassed those of previous bankrupt giants such as WorldCom and Enron. Lehman was the fourth-largest U.S. investment bank at the time of its collapse, with 25,000 employees worldwide. Lehman's demise also made it the largest victim, of the U.S. subprime mortgage-induced financial crisis that spread across global financial markets in 2008. Lehman's collapse was a decisive event that had worsen the 2008 global financial crisis and contributed to the erosion of close to $10 trillion in market capitalization from global equity markets in October 2008, the biggest monthly decline of equity market recorded at the time. (Brown, 2010)

In February 2007, the stock reached a record $86.18, giving Lehman a market capitalization of close to $60 billion. However, by the first quarter of 2007, problems in the U.S. housing market were already becoming visible as defaults on subprime mortgages rose to a seven-year high. On

March 14, 2007, the firm reported record revenues and profit for its fiscal first quarter. After the earnings announcement, Lehman's chief financial officer (CFO) said in a conference call that the risks posed by declining home prices were well contained and would have little impact on the firm's earnings. He also said that he did not anticipate problems in the subprime market spreading to the rest of the housing market or hurting the U.S. economy (Bubble, 2008).

As the credit crisis exploded in August 2007 with the collapse of two Bear Stearns hedge funds, Lehman's stock fell sharply. During that month, the company cut down 2,500 mortgage-related jobs. In addition, it also closed offices of Alt-A lender Aurora in three states. Even as the correction in the U.S. housing market gained momentum, Lehman continued to be a major player in the mortgage market. In 2007, Lehman underwrote more mortgage-backed securities than any other firm, accumulating an $85-billion portfolio, or four times its shareholders' equity. In the fourth quarter of 2007, Lehman's stock bounced back, as global equity markets reached new highs and prices for fixed-income assets underwent a temporary rebound. However, the firm did not take the opportunity to reduce the size of its massive mortgage portfolio thereby losing its last chance to contain the massive losses (Bubble, 2008).

Lehman's high degree of leverage (the ratio of total assets to shareholders equity was 31 in 2007) and its huge portfolio of mortgage securities made it increasingly susceptible to worsening market conditions. On March 17, 2008, following the near-collapse of Bear Stearns which was the second-largest underwriter of mortgage-backed securities. Confidence in the company returned to some extent in April, after it raised $4 billion through an issue of preferred stock. However, the stock continued to decline because hedge fund managers started questioning the valuation of Lehman's mortgage portfolio. On June 9, Lehman announced a second-quarter loss

of $2.8 billion and reported that it had raised another $6 billion from investors. The firm also said that it had increased its liquidity pool to an estimated $45 billion, decreased gross assets by $147 billion, reduced its exposure to residential and commercial mortgages by 20%, and cut down leverage from a factor of 32 to about 25. However, these measures were perceived as being too little and too late. Over the summer, Lehman's management made unsuccessful propositions to a number of potential partners. The stock plunged 77% in the first week of September 2008, in the middle of tumbling equity markets worldwide, as investors questioned CEO Richard Fuld's plan to keep the firm independent by selling part of its asset management unit and spinning off commercial real estate assets. Hopes that the Korea Development Bank would take a stake in Lehman were dashed on September 9, as the state-owned South Korean bank put talks on hold. The news proved to be the last blow to Lehman, leading to a 45% plunge in the stock and a 66% spike in credit-default swaps on the company's debt. The company's hedge fund clients began pulling out, while its short-term creditors cut credit lines. On September 10, Lehman reported a loss of $3.9 billion. The same day, Moody's Investor Service announced that it was reviewing Lehman's credit ratings, and also said that Lehman would have to sell a majority stake to a strategic partner in order to avoid a rating downgrade. These developments led to a 42% plunge in its stock (Investopedia, 2010).

With only $1 billion left in cash by the end of that week, Lehman was quickly running out of time. Last-minute efforts over the weekend of September 13 between Lehman, Barclays PLC and Bank of America, aimed at facilitating a takeover of Lehman, were unsuccessful. On Monday September 15, Lehman declared bankruptcy, resulting in the stock plunging 93% from its previous close on September 12 (Investopedia, 2010).

Inherently Wrong Assumptions

Lehman failed because the mathematicians who convinced Dick Fuld to make investments in real estate made some very wrong assumptions. Firstly, they had assumed that each investor has a certain probability of default based on historical data. The problem is that there hasn't been a national drop in housing prices since the great depression of 1920s, so the chance that a borrower could default was calculated on the basis of a good period when the housing prices were going up or remained stable. When the housing market crashed in 2007, many borrowers' properties worth even less than the mortgage loan payments they had to make in the future to retain ownership of the property, so many of them refused to pay. To add to the misery, 22% of these borrowers were the so-called *subprime* borrowers who had little income and had little hope of returning money. Banks were not afraid of lending money to them because even if they defaulted, the insurance sellers like AIG would pay them back. The participation of the subprime borrowers makes lending much riskier than before. In fact, the default probability in the US has increased by four times from the assumption in the model since 2007, making it four times riskier. This means that investors like Lehman Brothers were to get a hit four times harder than they had anticipated. (Horatio, 2009)

Secondly, whether one can make money from selling the CDO insurance for the bank depends on whether the borrowers return the money, which in turns depends on the economy. So if the economy goes down, a person is much more likely to lose money. If he is an active investor, then he probably has invested in the stock market as well. Now if the market crashes he loses both the money invested in the stock market and in the CDO.

These two errors were sufficient to mask the risk in CDO. In fact, the errors are so serious that 27 out of 30 of the CDOs issued by Merrill Lynch were downgraded from AAA (the safest investment) to "junk" when the errors were spotted (Horatio, 2009).

Although credit default swaps were claimed to introduce efficiency and transparency in financial system, it was also claimed in late 2008 that there were malpractices' in credit default swaps market including but not limited to reprehensible risk management and transparency. But the Securities and Exchange Commission did not take any corrective action, because of a number of numbers of reasons including the idea of free market. Manipulation is very hard to locate in over-the-counter markets, and also because of lack of sufficient information and understanding of dealers' credit derivatives exposures.

One mostly claimed reason of financial crisis – inefficiency at the part of regulators due to less transparency and risk management has to be distinguished from transparency for market players. While transparency and properly in house placed risk management is prerequisite for regulators to work efficiently, it was not desirable on the part of financial institutions as seen in the case of Lehman brothers and AIG.

Lehman Brothers, unaware of the hidden risks, decided to invest huge on CDO. It even had a 35 to 1 debt to equity ratio, that is, it only owned $1 out of every $36 in its bank account, the other $35 were borrowed. This meant that a loss of just 3% of the money on its balance sheet would have meant the loss of all the money it owned. After suffering heavy losses (more than 3% of the money in its balance) from CDO, borrowers began to lose confidence and called back the loans that were used by Lehman to make investments. The financial statements of Lehman's reflected that it had always relied on short-term loans; its lenders were able to call back their loans

quickly. Now the bank was in trouble. It borrowed much more than it was able to return and soon found itself unable to pay back. Lehman's collapse shook the global financial markets, given the size of the company and its status as a major player in the U.S. and internationally.

Proposed Solutions

It can be said that loosening of lending standards, inadequate risk management and weak regulatory, monitoring and credit rating mechanisms caused proliferation of sub-prime mortgage loans which eventually led to the recent financial market crisis. After going through a detailed literature review, we have come up with following recommendations for the over-the-counter (OTC) derivatives markets, including the credit default swaps:

- Exchange-based Trading
- Strengthening of Regulatory Environment

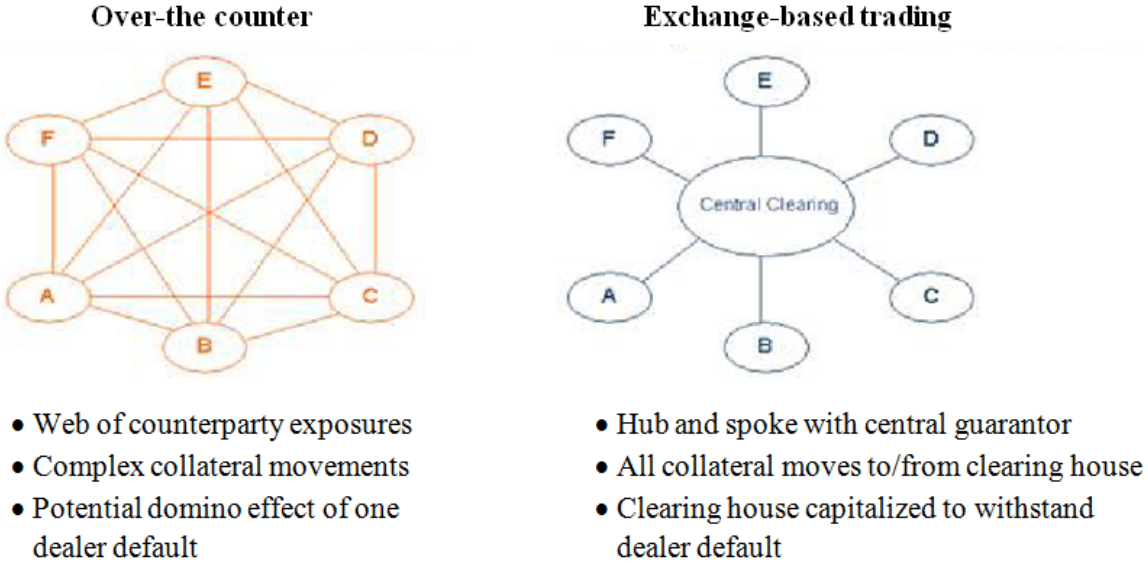
Exchange-based Trading

The trading of credit default swaps (CDS) on clearing houses/exchanges can improve the functioning of whole CDS market. We will analyze this solution by discussing advantages/disadvantages of OTC market and exchange trading.

Exchange-based trading will greatly reduce the counterparty risk. It will also result in greater transparency and order in the market. Recently there has been an increasing demand by regulators from all over the globe to introduce the central clearing for CDS trades. They are of the view that the establishment of one or more central counterparty (CCP) bodies will help to remove some of the systemic risk associated with CDS trading. In the current market there are two parties to every CDS contract who enter the contract privately, therefore there is significant counterparty risk involved in the deal. A central clearing platform would reduce the complications and counterparty risk by making a well-funded organization a central counterparty to CDS contracts.

The collapse of AIG, Lehman Brothers and Bear Stearns highlighted the risk and the need for reforms. If one or more counterparties default simultaneously under a CCP structure, a CCP would first seek to net and hedge positions as much as possible in an effort to reduce the impact on the CCP from these positions. And needless to say, the more standard the contracts are the more effective the CCP's hedging contracts will be.

Figure 4



Source: The Clearing Corporation (2009)

The use of clearing house will make things more standardized and one clearing body will match all the trades of the market participants as compare to very complex structure of over the counter market where a single dealer is taking position as seller, buyer and clearing agent of CDS. This structure makes thing extremely intricate and it's difficult to configure the true amount of outstanding contracts. The above figure explains the working of both over the counter and exchange-based trading.

The use of clearing houses for over-the-counter derivatives trading can decrease the risks faced by the financial system due to derivatives exposure for several reasons. First, a clearing house can diversify and manage risks associated with the failure of individual counterparty so the counterparty risk is reduced. Second, if a dealer uses a single clearinghouse, that clearinghouse can net out all of a dealer's exposures, which also reduces counterparty exposure. Third, a clearing house can monitor the exposures of its counterparties and can prevent counterparties from taking additional exposures so that unnecessary speculation can be controlled.

In conclusion, over-the-counter market is better at customization of the contracts where end-users are allowed to incorporate specific requirements. It also gives users the flexibility of finding counterparties when liquidity for a derivative instrument is low. However, exchange based trading offers best solution when it comes to risk management but at the same time it doesn't allow for customized contracts. This point is illustrated in the following example:

Assume a manufacturing company located in China which exports machineries to Germany. The company will get receipts in Euro's and in order to hedge the currency risk, it intends to enter into a derivative agreement. There are quite possibilities that the company could not able to enter into a contract with clearing house due to the mismatch of contract maturity and actual payment dates.

Although exchange-based trading is more desirable in current circumstances but implementing this solution is easier said than done. Clearing house matches buyers and sellers in drawing large pool of liquidity. However in case of derivatives, it is very difficult to create large pools of liquidity. Nonetheless, this step has to be taken in order to change the system and avoid similar kind of financial crisis in future.

Strengthening of Regulatory Environment

After the emergence of the great final crisis, it's imperative to have enhanced regulatory environment in order for the CDS market to work efficiently in future. We believe that the following actions should be taken on immediate basis to prevent the market participant from such a crisis in future. These includes,

- The regulators should opt for more timely trade matching. A need for T+0 or same day trade matching should be placed. This act will help to reduce the backlogs of unverified trades and will also reduce the average days requires to complete a trade even in a rapidly growing market. More timely trade settlement will also reduce the chance of higher losses and would effectively reduce credit risk being faced by the counterparty.
- There should be some alternation in the trade documentation to include provisions like cash settlement in the event of credit. The participants who wish to take part in auction currently sign different protocol for each credit event for both cash as well as physical settlement of CDS position in the CDS market.
- There should be in placed a standard foundation for industry wide, operational infrastructure changes that make best use of automation and electronic processing (Clearing house), and try to minimize counterparty risk through trade compression and collateral arrangements. The main objective of the introduction of trade compression is to reduce greatly the gross national amounts of outstanding CDS while not manipulating the economic details of participant's net position. This will also effectively reduce the number of outstanding trades. The mechanism of replicating the same risk appetite and cash flows for each trade can be used in order not to change the economic details of

party's net position. The trade compression should also have to take into account the each bank credit limits to counterparties. This will also reduce the credit risk and improve risk management through the improvisation of stricter rule regarding collateral requirements.

Conclusion

The original purpose in the innovation of credit default swaps was to make financial markets more resourceful and efficient in allocation of capital. Traditionally, the risk of debt financing is being borne by the investors who provide capital support to companies through debt financing. However the development of financial derivatives especially the CDS instrument has brought a new revolution in the mind of investors as how to perceive risk and changed the trend as now, the financier who supplies the resources necessarily not to be those who tolerate the credit risk. As an alternative, credit risk can be directed to those financiers who are best prepared to take it on their shoulders. Extricating the cost of funding and the credit risk also establishes superior transparency in the pricing of the financial instruments. Collectively, these advantages from credit default swaps should trim down the cost of capital of the companies.

Although CSDS were claimed to bring efficiency and liquidity in the market and there were inefficiencies on the part of regulators as well as on the side of market participant which led to great financial crisis. Due to OTC market, there was less transparency and proper risk management techniques in placed. It was really difficult to locate manipulation in over-the-counter markets.

Financial institutions played on their views about market growth will continue to exist and they would eventually make money in either case. There was not a cautious approach on the behalf of the institution, which ultimately determined gigantic risky positions taken by these big financial institutions in derivative instruments. But when investors were made available with factual information about the insolvency of individuals as well as big institutions that they would be in liquidity problem to make payments on the CDS contract sold by them, there exist mammoth

uncertainties as to the firms would be able to take on actual credit risk and pay back to insurers. This leads to a psychological chaos in the minds of investors and depositors and resulted in poor money market activities and hence declining values of the firms.

In concluding remarks the CDS instrument was not originally used for the purpose it was designed, and excessive trading of CDS with inappropriate risk management and greed contributed to the meltdown of world's financial system. CDS has contributed towards financial crisis through vicious circle. The chaos which started from United States of America spread around the globe in no time and turned into the great financial crisis

Limitations and Exclusions

This Research on CDS is subject to the following limiting conditions:

- Information, facts and figures in this report are obtained from reliable sources. We have tried to take into account all the information regarding historical financial crisis and global financial crisis, CDS market and collapse of financial institutions, that was available to us till December 09, 2010.
- The proposed solutions are recommended for similar kind of crisis which is a result of loosening credit standards, outcome of decline in mortgage prices, and Credit Default Swaps.
- We have not incorporated the causes and consequences of historical financial crisis, and other reasons of recent financial crisis in detail. We have tried to remain focused on Credit Default Swaps and its role in current financial crisis.
- A lot of literature on financial crisis and CDS is publicly available and we came up with this report after going through maximum material. However, we couldn't access some paid and expensive reports on CDS and current financial crisis, published by some renowned information services entities.
- As we are students and have to devote equal time to other subjects, we have limited time and budget to complete this research.

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