

Lessons from the 2008 Global Financial Crisis: Imprudent Risk Management and Miscalculated Regulation

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Abstract: *Of the major shortcomings exposed during the 2008 global financial crisis, there are two aspects that have attracted much interest among academics: the under-appreciation of the complexity of new operations at large financial institutions and the inadequate oversight of basic prudential supervision by regulatory agencies. To provide a brief focus on elements of these aspects, this paper presents corresponding case studies involve the fall of two of the largest finance companies ever existed: American International Group and Lehman Brothers Holdings. A survey of related historical arguments shows that while AIG fails due largely to its extended involvement in the new Credit Default Swap contracts that enable gambling on defaults, the collapse of Lehman Brothers' may be attributable to the misguiding capital adequacy regulations implied by the Basel II Accord. Though perhaps overly simplified, the conclusions from these two cases offer insights into the fundamental weaknesses of some primary contemporary risk management practices and regulations.*

Keywords: Global financial crisis, risk management, banking regulation, credit default swap.

Part A: Blurring the boundary between protection and speculation: Problems with CDS and the case of AIG

To those who studied the history of American International Group (NYSE ticker: AIG), one of the key events that fundamentally changed the firm's operational direction can be traced back to the late 1990s, when a special division - AIG Financial Products (AIG FP) - was created. A decisive deviation from traditional insurance market was when the division entered the rapidly growing credit insurance market. Exploiting a newly emerged derivative called Credit Default Swaps (CDS), AIG led the race to a new horizon of opportunities and gradually became the dominant giant in the industry who continuously received highest rating until its major setback in the global financial crisis (GFC).

Today, the story of how CDS paved the road for this "too big to fail" entity to first extreme profit and then a horrible death spiral is still very much intriguing

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the finance community. This paper seeks to explore a small but interesting chapter of that story regarding AIG's evaluation of the "insurance-like" CDSs. In addition, we can relate the case of AIG to a contemporary matter within the field of risk management: the realization that more effort should have been put into addressing risk in banking system as strictly as in the insurance system. To reduce the scope of the topic, I will focus on AIG's interaction with CDS market for debts and loans at corporation level. Nevertheless, the lessons learned from the AIG case can serve as valuable benchmark for understanding the problem with other sophisticated sovereign CDSs.

This part of the paper will be organized into 4 sections: the first provides a brief description of AIG's participation in CDS market as a major seller. The next section examines inherent risky aspects of CDS, whose contribution to the eventual bailout of AIG will be illustrated in the third section. The final section present a bottom line as a cursory summary.

1 AIG's humble beginning

1.1 Early days and core businesses

Like any giant in the modern finance world, American International Group did not start out to be as big as it is today. Its earliest operations begun in 1919, when a young and ambitious American named Cornelius Vander Starr opened a small insurance agency based not in America, but in Shanghai, China (Laing, 1991). At the time the agency offered fire and marine damage coverage and gradually began setting up subsidiaries in New York, U.S. under the name "American International Underwriters (AIU)" (Bandler, 2008).

Before long the company's head quarter was permanently moved to New York and it gradually developed into a major writer of insurance policies for American working outside the U.S. Later, with Maurice Greenberg as its head, the company was renamed American Home and became an important commercial and industrial property in the late 1960s. The AIG as known today was formed nearly a decade later. Throughout AIG's numerous subsequent mergers and acquisition, the company continuously diversified its financial services. The creation of AIG Financial Products division in 1987 marked the company's historical decision to consolidate its credit default operations.

1.2 The shift to CDS market

During the early 1990s, a new type of contract was originated by J.P Morgan & Co' swaps team. It planned to sell the risk of approximately \$5 million liability covering damage for one of its loyal customers (ExxonMobil). By making this deal, J.P Morgan could not only keep good relationship with its client, but also freed up a fair amount of cash to be lent out that would otherwise serve as capital reserved against the risk (Romm, 2010). The unprecedented contract was later dubbed "Credit Default Swap". Not only did CDSs helped free up

regulatory capital, they were later utilized as a form of credit enhancement for asset-backed securities. In his article regarding regulations of CDSs, [DuPont \(2009\)](#) mentioned J.P Morgan's proposal to have AIG FP write CDSs on the senior tranches of a collateralized debt obligation (CDO), called the Broad Index Secured Trust Offering, to reassure investors in 1998.

At the time of its inception, CDS was largely perceived as financial protection in which there are two parties who "swap" their credit risks. In principle, one party will make a loan and move the risk associated with that loan to another party, who will pay it back the loan's value in case the borrower failed to make payment, or triggered one among a set of "default/credit events" ([International Swaps and Derivatives Association , 2014](#)). The second party (seller of CDS) would take that risk in exchange for a series of periodic payment, called "CDS premium" or "spread", from the first party (buyer of CDS). It is worth noting that typically CDSs were used as protection against the default of fixed-income securities issuers, or "reference entities". Also, because CDS is an over-the-counter derivative, the protection sellers have to post pre-determined collateral to cover for bond prices' fluctuations similar to mark-to-market margin.

Initially CDSs were mostly used by banks to hedge risk related to their lending activities as well as a mean for liberating regulatory capital. It was much safer for bond holders knowing someone would cover their losses in case of the unlikely event that was the bond issuers went bankrupt, and all they had to pay might be a negotiated proportion of their periodic bond coupon. But the benefits of CDS trading quickly attracted participation of other players who realized they could gain great profit by gambling against the reference entities' credit quality, a devious interpretation of the originally good intention of CDSs' designers. The number of speculative trades, together with other factors like the 1997 Asian credit crisis and large scale index trading began in 2004 greatly fuelled the growth of CDS market. Additionally, since no limit was set on the amount of protection traders could buy, they expanded the volume far beyond what was required for hedging. According to [Hutchinson \(2008a\)](#), as of 2007 CDS had become the dominant credit market, was already 20 times larger than its size in 2000 and was three times exceeding the U.S. GDP, with a notional outstanding value of \$57 trillions. The growth of the market can be illustrated by [Figure 1](#).

Period	Notional amount outstanding (in billions of dollars)			Gross market values (in billions of dollars)		
	Single-name CDS	Multi-name CDS	All CDS	Single-name CDS	Multi-name CDS	All CDS
	12/31/04	5,117	1,279	6,396	112	22
12/31/05	10,432	3,476	13,908	171	71	243
12/31/06	17,879	10,771	28,650	278	192	470
12/31/07	32,246	25,648	57,894	1,143	859	2,002
06/30/08	33,334	23,991	57,325	1,889	1,283	3,172
12/31/08	25,730	16,138	41,868	3,695	1,957	5,652

Market value of CDS increased despite Notional amount decreased.

Figure 1: CDS notional and market values before and during the GFC. Source: [Bank for International Settlements \(2014\)](#).

With the undeniable benefits of buying such protection, the question is: Who wants to be seller of CDS? In theory, it might not be a bad choice for financial institutions, given the fact that at the dawn of CDS market, reference entities were large companies with great industrial prestige. Their credit history was quite positive, meaning chance that these entities went bankrupt was very small. [Davidson \(2008\)](#) suggested that considered as a superior investment, CDS selling brought large profit with near zero cost. He also argued that CDS market explosion had greatly increase the leverage level and speed of bond trading over the last years. Naturally, our insurance giant did not want to be an outsider in this business. As of 2008, AIG FP had made insurance of approximately \$441 billion worth of securities originally rated AAA, colloquially known as “super senior” CDSs. [Carney \(2010\)](#) related the steady revenue stream AIG received from buyers of CDS to the regular payments that a bond holder would receive. Some might as well say that AIG was “synthetically” investing in bonds without having to actually hold them and did not even have to put up any upfront cost. Unfortunately, neglect and abuse of the exotic nature of CDS lead AIG to a preordained trap of catastrophic scope. We shall take a closer look at how and when AIG’s worst nightmare came true in the next section.

2 Seeds of destruction

Even until today, to grasp the full scope of the changes CDS imposed on AIG in specific and insurance industry in general proves to be daunting, because of the obscure nature of these special contracts. One thing is certain, however, that whether the effects are positive or negative, AIG as a major underwriter took a significant role in CDSs' dynamic evolution.

2.1 Just a new type of insurance?

Given the nature of CDSs as protection contracts, one can argue that they are not dissimilar to those contracts involved in AIG's operation line. Both types require buyers to pay a recurrence fee in exchange for compensation for their loss. As such, AIG managers seem to have thought of a CDS simply as an extension of their insurance business, since it was, in essence, an insurance of bonds. The inherent risk of CDS seemed to be ignored before it was too late. Of course, with the luxury of hindsight, it is easy to conclude that AIG was "terribly naive" now that we know about their failure during the GFC. Academics and experts had recapitulated key differences between the two operations mentioned. In this paper researcher only examined two stark distinctions that researcher believed were the source of AIG's endless trouble in the fateful year 2008.

The first point is about the underlying assets of the contract. Bonds are by no mean like any other asset AIG used to insure. To elaborate on this point, consider [Davidson \(2008\)](#)'s illustration of the structural difference between conventional insurance contract and CDS, showing that rather than steady trends of insurance profit, CDSs yield very unpredictable inflows. That is partly because of the unorthodox high correlation among CDSs' so called "credit events". Consider when paying to cover a buyer's loss if his car crashes, a traditional car insurer will not have to worry that this event would increase the chance of another customer's car crash. But we cannot say the same about CDSs' default events because most often than not, when some bonds start defaulting, people may expect the worst and the other bonds are very likely to deteriorate as well. [Brown \(2010\)](#), who studied differences between hedging by CDS and insuring, further pointed out that insurance was impractical in cases when exposures are highly correlated such as natural disasters, while hedging requires significant correlation in order to effectively function. Like many other financial institutions, AIG's underlying asset pool was mostly comprised of the hot selling mortgage-backed securities (MBS) and Collateral Debt Obligation (CDO) based on MBSs, which were generally considered promising investments given the seemingly ever growing of mortgage market at the time. And after 2008 we knew all that was just self-deluding.

A second important feature distinguishing CDS contract from traditional insurance is that CDS's cover payment is triggered when there is a credit event, which is not necessarily an actual default. A credit event as defined in a CDS is any circumstance that reduces the reference entity's ability to repay its debt, in particular when its credit rating decreases. Unlike an insurance buyer, a CDS

buyer is covered whenever there is a possibility that the credit event happens, allowing him to take profit or to avoid losses without an actual default happening. In the case of AIG, this mean they had to prepare for payment with just the slightest signal of negative changes in bond prices. [Tolk \(2010\)](#) conceded in his report, about a decade earlier than the 2008 fiasco, that the definition of “credit event” in the swap determines investors’ risk. Most CDS terms utilize the definition published by the International Swaps and Derivatives Association (ISDA), which is much broader than mere default. For example, Moody’s and other credit rating agencies equate certain types of “restructuring” to “default”. This kind of assumption apparently increases AIG’s CDS risk from events that are not defaults.

Fortunately, in reality AIG did not have to post collateral for deteriorating bonds as long as they had AAA rating. Furthermore, most of AIG major counterparties, such as Merrill Lynch, hesitated to call for more collateral in fear of a forced depreciation of other bonds in their portfolio ([Carney, 2010](#)). Troubles came when the value of CDSs’ underlying assets decreased to the unanticipated point of reducing AIG’s own credit rating and thus forced the company to raise capital to meet collateral calls. To compare, we can see that downgrading an insurance company would not have much influence on its ability to pay as long as there was no actual loss from the buyer.

2.2 Naked CDSs

Like many other researchers, [Gilani \(2008\)](#) effectively emphasized that AIG’s problems did not stem from the company’s root insurance business, but from the volatile bets on CDSs. However, when considering the features of the type of CDS contract AIG had made, I reckon the problem with them was more profound than a faulty operational strategy, it was largely about, but not limited to, insufficient evaluation and abuse of the risky, “toxic” aspects of CDS. This justifies my examination on what AIG FP specialized in trading, a hidden iceberg in the credit derivatives ocean - naked CDS - in the rest of part A.

Why is this particular type of CDS problematic? First we need to note that the term refers to a credit contract in which a seller protects a buyer on a corporation’s default when the buyer does not own any of its bonds. If we compare this contract’s mechanism to the basic principles of insurance, we can see the problems with it. A prerequisite of traditional insurance is that the buyer must have a direct insurable interest, meaning exposure to a real loss on the subject of the insurance. Naturally, if this basic condition is violated, every protection buyer other than the owner of the subject will have high incentive to damage it in order to claim compensation. [Corcoran \(2010\)](#) mentioned the example of British underwriters in 1700s, who inadvertently “helped” reducing the number of seaworthy ships by selling insurance to individuals who did not own the vessels. A more recent remark relate buying naked CDS to taking out fire insurance on your neighbour’s house and then commit arson.

To further complicate the matter, the lack of regulation and the synthetic nature of naked CDSs means there was no limit in the number of contracts that

can be written (Kiff, Elliott, Kazarian, Scarlata, & Spackman, 2010). Naked CDS was estimated to make up as much as 80% of CDS market in 2007 (Kopecki & Harrington, 2009). However, Uygur (2010) expressed his puzzlement about the logic behind the numbers: the world's GDP as of 2009 was about \$56 trillion, nowhere near the enormous size of CDS market reaching \$64 trillion! He concluded in his research that the reason why CDS market got to be so large was because people were making bets that were not even attached to the value of the underlying assets, and nurturing hope for getting generous compensation with little to no costs. Extreme profitability was great incentive for investors to keep multiplying their problematic speculation.

Most academics agree that buying naked CDSs is similar to short selling bonds in that the buyer anticipate the depreciation of underlying bonds, however, the two methods yield significantly different risk/reward scheme. In an informative article on the Wall Street Journal, Soros (2010) provided a three-step scrutiny into the toxic nature of CDSs, claiming that CDSs trading created incentives for rather than discouraged speculating on the short-side. He argued that unlike short selling in stock market, which exposes the seller to unlimited risk when prices go down, buying a CDS involves limited risk with almost unlimited profit potential because of the protection against default. A relevant concern is the "bear raids" against reference entities. Deliberate shorting will result in higher CDSs price because of excessive demand of protection. Consequently, CDSs premium then acts as a noisy indicator for default possibility: even a potentially profitable company could not raise capital from banks if CDSs on that company's bonds became expensive, simply because bankers observe the CDS premium and reckon that it was highly likely to default. When its bonds are outrageously mispriced by CDSs, the company is deprived of financial support and may actually face bankruptcy. In short, defaults become self-fulfilling prophecies. But that was the problem for protection seller like AIG, not the happy speculating buyers.

But do the poisonous features of naked CDS have the same effect on every protection seller? The answer is No. While most banks and hedge funds balanced their sell and buy positions, AIG FP chose to stick with the sell side only (Davidson, 2008). A recent report from the ISDA (2009) supports this view, claiming that AIG was a "unique trader" because its record contain almost entirely of sold protection. As an AAA rated company, AIG was not required to post collateral on most of its derivatives by the counterparties. Here we can see AIG's overconfidence in its past experience with the insurance products had cost it dearly, leading to large-scale gamble on this new instrument. Given the number of contracts increased exponentially and its approach, AIG's exposure to CDS quickly grew out of control.

3 The death spiral

As the major CDS writer, AIG's prospect were actually not so grim if not for what happened in the market of protected assets, namely, the crisis in subprime

mortgage loans. By 2005 AIG had already absorbed a huge amount if not most of the risk from the subprime mortgage bond sector. As of 2008, more than \$440 billion worth of bonds was covered by AIG's CDSs, about \$60 billion of which were structured debt securities backed by mortgage loans (Morgenson, 2008). Things had not been in AIG's favour, who was technically betting that the housing bubble will not burst and assets would retain their value. As discussed above, AIG did not have to pay up daily losses like non-AAA CDS writers. However, when the value of the bonds declined, AIG faced a contractual obligation to post collateral to its counterparties. Over concern of its continuing losses, rating agencies Moody's and Standard & Poor's downgraded AIG's credit ratings. At the time the downgrade forced the company to deliver collateral of over \$10 billion to certain creditors, which AIG could not afford. For Forbes, contributor [Worstell \(2011\)](#) stated that to AIG, what suddenly happened was not the obvious loss on CDSs, but the obligation that it had to put up all the money it had already lost.

Before long AIG received one of the largest bailout packages in the U.S. history in a fashion that sparked numerous bitter outrages among U.S taxpayers. Details of the rescue and post-crisis settlement are the conversations for another paper. All things considered, the only reason AIG still exists, though not without some dramatic restructure, is because it had deeply involved in insuring the benefit of almost every core finance institution worldwide and people could not simply let it fall.

But let's end our story by imagining what could have happened if AIG was left to face its end. If AIG is not able to fulfill its promise of payment, then every one of the banks who bought CDS protection from AIG was in big trouble. They would have to seek for alternative protection sellers, who would charge them much higher premium. To cover the loss, banks will have to lend out less money. Consequently, lesser banks might not be able to raise enough fund to pay CDS cost and collapse. This will in turn facilitate mass payment for CDS written on these banks' debt. The repetition of payment and collapse of counterparties was referred to as a vicious downward spiral, or a domino-like fall on an unimaginable scope. Although helping to mitigate the impact, exceptional rescues like the case of AIG were too late, and too limited, to stop the death spiral from spreading when CDS had already rooted into the concept of financial insurance itself.

4 The bottom line

As a rule of thumb, where there is gamble, there will be cheaters. In the modern finance system, abusive use of CDSs raised the concern of increasing moral hazard. Speculators banded together to "bear raid" the reference entities. Taxpayers had to pay to rescue the losers, who paid for the winners. But the critical question that risk managers should ask is: Why was such gambling allowed in the first place? Different perspectives yield different answers, but they may have a common ground: irrational greed that clouded sense of danger.

Advocates of AIG's actions might argue that AIG was a protector of long-term value, allowing people to sleep well at night. That might be true. But they failed to realize one fact: some did not sleep until they burned down their neighbour's house, and squeezed out every last coin of their protector.

Part B: Exploitation of regulation flaws: the case of Lehman Brothers

From its earliest day, banking had inarguably been the most important sector in the global finance system, in that it is the cornerstone for the payment system and is a main source of liquidity essential for economic functionality. The performance as financial intermediaries exposes banks to several risks, prominent among which are liquidity and credit risks. The significance of traditional banks had been complemented by that of investment banks, which offer investment returns instead of interests and without the constraint of depository regulation. Naturally, in order for these new institutions to continue their critical role, international and domestic regulators would try to subject investment banks to other advanced supervisions. Given the increasing sophistication of banking activities and the associated risks, capital adequacy requirement have been used as one of the most comprehensive and effective forms of regulation.

Over the past decade, international regulators have adopted a new base concept called "economic capital", which quickly became the epitome of modern banking risk management. The term is widely referred to as the amount of capital a bank has to achieve to maintain a certain level of protection against default. In other words, capital adequacy could indicate to investors that money put in the bank is a safe bet. Unfortunately, bankers most often than not tend to ignore the important fact that capital adequacy was just a safety standard recommended by regulators, and thus might not accurately address the banks' risks, especially in such turbulent times as the period of global crises. Abusive use of this measurement could induce bankers to a false sense of safety and expose them to certain losses. Arguably the largest bankruptcy in the U.S. history, the case of Lehman Brothers Holdings Inc. (NYSE ticker: LEHMQ - hereafter LEH) was a lesson most recommendable for, but not limited to, risk managers who seek to understand the potential damage of regulation flaws.

There are many justifications for my interest in studying the astronomic scope of this bank's failure. Some researchers attributed Lehman's downfall to the extent to which it was exposed to, or "gambled" upon, the troubled sub-prime mortgage market. However, it will be worthwhile if we put the strategies of LEH aside and focus on a different aspect of its failure. Why such a financial giant, with decent resources spent on risk management system, in addition to constant monitoring from legislative supervisors, could not escape its ultimate fate? Researcher consider the story behind LEH's downfall was ironical in that it had effectively multiplied its risk exposure by exploiting, whether intentionally or not, the very regulatory frameworks recommended for consolidating its

safety. Said frameworks, and arguably the one had the most thorough influence in the 2008 global crisis, was a set of capital adequacy standards designed for internationally active banks by the Basel Committee on Banking Supervision (BCBS). How the major flaws of BCBS's first revision of Basel Accord on Capital Adequacy (Basel II) were misused by Lehman's risk management will be explored in this part.

The rest of the discussion will be organized as follow: the following section begins with a description of Lehman Brothers' early achievements and its core business in the period leading to its bankruptcy. The next section focuses on examining implications of Basel II on risk management of the banking sector, with references to Lehman Brothers. The third section comments on the severe consequences LEH suffered from the misuse of capital adequacy requirements. The last section provides a brief summary.

1 The eve before the storm

Before declaring bankruptcy in 2008, Lehman Brothers was the fourth largest investment bank in the USA (after Goldman Sachs, Morgan Stanley and Merrill Lynch), specializing in investment, equity and fixed-income sales and trading securities (especially U.S. Treasury bonds) as well as investment management, private equity, and private banking. From its first days, Lehman Brothers was known to have withstood every major upheaval in the financial market. Some of which were the threat of a credit crunch that was triggered by the near-collapse of Long-Term Capital Management, or the challenge in 2000 when the internet bubble burst ([The Telegraph](#), 2008). From a pure broker specializing in bond-trading, LEH had steadily evolved into one of the most redoubtable investment bank at Wall Street, posting record profit of \$4 billion in 2006 ([Williamson](#), 2008).

In the years leading to its bankruptcy, Lehman borrowed significant amount to fund its investing in the mortgage which was considered highly profitable and steadily growing. Generally, investment banks such as Lehman were not subjected to strict regulations applied to deposit-taking institutions in term of their risk-taking strategy. Key risk-taking activities of LEH included acquiring "toxic" residential mortgages and significant positions in mortgage-backed securities, commercial real estate, and leveraged lending commitments. According to a relevant article on [The Telegraph](#) (2008), then-LEH's CEO Richard Fuld had opted for diversifying its portfolio by acquiring big mortgage lenders such as BNC Mortgage and Aurora Loan Services, packaging their steady flow of sub-prime and Alt-A loans and moving these loans off LEH's balance sheet in the form of mortgage-back securities. Lehman's acquisitions at first seemed to be in the right direction, resulting in the firm's record revenue growth rate of 56% from 2004 to 2006, highest among investment banking businesses ([Investopedia](#), 2012). In 2007, Lehman's mortgage-backed securities value was greater than four times its shareholders' equity, reaching an \$85-billion portfolio.

However, during all this time, Lehman Brothers as an investment bank did

not have access to the benefits of the federal safety net provided by the government. This motivated LEH's to run a supposedly prudent management based on the new Basel Accord and apply heavy pressure on U.S. Securities and Exchange Commission (SEC) to become the first Federal agency to adopt this framework in 2004. One of SEC's failures regarding capital regulation of the U.S. securities holders under Basel II was to legalize artificially high leveraging in investment banks (Madigan, 2009). Hal Scott, director of a research organization called U.S. Committee on Capital markets regulation stated that SEC's approval of inadequate Basel II requirement allowed the top five investment banks to reach leverage of over 30 to 1, setting the stage for the subsequent global financial collapse. According to Scott (2012), "lack of capital was a major reason for the failure of Lehman Brothers". In an earlier testimony, Schapiro (2010), then-chairman of the SEC, conceded Lehman Brother's ultimate failure could be attributable to its aggressive growth strategy of taking perilous exposure to the subprime mortgage market. She further admitted that SEC's Consolidated Supervised Entity (CSE) program had failed to keep track of risk communication between LEH's management divisions, and that even SEC could not predict the extent to which mortgage markets affected the firm. We shall see in the next section how seemingly reasonable Basel adoption could lead to such unprecedented disaster.

2 Holes in the roof

The history of the Basel Accord could be traced back to the year 1988, when the first version of it was published by BCBS, a committee of central bankers from the group known as G-10. According to information provided on the Bank of International Settlement (BIS)'s website, while BCBS possesses no formal supervisory authority, it constructs general instructions and recommendations for banking regulation. It was expected that based on these broad frameworks, individual authorities will make appropriate adjustments to their own systems and needs before implementing them. In June 1999, a proposal for a modified framework was made, which consists of a "three pillars" approach: (1) minimum capital requirements refining the standards in the 1988 version; (2) supervisory review providing guidelines to thoroughly reassess banks' internal risk management system; and (3) market discipline which acts as a complement to supervisory efforts. The revised version of Basel Accord (commonly referred to as Basel II) was finalized on 26 June, 2004 and ever since quickly be adopted by virtually every internationally active banks in the world.

In light of the crisis, there have been strong criticism made against the intuition of capital-based regulations in general and Basel II in specific. Theoretically, a capital requirement is made to instruct banks and other depository institutions to calculate how much capital they should hold for a certain level of assets they own. This requirement was put in place to prevent institutions from taking risky investments that could lead to default and that in case they do, they will have enough resources to endure losses from those investments. As

Chairman Sheila Bair of U.S. Federal Deposit Insurance Corporation (FDIC) commented on the proposed adoption of Basel II in 2004, regulators could not leave capital decision entirely for the banks, for they would most likely maintain less capital than would be prudent. This remark validated the application of Basel II in the U.S.

Nevertheless, the criticism mainly aimed at exposing the misleading implications Basel II had on the overall soundness of banking activities. Subject to time constraint, this section will specifically address two such implications centered on capital standard imposed on banks: the dangerous equation of regulatory capital adequacy and safety; and the unintelligible neglect of significant effects of leveraging.

The first misleading justification is that a firm will be able to quickly return to business after being hit by a loss, because it is safeguarded by its capital adequacy. Apparently, this was not true in the case of Lehman Brothers, who suffered a significant decline in reputation when it spent capital to post collateral. When LEH's ratings went down, it had difficulties trying to raise more funds from the market and eventually in desperate need of government support. With an investment bank like LEH, all that keeps it in business are liquidity and trust and in time of crisis, both of which cannot be insured merely by capital adequacy, and losing one might lead to losing the other. When LEH's partners interpreted its effort in raising capital as a shortage of liquidity, they began to lose their trust in LEH and withdrew their investments, causing further illiquidity. Worse, the case of LEH was not unique by any means. Bankers failed to realize the fault in what seemed to be sensible intuition that regulatory capital evenly protects both the banks and their creditors. In reality, when a crisis hits, only the creditors is protected and the banks will suffer from its limited options of raising additional funds. [Kilavuka \(2012\)](#) pointed out that even when being immediately compensated, short-term losses might have negative impact on a firm's long-term operations. This author emphasized the idea using the example of the reputational damage a firm may suffer in a legal dispute, although the temporarily associated cost can be easily met.

We can see that regulators' best hope when introducing capital requirement is that it will encourage prudent behaviour from the bankers, and they will try to avoid risk. Even when bankers want to take on more risk, a high capital reservation will reduce its lending capability. But the question is: how high should the capital ratio should be? Basel II effectively kept this standard as it was established from Basel I, stating that the percentage of a bank's capital to its risk-weighted assets must be no lower than 8%. Prior to the crisis, given the steady cash flows from mortgage loans, this ratio might not be high enough to prevent banks from lending more and taking excessive risk. A research of [Avery and Berger \(1991\)](#) suggested that compared to traditional equal-weighted measurement, risk-weighted capital standards provide a more accurate threshold to predict future problems related to banking; however, they also found a negative correlation between the level of risk taken and banks' capital requirements. In line with this finding, [Genotte and Pyle \(1991\)](#) argued that under some circumstances, tightening capital constrain could reduce the beneficial effect it

has on probability of default and could actually lead to financial instability. In addition, [Allen and Jagtiani \(1991\)](#) confirmed that the U.S. banks' exposure to systematic market risk was significantly increased when Basel regulations were introduced.

Another relevant concern regarding the misconception of Basel II is that it might overestimate the role of capital requirement in risk management and consequently reduce managers' vigilance. In their article regarding operational risk management, [Calomiris and Herring \(2002\)](#) suggested that insurance and internal regulation might outperform capital requirement in controlling operational risk. Furthermore, [Wihlborg \(2005\)](#) validated the idea that excessive involvement of regulators would applaud the public belief contributing banks' mismanagement to a supervisory failure.

Aside from its misleading implication of adequate protection for banking operations, Basel II was also faulty in that it largely overlooked the importance of leverage. When interest rate is low, banks have great incentives to increase their leverage ratio (the ratio of its assets over equity). We know that leverage usage is a double-edge sword, which can amplify the effect of market movement on banks' performance. In an article on [The Economist \(2008\)](#), Dutch bank ING's chief risk officer, Koos Timmermans, was cited as claiming that there are several types of leverage that could lead to a bank insolvency, among which was the excessive exposure to complex financial innovations such as CDOs. [Moosa \(2010\)](#) emphasized this insight by an example of a bank leveraging to 25:1 and use the borrowed money to make long-term mortgage loans. The bank then sells out these loans as short-term collateralized debt obligations (CDOs). Consequently the bank became highly leveraged and illiquid because of the asset-liability mismatch. This scenario is particularly true with Lehman Brothers, being the "champion" in the CSE program in terms of leveraging. [Hutchinson \(2008b\)](#) argued that with a leverage ratio of roughly 30 to 1 in 2007, LEH's managements were getting themselves into big trouble: a mere decline of 3.3% of asset value could sweep out all the equity, especially when a majority of their assets was in the form of off-balance sheet credit default swaps and other derivatives positions that were virtually impossible to priced correctly. For a comparison, one of LEH's companions in CSE, the so-called "adequately capitalized" Bear Stearns was leveraged 32-1 when it went bankrupt.

3 The downpour

From 2003 to 2004, in response to the pressure from European Union legislative demand to either accept E.U. financial regulations or substantially equivalent rules, major U.S. banks including Lehman Brothers requested for SEC's creation of the voluntary supervision known as the CSE program. In his informative journal article, [Rosato \(2010\)](#) stated that as a member of CSE, Lehman Brothers was allowed to compute its required capital using an "alternative method" that complied with the Basel II standards. Participating financial institutions would also be required to maintain an overall capital ratio of not less than the Federal

Reserve's 10% standard. At the time managers at LEH considered CSE's terms acceptable, since its internal risk modelling could allow for a ratio well above this limit. However, when expressing his concern regarding the over-reliance of internal risk management system, then-Fed Chairman Alan Greenspan emphasized the irreplaceability and superiority of experienced judgment over even the most complex risk measuring models. Unfortunately, it would appear that Greenspan's caution was credible.

Prior to its collapse, Lehman Brothers debt-to-equity ratio reached a height of 31.6 to 1 as of February 2008 (according to SEC's 2008 report). While this ratio was significantly higher than SEC's standard of 15 to 1, Lehman Brothers' minimum capital reserve had never fall below that of the 10% limit. Rosato (2010) attributed this phenomenon to several factors, including flaws of constructed internal models, SEC's oversight and most importantly, the deviation from Basel II principles. He also described Lehman's abuse of "Repo 105", a transaction that allowed the bank to temporarily classified short-term loans as revenue to pay down debt, and technically remove its debt from the balance sheet. Lehman was then able to illegitimately reduce its leverage ratio and thus reduce its capital charges. This can be shown via the firm's summarized financial report as in Figure 2:

LEHMAN BROTHERS HOLDINGS INC.
Management's Discussion and Analysis of Financial Condition and Results of Operations

Tangible Equity Capital and Capital Ratios

In millions	May 31, 2008	Feb 29, 2008	Nov 30, 2007
Total stockholders' equity	\$ 26,276	\$ 24,832	\$ 22,490
Junior subordinated notes ^{(1),(2)}	5,004	4,976	4,740
Identifiable intangible assets and goodwill	(4,101)	(4,112)	(4,127)
Tangible equity capital	\$ 27,179	\$25,696	\$ 23,103
Total assets	\$ 639,432	\$ 786,035	\$ 691,063
Leverage ratio	24.34x	31.65x	30.73x
Net assets	\$ 327,774	\$ 396,673	\$ 372,959
Net leverage ratio	12.06x	15.44x	16.14x

Figure 2: Overview of Lehman Brothers' capital structure during the GFC. Source: [United States Securities and exchange commission](#) quarterly report (Form 10-Q), 31/05/2008.

With such a troubled asset portfolio, Lehman filing for bankruptcy was inevitable. In June 2008, it posted a \$2.8 billion loss, its first quarterly loss as a public company, and attributed the loss primarily to write-downs on residential and commercial mortgage securities and related hedge positions. Even though the firm reported that its liquidity pool had grown to \$45 billion, it still had a significant amount of illiquid assets, consisting primarily of commercial and residential loans. On September 15, 2008, concerns regarding Lehman's holdings of illiquid assets resulted in an unprecedented loss in confidence in the

firm's ability to pay. The demand from investors for collateral and margin followed and quickly pushed Lehman to the corner as it was unable to refinance its businesses any longer. When the market value of Lehman's mortgage backed securities went down, it was forced to degrade these assets' book value and put in additional capital to maintain requirements of Basel II. Considering both the cost of raising additional capital and the negative effect such effort could bring on the firm's reputation, Lehman tended to avoid such "mark downs" as much as possible. In a similar manner, Lehman would incur capital charges whenever it sold out assets to cover debt, thus motivated its managers to artificially reduce the leverage ratio. Apparently, Basel II standards had inadvertently created incentives for perilous management practices.

4 Conclusion

The 2008 global financial crisis had undoubtedly exposed many flaws of capital-based regulation in general and the Basel II in specific, chief among which were the misleading impression of safety in banking activities, the insufficiency in dealing with leverage, and the oversight of banks' internal risk evaluation. There even be an emerging belief that instead of addressing these problems, Basel II became a catalyst facilitating the quickly spread turmoil in the structured credit market, and provide a fertile ground for numerous misconducts in banking risk management. From an impartial perspective, it was not easy to tell whether investment banks such as Lehman Brothers was the culprit or the victim of these misconducts, but there is one thing we can learn from its interaction with Basel II: regulation did not, and will never mean to be a substitution for the sense of prudent behaviour.

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