

*Lessons from Sub-prime Meltdown*

**Submission for  
CRISIL YOUNG THOUGHT LEADER 2007**



**Priyanka Chandran**

**Class 2008**

**Faculty of Management Studies, Delhi**

*Ph: +91-9810320245*

*Email: 1*

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## Abstract

This paper begins with an understanding of what are subprime loans and the origin of the subprime market in the US. The benefits which the subprime market has offered to each of the participants and the economy as a whole have been discussed. The growth of the CDO and the financial implications of the same have also been highlighted. This paper then goes on to discuss the origin of the subprime crisis and compares the current Bear Stearns crisis to the LTCM disaster of 1998. The implications the crisis has had on the various facets of the economy like the stock market, credit market, housing market, GDP growth, unemployment etc have been highlighted and an effort has been made to project the state of the US economy in the future. Finally the lessons that we can learn from this crisis have been highlighted. Some policy recommendations from each of the lessons learned for the global arena and the Indian markets are also discussed.

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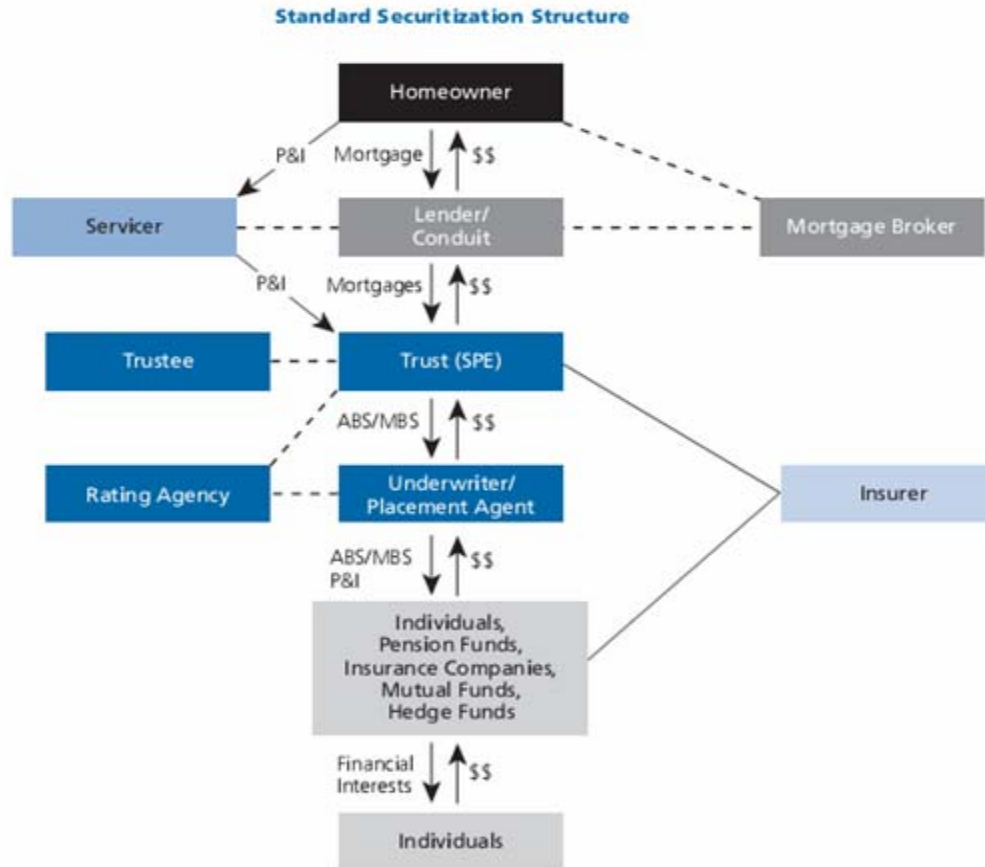
## Introduction

### What are subprime loans<sup>1</sup>?

Normal loans are dispensed to borrowers who have a good credit history and a good FICO score. However it was felt that a lot of money could also be made to borrowers who were being denied an opportunity because of poor credit history. Such borrowers are then charged higher interest rates to compensate for the risk and the likelihood of default. There are various different types of subprime mortgages the most common ones being the Adjustable Rate Mortgages. The participants in the loan disbursement process are shown below.

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<sup>1</sup> The qualitative mechanics of instruments are not dealt with here and a higher level view is sought



*Source: Subprime Meltdown: A Primer, Part I NERA Insight Series, 21 June 2007*

## Subprime as a Boon

The subprime market has given proven to be a boon for the participants in this market.<sup>2</sup>

<sup>2</sup> Refer Appendix I for Flowchart of Subprime Loan Origination

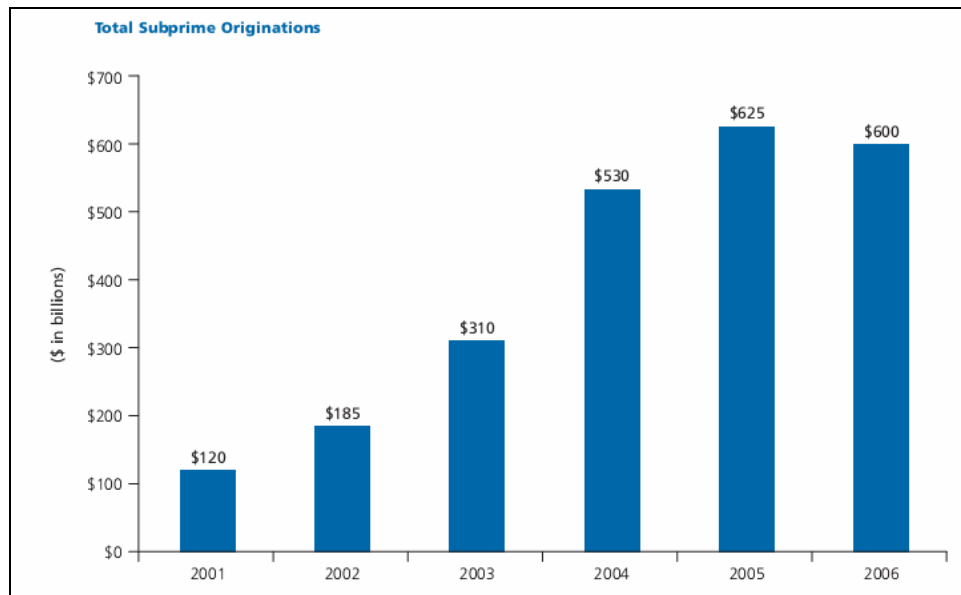
PARTICIPANT	BENEFITS
Borrowers	<ul style="list-style-type: none"> <li>• Access to credit despite a low FICO score and a poor credit history</li> </ul>
Mortgage Originator	<ul style="list-style-type: none"> <li>• Makes money through the fees that are used to originate a mortgage and the difference between the interest rate of the market and the premium charged to the borrower</li> </ul>
Securities Dealer	<ul style="list-style-type: none"> <li>• Makes money by selling securities to investors and charges commissions for underwriting</li> </ul>
Investors in MBS	<ul style="list-style-type: none"> <li>• Greater liquidity than loans backing transaction</li> <li>• Opportunity to diversify portfolio</li> <li>• Constraints of purchasing event grade paper can be met with ABS</li> </ul>
Economy	<ul style="list-style-type: none"> <li>• Expanded source of financing for home ownership</li> <li>• Greater integration of capital and financial markets</li> <li>• Source of funds for banks and other institutions</li> </ul>

*Benefits to the participants of the Subprime Market*

## Evolution of the Crisis

### Rise of the US Subprime Market

The subprime industry arose in the US when the real estate sector was looking very attractive. But as the interest rate in the market grew, the subprime borrowers were unable to pay back their debt. This debt which was now a part of the MBS or CDO's (disbursed in various portfolios) went bust and created the crisis.



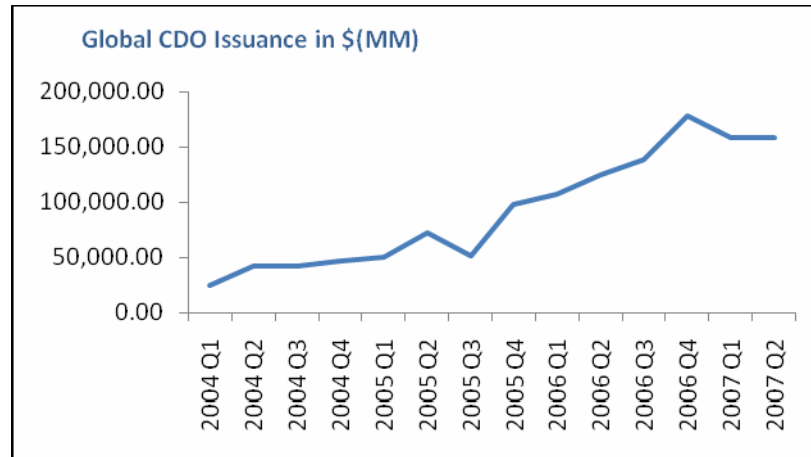
*Source: Mortgage Finance*

### **Growth of CDO and Impact on Financial Institutions**

Collateralized Debt Obligation (CDO) is an investment grade security backed by a pool of bonds, loans and other assets<sup>3</sup>. Banks and other financial firms typically create CDOs by wrapping together 100 or more bonds and other securities, including debt investments backed by home loans.

Investment-grade ratings on these CDOs do not give any idea of what is the kind of debt in the package and how exposed the instrument is. Thus CDO's are hiding a big part of the subprime crisis which has the capability of bringing down the financial system.

<sup>3</sup> [www.harperisk.com/ArtGlossary/ArtGlosscd.htm](http://www.harperisk.com/ArtGlossary/ArtGlosscd.htm)



*Source: Securities Industry and Financial Markets Association*

Thus a lot of imminent investment banking firms starting from the Bear Stearns to many other smaller firms investing in mortgage backed securities or having exposure to mortgage in their debt have filed for bankruptcy and many more are expected to hive off in the future.

Institutions	Current Position
Bear Stearns (One of the Largest investment banking and securities trading firm)	<ul style="list-style-type: none"> <li>• Collateralized loan of up to \$3.2 billion to "ball out" one of its fund</li> <li>• Two subprime hedge funds had lost nearly all of their value</li> <li>• Bear Stearns posted a 61% drop in net during September</li> </ul>
Novastar Financial Inc (Subprime Mortgage Lender)	<ul style="list-style-type: none"> <li>• Wholesale lending operations shutdown</li> </ul>
Aegis Mortgage Corp (Subprime Lender)	<ul style="list-style-type: none"> <li>• Sought Bankruptcy</li> </ul>
Luminent Mortgage Capital (Investor in MBS)	<ul style="list-style-type: none"> <li>• Received Default notices from creditors</li> <li>• Being investigated for making material false statements about its financial position</li> </ul>

*Figure 1: Firms that have filed for bankruptcy*

### **LTCM and Bear Stearns Fallout: A Comparison**

The LTCM and Bear Stearns Funds both created credit crisis however a lot has changed in the global economy since 1998. The increasing number of foreclosures and the worldwide felt

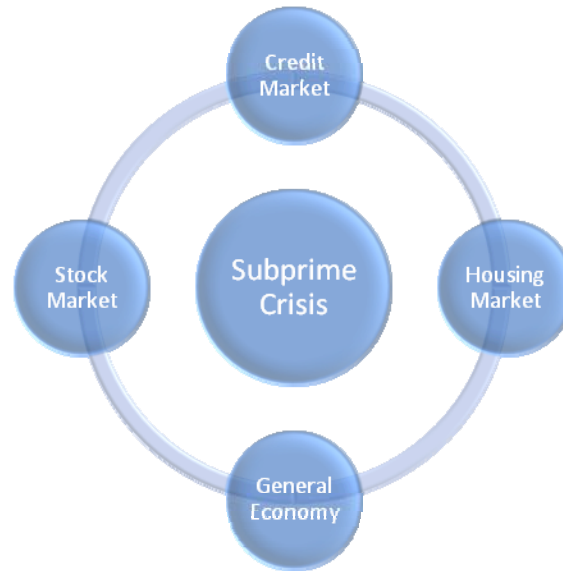
impact on the stock market, subprime woes and the fallout expected from the same is expected to be of a much higher magnitude than the LTCM.

	LTCM	Bear Stearns
<b>Nature of Fund Investment</b>	Interest Rate Swaps	Mortgage backed securities
<b>Nature of Crisis</b>	Liquidity	Insolvency/Debt
<b>Magnitude of the crisis</b>	In 1998 LTCM was one of kind which fell out because of investment in Russian bonds and the Japanese Yen whose economies collapsed during the Asian Crisis	There are about 6,000,000 subprime mortgages in the US and an anticipated principal sum of \$900,000,000,000 is exposed which is 7 times the size of the LTCM.
<b>Bailout Amount</b>	Bailout amount \$3.65 billion	Bear Stearns smaller fund has been announced at \$3.2 billion. The fed has already pumped a lot of money and even announced a rate cut of 50 basis points
<b>Nature of the US Economy during the crisis</b>	Current Account Deficit -> 2% Credit market debt to GDP-> 250% Household debt-> 65% of GDP.	Current Account Deficit -> 8% Credit market debt to GDP-> 330% Household debt-> 100% of GDP.
<b>Impact on Stock Market</b>	From its peak close that July to its low in October, the S&P 500 fell 19%.	The steepest drop was 8%, from July 19 to mid August.

*Matrix Comparing LTCM and Bear Stearns Crisis*

## Impact of the Subprime Crisis

The subprime market is causing severe repercussions and the main areas of impact of the subprime crisis have been identified and listed.



*Figure 2 Impact of Subprime Crisis*

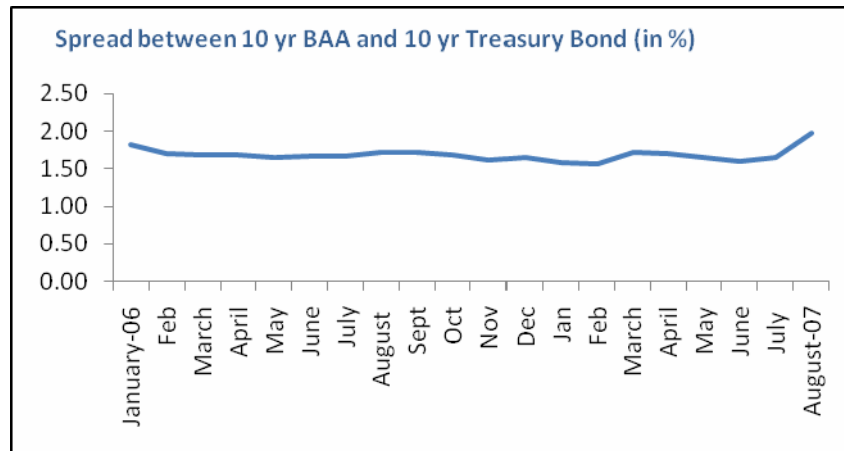
### **Stock Market**

The subprime crisis has had an impact on stock markets worldwide

- The cumulative falls on major stock markets since the crisis erupted in July are more than 10%
- This has erased a staggering 4.5 trillion US dollars from global stock markets in four weeks.
- Between (13-17 August) alone, the drop on New York's Dow Jones Index was almost ten percent, while Tokyo's Topix share index fell 9.4 percent.

### **Credit Market**

Credit Squeeze has been a natural consequence of the subprime crisis as the banks and other lending agencies are tightening the norms for giving the loans. Although the increase in the spread has been only from 1.83 to 1.98 % the impact is being felt as investors are forcing companies to renegotiate terms, delay offerings etc leading to balking of buyouts.

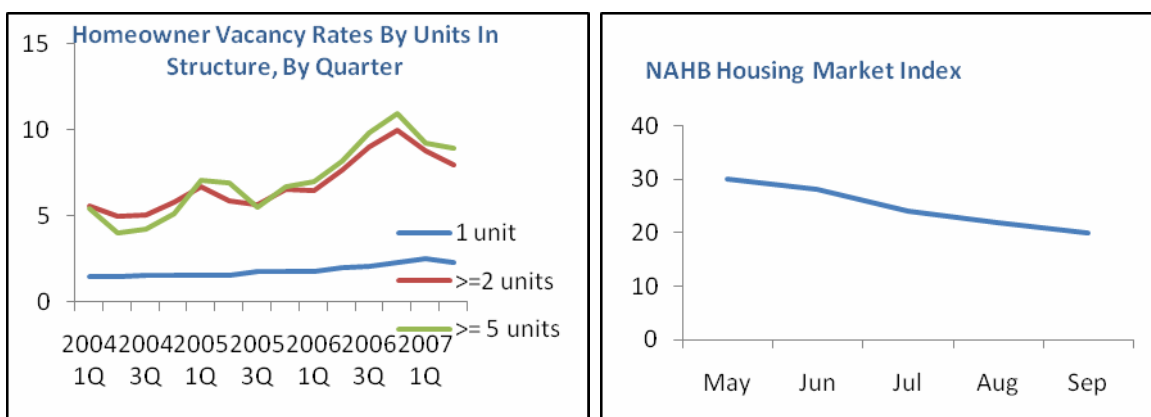


Source: Federal Statistical Reserve

## Housing Market

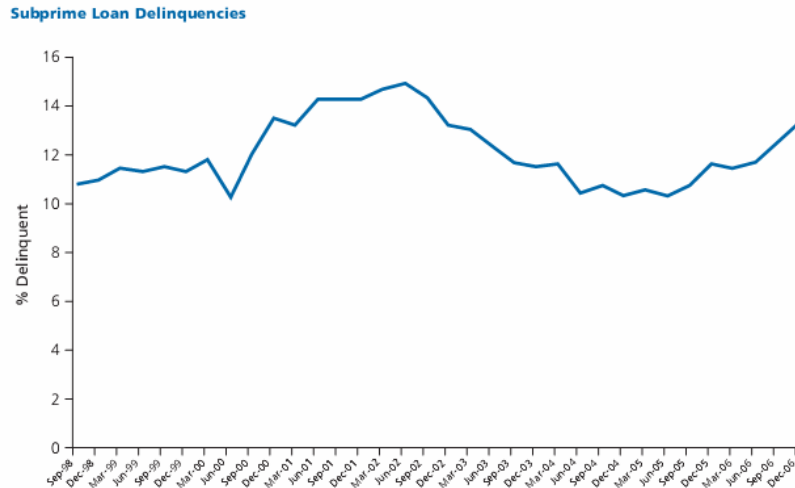
The rise in the home vacancy rate and the NAHB housing market index (which has declined by about 40 %) point to the problems facing the housing market. The typical issues include

1. Consumers are not willing to buy homes because the market for houses is dropping and consumers do not want to lose value on their purchase.
2. Lenders are obligated to improve their due diligence which means that many homebuyers who were previously eligible are not anymore.



Source: US Census Bureau and NAHB

The increase in the delinquency rate particularly in the subprime market is also impacting the housing market.



*Source: Bloomberg*

## Economy

**GDP:** The growth in the US economy has been sustained by the boom in housing. Although the correlation coefficient between the GDP (in billion USD) and the NAHB Housing Opportunity Index is fairly low at -0.45 (calculated from the data shown below) it is indicative of the fact that there has been a fair impact on the GDP.

Year	NHAB Housing Index	GDP
Jan-04	68	11405.5
Apr-04	695	11610.3
Jul-04	67	11779.4
Oct-04	69	11948.5
Jan-05	70	12154.0
Apr-05	67	12317.4
Jul-05	70	12558.8
Oct-05	68	12705.5
Jan-06	57	12964.6
Apr-06	51	13155.0
Jul-06	39	13266.9
Oct-06	31	13392.3
Jan-07	35	13551.9
Apr-07	33	13774.7

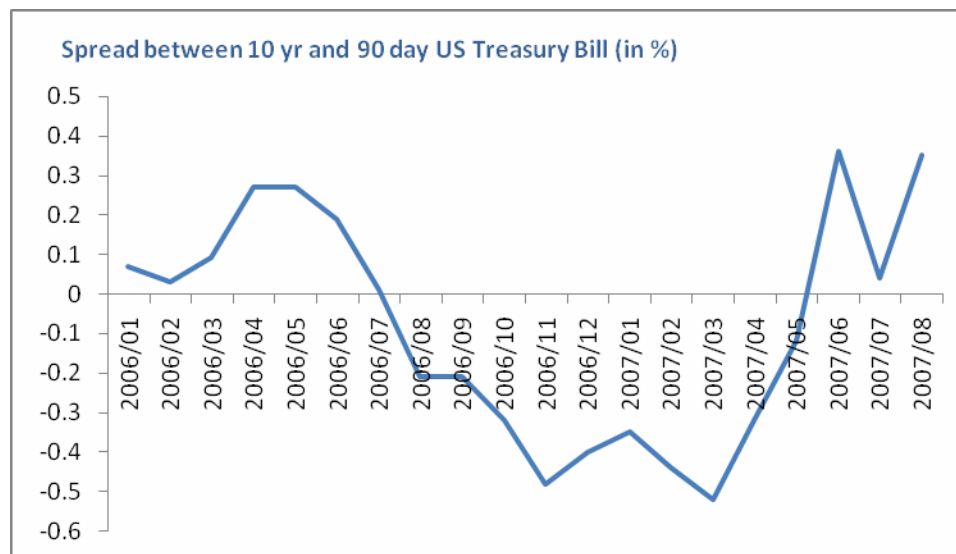
*Source: US Census Bureau and NAHB*

**Consumption:** Consumption in US has been residential investment led. Thus in the wake of the subprime crisis and the weakening of the housing market the consumption is also expected to see a shortfall. This in turn could be pushing the economy towards recession.

**Employment:** Roughly a quarter of the jobs created since the 2001 recession has been in construction, real estate, and mortgage finance. Even more important, consumers have withdrawn \$2.5 trillion in equity from their homes during this time, spending as much as half of it and thus making a huge contribution to the growth the U.S. economy has enjoyed in recent years (consumer spending accounts for two-thirds of GDP). With the subprime crisis looming large the employment scenario is also likely to be affected.

### Future of the US Economy

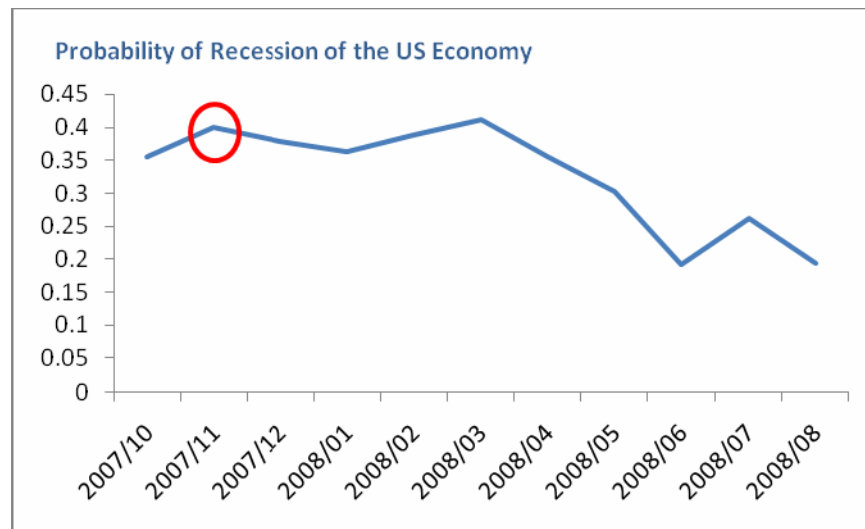
With the impact of the subprime crisis has had on the various aspects of the economy it remains to be seen as to what would be the state of the US economy in the time to come.



Source: Federal Reserve Statistical Release

This yield curve is showing signs of flattening and could probably also shown an inversion in the future. In the backdrop of the current subprime crisis and all these situations prevailing in the US

economy there could be a recession in the pipeline. The Probit model<sup>4</sup> can be used to predict the same with a fair amount of accuracy. With the given data the probability of a recession could go as high as 40 %. The result is a short period of weak growth. However in the wake of the Fed cutting rates there is a very high probability that the economy burps in the wake of the current fiasco and bounces back to a good shape in the future.



Source: Federal Reserve Statistical Release

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<sup>4</sup> The probability model consists of a probit equation of the form  $Recessm_{t+12} = F(\alpha + \beta sprd_t)$ , where  $sprd_t$  is the difference between long- and short-term interest rates in month  $t$ ,  $\alpha$  and  $\beta$  are constants,  $F$  is the cumulative normal distribution function  $F(z) = \int_{-\infty}^z \frac{1}{\sqrt{2\pi}} \exp(-x^2/2) dx$  and  $Recessm_{t+12}$  is the probability of a recession occurring in month  $t+12$  from the viewpoint of information available in month  $t$

## Lessons from the Subprime Crisis

### **LESSON I: Distorted Incentives without Accountability can spell Disaster**

The subprime crisis has been the result of individual incentives and the lack of accountability which has caused the present dilemma. The market for MBS created by subprime loans is like **lemon markets** because of the information asymmetry between the key players and in this situation only low quality lemons would be traded. Under the extreme scenario, such a market should cease to exist however low tranches are backed by multi class MBS and thus the players have managed to survive which has spilled disaster for the US economy and the economies world over.

### **LESSON II: Central Banks face Moral Hazard which needs to be resisted**

Under the conditions that are prevailing now the Fed has to consider the moral hazards inherent in any bailout. The Fed has already pumped \$31.25 billion in temporary reserves to the banking system via system repurchase agreements and the Fed has also slashed the interest rate by 50 basis points again. But such actions will only further the tendency to default.

### **LESSON III: Risk Allocation does not mean Risk Elimination**

Spreading risk does not eliminate it and eventually these risks expose themselves. As risk is spreading globally it becomes difficult to assess the impact of loss and its ripple effects show up in the most unlikely places.

### **LESSON IV: Complex Mathematical Models can also fail**

FICO scores which have been used to judge the consumer's ability to pay back seems to have failed as the number of foreclosures have exceeded a lot with the increase in the interest rate over the last year .Moreover if the interest rate changes, the valuation of different tranches of CDO's would change and hedge funds have made bets on the correlation of the actual change to their models which has spiked off illiquidity at least in the short run.

**LESSON V: True Risk Assessment of Securities is Crucial**

Rating agencies are typically paid by issuers and only for initial ratings thus true assessment of the risk of securities by re-rating need to be ensured.

**LESSON VI: Credit History Analysis of Borrowers is Essential**

In the wake of failure of models and even FICO to calculate the credit lending capability, it has become all the more important to ensure stricter lending practices. There has to be greater check on the background of borrowers to curtail the increasing foreclosures.

**LESSON VII: Greater Need for Consumer Protection**

With lending standards tightening, the appropriate policy response needs to balance improving consumer protection with maintaining the viability of the securitization model that has successfully dispersed credit risk away from systemically important financial institutions.

## Recommendations

LESSON	RECOMMENDATION
<p><b>Distorted Incentives without Accountability can spell Disaster</b></p>	<ul style="list-style-type: none"> <li>• Greater accountability in the form of stricter norms against the lenders so that the disaster can be curtailed at the first link of the chain</li> </ul>
<p><b>Central banks face moral hazard which needs to be resisted</b></p>	<ul style="list-style-type: none"> <li>• Instead of lowering the price at which financial institutions can borrow, the Fed should have effectively created a market by expanding the set of eligible collateral</li> <li>• The Fed should also enlarge the set of eligible counterparties at the discount windows. This should not just be banks and other depository institutions, but any financial entity that is willing to accept appropriate prudential supervision and regulation. The nature of the supervision and regulation required will differ depending on the nature of the institution</li> </ul>
<p><b>Risk Allocation does not mean Risk Elimination</b></p>	<ul style="list-style-type: none"> <li>• US must join with other countries to craft oversight and regulatory responses that are as global as the financial marketplace</li> </ul>
<p><b>Complex Mathematical Models can also fail</b></p>	<ul style="list-style-type: none"> <li>• Modeling has to be supported by credit history assessment and mathematical models should be used only for supplementing</li> </ul>

<p><b>True Risk Assessment of Securities is Crucial</b></p>	<ul style="list-style-type: none"> <li>• Credit rating agencies need to regularly review and re-rate debt securities.</li> <li>• Rating agencies should put in place automated and objective systems, based on the changing value of underlying assets, to continuously re-rate debt structures</li> <li>• Training and qualification standards for ratings analysts to help create consistent, objective, transparent and replicable methods</li> <li>• A finite delay by ratings analysts would greatly enhance the integrity and independence of the rating process</li> </ul>
<p><b>Credit History Analysis of Borrowers is essential</b></p>	<ul style="list-style-type: none"> <li>• Fully documenting a borrower's ability to repay the home loan</li> <li>• The escrow of property taxes and hazard insurance</li> <li>• Verifying all sources of a borrower's income</li> </ul>
<p><b>Greater Need for Consumer Protection</b></p>	<ul style="list-style-type: none"> <li>• A suitability standard should be considered for mortgage borrowers and lenders. This would help restrict predatory lending</li> <li>• There have to be greater disclosure Practices for Mortgage Products: The details of teaser rates, interest-only payments etc should be clearly and effectively communicated to potential borrowers</li> </ul>

*Matrix depicting recommendations for all lessons*

## Conclusion

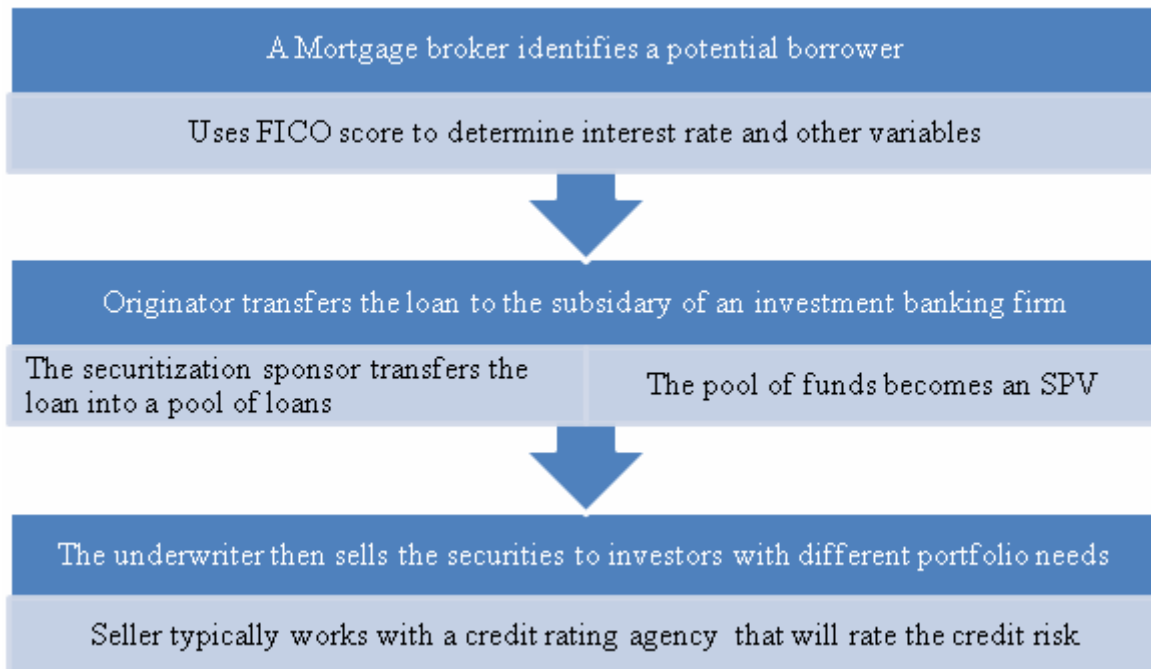
The potential for efficiency gains from subprime lending and risk based pricing are real. If risk can be more accurately measured, the benefits to low income and low credit score households and to society as a whole are great. Consumer choice is enhanced, risk is more efficiently priced, capital is increasingly allocated to highest and best use, while numerous households that would have been denied credit, find access to the ownership market. On the other hand, if the risks of subprime lending are underestimated, the result may be very costly and inefficient. More borrowers will default, creating significant future credit and social problems for individual households. However, the industry is still growing. Emerging countries like India have a lot to learn from this.<sup>5</sup> Policymakers and regulators need to closely watch this field, while lenders should work to overcome failures in current practices.

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<sup>5</sup> Refer Appendix III for Recommendations for India

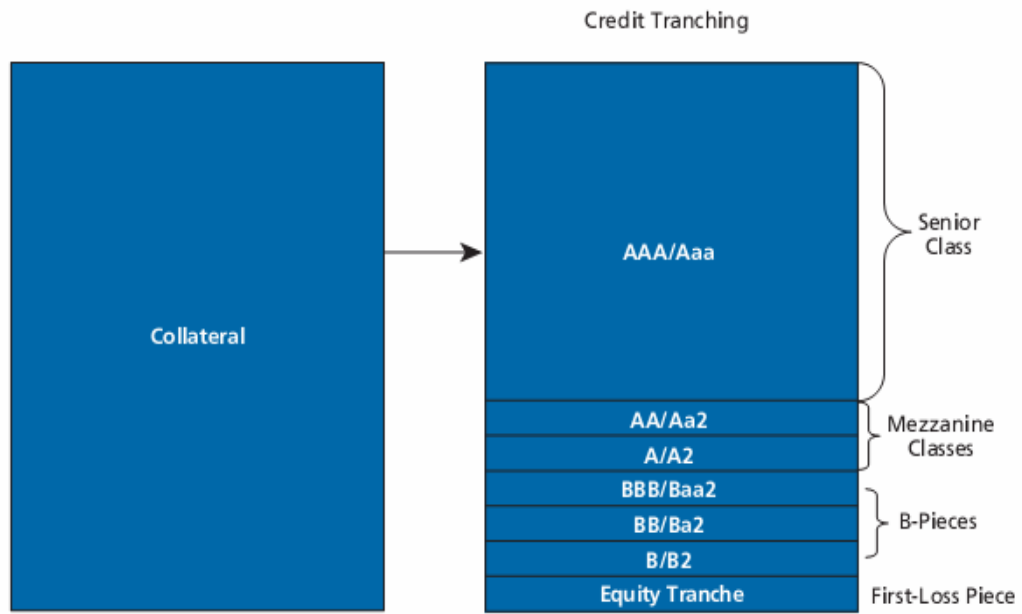
## Appendix

### Appendix I: Flowchart for Subprime Loan Origination



## Appendix II: CDO Structure

Schematic of MBS Structure



Source: "A Simple Guide to Subprime Mortgages, CDO and Securitization," Citibank analyst report, April 12, 2007.

### Appendix III: Recommendations for India

PARTICIPANT	RECOMMENDATION
Banks/NBFCs	<ul style="list-style-type: none"> <li>As the economy grows and banks are considering an upcoming segment of masses for extending credit, the need for a proper check on the credit history gets reiterated</li> </ul>
Credit Rating Agencies	<ul style="list-style-type: none"> <li>Greater Regulation and importance of the true assessment of securities in the wake of Basal II and policy frameworks for development of CDO market</li> </ul>
Central Bank	<ul style="list-style-type: none"> <li>Strong need to control inflation which form the prime cause of interest rate hikes leading to severe implications on financial and capital markets</li> <li>A closer look at the CAC implementation as the financial markets have a severe repercussions on the economy</li> </ul>

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