Subprime Mortgage Crisis in US
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ABSTRACT
The economic instability and slowdown in US countries of 2007–2010 was a result of subprime mortgage crisis stemmed from an earlier expansion of mortgage credit, including to borrowers who previously would have had difficulty getting mortgages, which both contributed to and was facilitated by rapidly rising home prices. The subprime mortgage crisis occurred when interest rates rose, home prices fell, and borrowers defaulted on loans. Its effect was the 2007 banking crisis, the 2008 financial crisis, and the Great Recession—the worst recession since the Great Depression. The major contribution of this crisis was due to the private lending sector. Nearly 84 percent of the sub-prime mortgages in 2006 were issued by private lending. While some high-risk families could obtain small-sized mortgages backed by the Federal Housing Administration (FHA), others, facing limited credit options, rented. In that era, homeownership fluctuated around 65 percent, mortgage foreclosure rates were low, and home construction and house prices mainly reflected swings in mortgage interest rates and income.

Keywords—— Banking Sector, Lending Money, World Economy, FMCG, Subprime Mortgage Crisis

I. INTRODUCTION
The crisis began with the bursting of the housing bubble in the US and high default rates on "subprime" and other adjustable rate mortgages (ARM) made to higher-risk borrowers with lower income or lesser credit history than "prime" borrowers. Loan incentives and a long-term trend of rising housing prices encouraged borrowers to assume mortgages, believing they would be able to refinance at more favourable terms later. However, once housing prices started to drop moderately in 2006-2007 in many parts of the U.S., refinancing became more difficult. Major banks and other financial institutions around the world have reported losses of approximately U.S. $150 billion as of February 2008, FCIC [1]. Due to a form of financial engineering called securitization, many mortgage lenders had passed the rights to the mortgage payments and related credit/default risk to third-party investors via mortgage-backed securities (MBS) and collateralized debt obligations (CDO). Corporate, individual and institutional investors holding MBS or CDO faced significant losses, as the value of the underlying mortgage assets declined. Stock markets in many countries declined significantly. With interest rates on a large number of subprime and other ARM due to adjust upward during the 2008 period, U.S. legislators and the U.S. Treasury Department are taking action. The risks to the broader economy created by the financial market crisis and housing market downturn were primary factors in the January 22, 2008 decision by the U.S. Federal reserve to cut interest rates and the economic stimulus package signed by President Bush on February 13, 2008. Both actions are designed to stimulate economic growth and inspire confidence in the financial markets. The subprime mortgage market has experienced a huge growth from 1994 to 2007 [2]. Together with a steady increase in house prices, historical low interest rates, abundant liquidity, and loan incentives, borrowers were encouraged to consume mortgages, believing that they would be able to refinance it due to the favourable economic conditions. Also borrowers and investors were willing to take on more risk, thinking that the market could absorb it. However, this situation changed at the end of 2006 when the housing bubble came to an end and interest rates began to rise. Warning signals began to emerge for a potential financial crisis when investors and lenders realized that they had been too optimistic about the economic conditions. When in the beginning of 2007 home sales continued to fall, serious concerns emerged when many borrowers turned
out to be in financial difficulties and could not refinance or sell their homes to pay off mortgages when they were unable to make monthly payments [3]. In addition in March two of the largest mortgage lenders, New Century Financial and Accredited Homes lenders, and experienced serious difficulties and in April the second biggest subprime mortgage lender in the US, New Century Financial filed for bankruptcy. Uncertainty started to increase but problems for the credit and housing market as a whole were expected to be limited. In mid-June, expectations were fading away when the weakness of the housing market became apparent in the form of loan quality problems, rising defaults on sub-prime and alternate mortgages, a sharp decline in the value of subprime mortgages and shares of financial institutions, deteriorating credit quality and increasing uncertainty [4]. Rating agencies were forced to downgrade MBS and CDO bonds backed by subprime mortgages as a result of rising defaults on subprime and alternate mortgages. For example on June 15, rating agency Moody is downgraded the ratings of 131 ABSs backed by subprime home loans and placed about 250 bonds on review for downgrades.

II. BACKGROUND INFORMATION OF SUBPRIME MORTGAGE CRISIS

Subprime lending is a general term that refers to the practice of making loans to borrowers who do not qualify for market interest rates because of problems with their credit history or the inability to prove that they have enough income to support the monthly payment on the loan for which they are applying. Subprime loans or mortgages are risky for both creditors and debtors because of the combination of high interest rates, bad credit history, and murky personal financial situations often associated with subprime applicants. Subprime borrowing was a major contributor to an increase in home ownership rates and the demand for housing. Some homeowners used the increased property value experienced in the housing bubble to finance their homes with lower interest rates and take out second mortgages against the added value to use the funds for consumer spending.

The assessment on risks and the increasing uncertainty in the financial market about the value and potential losses related to subprime mortgage products made investors exchange from their risky securities to relatively safe government securities. On June 20, reports suggested that two Bear and Sterns hedge funds invested in securities backed by subprime mortgage loans were about to collapse. And on July 11, the number of US foreclosures nationwide was 87% above its level the previous year. Uncertainty and worries spread rapidly across the financial system which as a result caused market liquidity for mortgages related securities and structured credit products to disappear. The crisis started to show aspect of accredit crunch, as the uncertainty about the size of losses and the duration of the crisis began to affect the ability to obtain funds. Financial institutions became more reluctant to provide liquidity to others and while liquidity in the market evaporated, major banks experienced increasing difficulties to value their own holdings, turning liquid into illiquid assets and in addition led to an increasing uncertainty in the financial system.

Furthermore on July 30, the subprime crisis expanded to Europe when the German bank IKB warned of losses related to the fallout in the US subprime mortgage market.

Also, BNP Paribas, the largest bank in France reported that three investment funds invested in ABSs needed to shut down due to difficulties in valuation of these funds. In August the ECB and FED decided to intervene and injected billions of reserves in the financial market as an attempt to restore confidence and to help decrease the pressure in the market turmoil. In September the turbulence on the credit market seemed to have spill over effects on the economy when the US government reported that the employment rate experienced a decline for the first time in four years [5]. Bad news related to the subprime mortgage crisis continued to be in the headlines throughout 2007 and the first half of 2008 and just when investors thought that the worst should be over, in July 2008, the US was shocked by the third largest bank collapse of Indi Mack and fears about the financial health of the nation’s two largest mortgage firms, Freddie Mac and Fannie Mae.

Now, almost one year later, the credit crisis that started has not only affected the financial markets but also the real economy in the US, Europe, Australia and Asia. The uncertainty about the health of large financial institutions, the ratings and quality of structured products, and the magnitude of future write down and the duration of the crisis, caused financial institutions to become unwilling to provide liquidity to other which in turn led to liquidity crisis in the financial system. It has forced some major financial institutions to be taken over, and even others to fill for bankruptcy. Also, it has brought the assets backed commercial products. The end of the crisis is not yet in sight since the weakness and the vulnerability of the financial markets still remain visible with losses at leading financial institutions topping $500 billion as of July 2008 [6-7].

III. CAUSES AND FACTORS OF THE US SUBPRIME MORTGAGE CRISIS

A variety of factors have contributed to an increase in the payment delinquency rate for subprime ARM borrowers, which recently reached 21%, roughly four times its historical level. Easy credit, combined with the assumption that housing prices would continue to appreciate, also encouraged many subprime borrowers to obtain ARMs they could not afford after the initial incentive period. Once housing prices started depreciating moderately in many parts of the U.S. (see United States
housing market correction and United States housing bubble), refinancing became more difficult. Some homeowners were unable to re-finance and began to default on loans as their loans reset to higher interest rates and payment amounts. Other homeowners, facing declines in home market value or with limited accumulated equity, are choosing to stop paying their mortgage. They are essentially "walking away" from the property and allowing foreclosure, despite the impact to their credit rating.

**Role of borrowers**

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**Increasing Risk Characteristics of Subprime Products**

After the recession in 2001, when interest rates declined, borrowing demand increased, mortgage lenders expanded their business, and new lenders entered the market. Together with the US housing bubbles, which caused US housing prices to rise with 34%, adjusted for inflation, between 2002 and 2005 [8], an appetite for risk, and economic recovery, an environment was created in which investors and lenders were encouraged to seek instruments that offered high returns resulting in an increase in the demand for securitized subprime mortgages. Due to this rapid growth of subprime mortgagees, it became easier for borrowers to obtain loans. According to [6, 9], one of the most important factor that contributed to the current crisis is the increasing risk characteristics of subprime mortgages resulting from relaxed underwriting criteria. The risk characteristics were already discussed. This problem is also referred to as risk layering where the loan is characterized, for example, with little or no documentation provided by the borrowers, with little or no down payment made, and with a low initial teaser interest that restate to a new, higher rate after a period of two or three years. Lenders developed or offered subprime mortgage loans that combines the lowest possible down payments and monthly payments with lowest underwriting criteria as a response to the rapid home price appreciation, the increasing competition among lenders and political agenda that encouraged home ownership. However, the subprime loans that were originated and suffering from poor underwriting standards were characterised by multiple weakness such as less creditworthy borrowers, high cumulative loans to value ratios, and limited or no verification of the borrower’s, income. In general, prime and subprime borrowers had to provide full documentation about their income and assets which then would be verified by lenders. However, in recent years, low or no documentation loans became available to person with impaired credit histories and to first time borrowers. Furthermore, in 2005 and 2006, loans referred to as Piggybacks became more common. Hereby subprime borrower was allowed to have mortgages on their homes. In addition to a first mortgage for 80% of the total purchased price, a second mortgage for the remaining 20% was made so that the borrower would not have to make down payment. However, these types of loans were provided under the assumption that housing prices would continue to rise. Borrowers could easily refinance their homes or sell it at profit so that the delinquency rates remained low. When in 2006, house price appreciation started to slow down and interest rates began to rise many borrowers in the subprime market found it impossible to refinance on favourable terms and were unable to maintain their mortgage payments when their loans reset and as a result, default rates began to increase [8].

**Mortgage fraud by borrowers from US Department of the Treasury**

Misrepresentation of loan application data is another contributing factor. As much as 70 percent of recent early payment defaults had fraudulent misrepresentations on their original loan applications, according to one recent study. The research was done by Base Point Analytics, which helps banks and lenders identify fraudulent transactions; the study looked at more than three million loans from 1997 to 2006, with a majority from 2005 to 2006. Applications with misrepresentations were also five times as likely to go into default.US Department of the Treasury suspicious activity report of mortgage fraud increased by 1,411 percent between 1997 and 2005.

**The Weakness in Risk Management and Risk Measurement**

Another contributing factor according to [4, 10] is the weakness in the risk management and risk monitoring across financial institutions. According to many analyst the current crisis has emphasized one more the importance of adequate risk management and risk measurement. Financial institutions were affected by this crisis in numerous ways because for a small part they had actually invested in subprime market securities directly but more importantly they had provided backup credit lines for special purpose vehicle that held those securities. When some of them started to suffer from severe losses, financial institutions became very concerned about the liquidity and capital implications. Hence, adequate risk management and risk measurement of securitization business is important because it seeks to ensure the investors ability to fund increase in assets and meet obligations as they come due. Typical financial features of risk management are maturity transformation,
leveraging of balance sheets, and market to market evaluations. The risk management by banks will need to be able to deal with complex interactions between changes in asset values, leverages, and liquidity risk. This requires the ability to draw information’s from various operations of the banks and assess the impact of external events by banks for example performing value at risk analyses (VAR), stress tests, scenario analysis, and other risk measures. Most quantitative models are backward looking which means that they analyse historical data. The historical data used was not suitable to respond to the market developments. Maintaining volumes and compensation for expected losses have been the main focus in the financial sector. However, the real threats and risk costs arose from the potential for unexpected losses arising from the combination of the risk factor associated with the subprime and other originate and distribute business models. According to Basel Committee on Banking Supervision [11], the risk measures had focused too much on firm specific shocks instead of firm specific and market wide shocks. As a result, default risk, market risk and liquidity risk were underestimated and the nature, magnitude and duration of the current crisis across the global financial system were not fully anticipated by the financial sector. In addition, several financial institutions were not aware of the large exposures they had to their off balance sheets assets simply due to the complexity of the securitized products, the inadequate internal communication and weak controls over the risk of products.

Role of Financial Institutions

A variety of factors have caused lenders to offer an increasing array of higher-risk loans to higher-risk borrowers. The share of subprime mortgages to total originations was 5% ($35 billion) in 1994, 9% in 1996, 13% ($160 billion) in 1999, and 20% in 2006. A study by the Federal Reserve indicated that the average difference in mortgage interest rates between subprime and prime mortgages (the "subprime mark-up" or "risk premium") declined from 2.8 percentage points (280 basis points) in 2001, to 1.3 percentage points in 2007. In other words, the risk premium required by lenders to offer a subprime loan declined. This occurred even though subprime borrower and loan characteristics declined overall during the 2001-2006 period, which should have had the opposite effect. The combination is common to classic boom and bust credit cycles.

The Role of Rating Agencies

A third factor, mentioned by Blommestein[10], Borio[4], IIF [6] and Financial Stability Forum [7] is the role of rating agencies and the extent to which they have misjudged the risk associated with subprime loans and misunderstanding between investors and rating agencies due to unexpected rating agency downgrades. Investors started to lose faith in the ratings of these structured securities which as a result raised concerns about the valuation of such securities. Questions were raised about the effectiveness of the methodologies used by the agencies to model the probability of default and the loss given default when the number of delinquencies, defaults and foreclosures rapidly increased. In 2007, many blamed rating agencies for failing to downgrade securities in a timely manner. The crisis has showed that market participants and rating agencies underestimated the risks since there have been several examples where subprime securities were downgraded from “triple A” to junk. Furthermore, there was a misunderstanding between investors and rating agencies about the scope of ratings. Noyer [12], mentioned two reasons for this misunderstanding. The first reason is the confusion about the actual scope of ratings. Rating agencies only estimate the credit risks while many investors expected that the ratings would cover all the risk, especially liquidity risk. The other reason is the concerned with the methodologies used by the agencies to model the ratings. Rating agencies have a long history of providing ratings for corporate bonds. However, this is not the case for structured products which also mentioned by Aschcraft and Schermann [13], where ratings for structured products rely heavily on the quantitative models, forecasts of economic conditions since structured products represent claims on cash flow from portfolio of underlying assets, whereas corporate debt rating rely essentially on analyst judgments, and are based on neutral economic conditions and firm specific risk characteristics. This means that consequences of assigning ratings to structured security and a corporate bond are not the same because their risk profile differ significantly. The potential volatility for a structured security is far greater than for a corporate bond. In addition, just like the risk measurements of banks, the risk models of rating agencies did not include the so called trail risk events (the risk of extreme events that can cause large losses). Furthermore, the securitization of non-confirming mortgage is a relatively recent innovation which means that there is a limited ability to measure historical performance to determine the correlation between credit scores of borrowers and the probability of their ability to meet the commitment. These factors greatly affected the reliability of the rating agencies, Kregel [14].

Also the model and methodologies used by the rating agencies contain several weakness and did not cover all the risk associated with the structured products. Finally, more attention should have been paid to the conflict of interest during the rating process.

The Lack of Transparency and Disclosure

Another factor mentioned by Crouhy and Turnbull [15] is the lack of transparency and the disclosure which affected many players in the financial markets since it worsened the uncertainty and damaged the confidence in the financial markets. For Example, many investors were surprised the magnitude of the sometimes excessive write-downs by financial institutions and the exposure of off-balance sheet asset to losses. Another example is the level and diversity of commitments by financial institutions. As a result of severe competitions, many banks offered to extend credit and liquidity to for example SIVs but the total magnitude of the commitments was often not fully disclosed in timelymeanner. The IMF [16] did also mention this in their
Global Stability Report in which they refer to the crisis of confidence that can easily emerge when losses are unknown and off balance sheet commitments are non-transparent. As a result, many investors were not able to obtain the knowledge of underlying facts and assumptions and thus relied completely on the rating agencies. Also, the investors were unable to find out the information about the types of assets, such as CDOs, subprime or prime mortgages. For investors, it is important to know because the fulfilments of the commencements can have a serious effects on the liquidity of the institutions.

The Creditworthiness of Monoline Insurers

Monoline insurance companies are service providers in the capital markets that guarantee the timely repayment of bond principal and interest when an issuer defaults. By providing credit enhancement to capital market transactions, they provide investors and issuers with financial security and liquidity. The two largest monolines, MBIA endameba, were founded in the 1970s and provided insurance of municipal bonds and debts issued by hospitals and non-profit groups. The total amount of outstanding papers ensured by monoline companies reached dollar 3.3 trillion in 2006. In recent years much of monolines growth has been unstructured products, such as ABSs and CDOs. According to the Association of Financial Guarantee Insurers, prior to 2007, no member company has ever failed to fulfill its payment obligations to insured bond investors when due. However, the current market conditions have caused monoline insurers significant problems. When mortgage delinquencies rose, monolines started to suffer severe losses. The only single A-rated insurer, ACA, reported a loss of $ 1 billion. In fourth quarter MBIA added an additional $ 3.5 billion of write downs on its credit derivative portfolios and reported a loss of $ 2.3 billion. Serious concerns did arise about whether monoline insurers had sufficient resources to honor their commitments. As a result of the multiple downgrades and reported losses, credit agencies placed monoline insurers under review and concerns about the credit worthiness caused disruptions in the market.

IV. THE EFFECTS OF SUBPRIME MORTGAGE CRISIS

Liquidity in the market for ABSs and CDOs backed by subprime mortgages has been evaporated which led to an overall liquidity crisis. Leading banks have suffered significant losses, consolidation has accelerated as large financial institutions have acquired subprime mortgage originators and servicers, and some even experienced bankruptcy. Furthermore, under writing standards have significantly been tightened in the form of greater income, employment and asset verification, higher minimum credit score, and the elimination of 100% financing. Also the FED and the ECB have injected billions of dollars to restore investors’ confidence and to prevent the crisis to get further worsen.

Impact on Stock Markets

On July 19, 2007, the Dow Jones Industrial Average hit a record high, closing above 14,000 for the first time. By August 15, the Dow had dropped below 13,000 and the S&P 500 had crossed into negative territory year-to-date. Similar drops occurred in virtually every market in the world, with Brazil and Korea being hard-hit. Large daily drops became common, with, for example, the KOSPI dropping about 7% in one day, although 2007’s largest daily drop by the S&P 500 in the U.S. was in February, a result of the subprime crisis.

Impact on Financial Institutions

Many banks, mortgage lenders, real estate investment trusts (REIT), and hedge funds suffered significant losses as a result of mortgage payment defaults or mortgage asset devaluation. As of March 3, 2008 financial institutions had recognized subprime-related losses or write-downs exceeding U.S. $170 billion. Other companies from around the world, such as IKB Deutsche Industriebank, have also suffered significant losses and scores of mortgage lenders have filed for bankruptcy. Top management has not escaped unscathed, as the CEOs of Merrill Lynch and Citigroup were forced to resign within a week of each other. Various institutions follow-up with merger deals.

The Difficulty in Valuation

Many price assumptions of instruments has to be revaluated because they were below their true values due to an increased level of uncertainty associated with the valuation. Because of the increased uncertainty in the financial markets caused by the credit crisis, lenders refused to extend credit causing liquidity and funding problems. The unwillingness of lenders and investors to provide funding resulted in lack of liquidity and contributed to a decline in the fair value of financial instruments. Crouhy and Turnbull [15] explains this uncertainty in valuation by the use of the fair value accounting framework from the financial accounting standards board and the issues related to nonstandard instruments. The international financial reporting standards board also provides a framework to determine the fair value. According to this framework, quoted prices in an active market provide the best evidence of fair value and must be used when available. In the absence of such quoted market prices, an entity uses evaluation technique to determine what the transaction price would have been on the measurement date in an arm’s length transaction. Furthermore in order to use a valuation technique, all current market conditions, including current credit spreads and the relative liquidity of the market has to be included. Since an active market for ABSs and CDOs did not exist anymore, there was severe pressure on accounting institutions to develop more common guidelines for valuation and related disclosures in order to review valuation, accounting and risk disclosure issues associated with structured products and certain financial derivatives.

Potential Spill-over Effects

Almost 12 months after the financial turmoil started in the US subprime mortgage market, the effects are far from over yet. In April 2008, IMF published in its global stability report that spill over effects might spread
to credit markets and participants. The first effect that is mentioned is that the loser credit standard may extend beyond the subprime sector. The IMF warns that there is a risk that other high quality mortgage collateral may be subject to the same underwriting weakness. The second effect is a starting deterioration for the white market of the structured product, particular ABSs CDOS. A third potential effect is that other consumer credit market including credit card backed ABS and CDO structured could experience significant losses. Due to the house price appreciation before 2005, homeowners were able to extract equity from their homes and pay down their higher interest rate credit card and other debts. But when house prices started to flatten in 2006, this became more difficult to house owners.

However while the huge losses are widely acknowledged and the financial institutions have succeeded to raise additional capital, new concerns emerged. In July the IMF published a market update warning that the global financial markets continue to be fragile and that the policy trade-offs between inflation, growth and financial stability are becoming increasingly difficult. They identified several factors that could contribute to this threat.

- The overall credit risk is still very high since delinquencies and foreclosures are still rising sharply as already mentioned in the report of April. Moreover the third largest collapse of Indi Mack, the concerns about the healthiness of Freddie and Fanny May, and the expectation that the major banks such as City Group, Merrill Lynch and J P Morgan chase will disclose billions of dollars of write down, quarterly losses and profit declines.
- The banking sector is still under severe pressure due to a sharp decline in their share prices, high funding costs, limited liquidity, falling credit quality and loss in confidence. Because of the persistent problems of the financial markets due to exceed of their losses in write downs, it becomes more difficult to raise additional capitals.

V. CONCLUSIONS

These steps help provide access to funds for those entities with illiquid mortgage-backed assets. This helps lenders, SPE, and SIV avoid selling mortgage-backed assets at a steep loss. Second, the available funds stimulate the commercial paper market and general economic activity. Specific responses by central banks are included in the subprime crisis impact timeline. To investigate whether the announcements of financial news related to the subprime crisis does affect the returns of financial and non-financial institutions, an event study is used. In the present article, the study and analysis of the underlying causes and the essential effects of mortgage crisis in US form 1994 to 2006 has been made with thorough references and facts. The present analysis can be adopted to frame transparent, productive and fool proof economic plan for mortgage loan methodologies. The study may lead to more realistic planning of featured securities in banking sector in India by assessing the abnormality or excess of the returns earned by the security holders accompanying specific events.
REFERENCES


LIST OF ABBREVIATIONS

FCIC : Financial Crisis Inquiry Commission, USA
FMCG : Fast-Moving Consumer Goods
IKB : IKB Deutsche Industriebank
BNP : BNP Paribas Investment Group
CED : Centre for Education and Documentation
FED : Federal Reserve Banks
VAR : Value at Risk