The Financial Turmoil of 2007-2008 : From 'Subprime' to 'Global' *En Route* Mortgage Securities

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Abstract : The paper appraises the financial turmoil of 2007-2008 which originated in United States housing market and later spread throughout the global economy. U.S. house prices started a steady south-ward journey consequent to bursting of the house price bubble. Borrowers were left with outstanding mortgage loans much higher than the value of the property. The mortgage borrowers opined that higher mortgage level payments on a house whose value has declined considerably did not make much 'financial sense', which led people to 'walk away' from their houses. This led to widespread foreclosures which considerably increased the inventory of foreclosed property forcing housing prices to plummet further. Financial institutions faced huge losses as the value of assets (foreclosed houses) fell significantly along with drastic increase in mortgage loan default rate. Mortgage securities, which are important funding instruments in the housing finance system, are much prevalent in the U.S. housing market. Banks and non-banking financial institutions which had invested in these securities suffered huge losses as the value of these instruments declined significantly when delinquencies increased. Several of these entities collapsed along with the housing sector. This paper investigates the role of mortgage securities in the arena of housing finance and argues that excessive financial engineering is one of the major causes of the financial turmoil. This paper also argues that the process of 'securitization' was vital in transforming the 'subprime' crisis into a 'global' financial crisis. However, in the context of Indian housing finance system, this paper concludes that the impediments to the growth of secondary market have actually insulated the system from a similar crisis.

Key-words: Mortgage securities, subprime loans, Alt-A, serious delinquency, structured finance, collateral debt obligation.

1. Introduction

The elementary aspect of 'housing' is shelter and housing finance is basically financial assistance for acquiring a house. Housing finance may be formal provided by financial institutions (either specialized institutions dedicated in providing financial assistance for housing or general purpose financial institutions which provide such assistance in addition to other loans) or informal in the form of direct financial assistance from relatives and friends. An entity which provides such assistance abides by the housing policies of the respective states as providing shelter to the population is an important agenda for every state. For developing countries like India where the housing shortage is substantial in spite of the best efforts of the government, role of the housing finance institutions (HFIs) is more significant. An HFI has to balance between the social issue of providing specialized financial assistance and the issue of profitability. Profitability of these entities depends largely on

the spread which is the difference between average yield on housing loans and the average cost of funds. An HFI approaches the capital market through issuance of debt securities or take non-conventional route of financing which is referred as the 'mortgage security' route in order to reduce their cost of capital (Chiquier, Hassler & Lea, 2004). A secondary mortgage market (SMM) is a market for trading of the mortgage securities which unites the originators (of mortgage loans) and the investors. Development of the SMM frees the lender from excessive dependence on expensive retail funding sources (branch networks) for mobilization of funds. A well developed SMM helps HFIs to reduce the risks associated with mortgage lending and, therefore, is an important issue in the development of the housing finance system (HFS)[1] of a country. A SMM (a) attracts new investors into the mortgage market and increases the flow of funds into the housing sector (b) increases liquidity of mortgage loan assets and decreases the risk of providing long term finance (c) reduces geographical segmentation of sources of finance of the HFI as these entities are able to tap international funds (d) allows the HFIs to reduce their average cost of funds by tapping non-traditional sources of finance which makes the overall HFS more efficient. Mortgage securities played crucial role in the financial crisis (2007-2008) which ensued in the primary mortgage market in U.S. as delinquencies on housing loans increased manifold forcing massive foreclosures. The financial crisis which was initially called 'subprime' crisis transformed into a 'global' crisis through mortgage securities. This transformation was predominantly due to over-liquidity of the mortgage securities within the U.S. HFS which was noted, earlier, as an 'advanced housing finance system' by Renaud (1999).

2. Mortgage Securities

Housing finance institutions, which originate housing loans, either follows the 'originate to hold' model where the housing loans remain in the Balance Sheet of these entities or takes the 'originate to transfer' route where the mortgage loans are bundled and transferred to investors through the process of securitization. Thus securitization creates mortgage securities which transforms illiquid mortgage loans into marketable securities that draw new investors to the mortgage market and creates marketability of the mortgages. The main purpose of mortgage securities is to secure long term funds for housing. These instruments tantamount to non-conventional routes of financing and are aimed at;

- Tapping long term funds of institutional investors (pension funds and insurance companies) into the mortgage market,
- Increasing the liquidity of mortgages and reducing the risk related to housing loan for the loan originators,

The early forms of mortgage related securities are the 'wholesale loans'[2],'agency bonds' and 'mortgage bonds'. Wholesale loans' involve sale of mortgages, singly or more commonly in pools, to institutional investors. Agency Bonds are issued by government sponsored enterprises (GSEs)[3] in US and are entirely backed by mortgage loans purchased from the originators.' Mortgage bonds' (known as covered bonds or 'pfdanbriefe' in European countries) are issued by the originator as well as secondary HFIs against collateralized mortgage pools. The bonds are either straight (non-amortizing)

or pass-through (mortgage payments are passed through to investors). The investors have specific claim on the mortgage pools which are held as collaterals. As these three kinds of mortgage securities are privately placed with institutional investors, for further development of SMM, the Federal government used the process of 'securitization' to create mortgage-backed securities (MBSs) which are issued for the public and are traded in the stock exchanges.

3. U.S. Housing Finance System

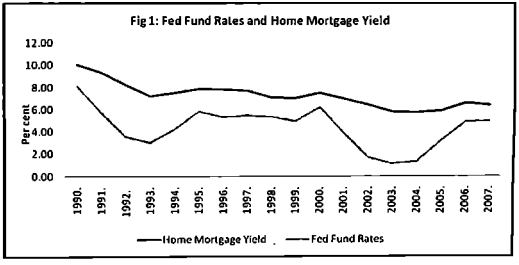
The evolution of institutional mortgage lending in U.S. can be classified into three phases; phase one (1831-1931) witnessed the growth of many mortgage lending institutions and instruments. Phase two (1932-1981) featured growth of government-supported special circuits that dominated the arena of mortgage finance. Initiation and development of the secondary market was an important phenomenon of this phase. The last phase (1982-1996) was dominated by sophisticated 'securitization' in the arena of housing finance which amplified the use of mortgage securities (Lea, 1996). The mortgage market crisis (2007-2008) popularly known as 'subprime' crisis initiates yet another phase in the U.S. HFS.

During the first phase the saving and loan associations (S&Ls) were the main housing loan originators and housing finance, as such, followed the simple 3-6-3[4] rule. As the SMM was not developed during this time, the S&Ls followed the 'originate to hold' model. Housing loans featured high down payments (which were often as high as 50 per cent), high loan to value (LTV) and shorter tenures (generally five years). Housing loan repayment was made through 'bullet payments'[5] and mortgage insurance was provided by private insurers. The second phase initiated with the establishment of Home Owner's Loan Corporation (HOLC) in 1933 which was instrumental in developing the long term fully amortized, low down payment, and level-payment loan [popularly known as the fixed rate mortgage (FRM)]. Federal Housing Administration (FHA), started in 1934, initiated an insurance program on housing loans originated by commercial banks and mortgage banks that led to the popularity of FRM. Federal National Mortgage Association (FNMA or Fannie Mae) was formed in 1938 to trade FHA insured loans. Fannie Mae issued 'mortgage securities' in the capital market and used the proceeds to buy FHA insured loans from the commercial banks and the mortgage banks. In 1968, Fannie Mae was transformed into a privately managed government sponsored enterprise (GSE) called the Government National Mortgage Association (Ginnie Mae) and Fannie Mae was allowed to trade conventional privately insured loans of the thrifts[6] and in 1970, the Federal Home Loan Mortgage Corporation (Freddie Mac) was started by the Federal government for purchase and sell of conventional housing loans of the thrifts. Later Freddie Mac was allowed to trade in housing loans originated by the commercial banks and the mortgage banks. The sophistication of the securitization process and the saving and loan crisis which initiated the adjustable-rate mortgages (ARM)[7] earmarked the third phase in the US HFS. The housing loan originators retained ARMs in their books, however, sold FRMs to Fannie Mae, Freddie Mac or Ginnie Mae, which then packaged the loans into mortgage- backed securities and sold them to institutional investors. Fannie Mae, Freddie Mac and Ginnie Mae developed an efficient secondary mortgage market to sustain trading of mortgage securities. Thus the process of 'securitization' created the most important mortgage security called mortgage-backed security (MBS).

The expansion of MBS issuances stimulated the integration of the mortgage market with capital markets and broadened the institutional base for mortgage funding. Financial engineering created multiple-class MBSs, known as the collateralized mortgage obligations (CMOs) and the real estate mortgage investment conduits (REMICs) which accelerated the process of integration of the financial market. These securities created 'tranches'[8] against varying levels of prepayment risk, better suited to the financial need of different investors. Excessive financial engineering along with an abnormal boom and corresponding bust of house prices resulted in a severe mortgage market crisis in 2007-2008 that shook the very foundation of the U.S. HFS.

4. The Financial Turmoil of 2007-2008

U.S. monetary policy (2000-2001) of 'low interest rate' injected enormous liquidity into the financial system. Short term interest rates were reduced to such level that the inflation adjusted rates often became negative. In Figure 1, the fed fund rate[9] and the home mortgage yield (average yield of mortgages, including origination fees and considering an average repayment period of ten years) is considered [ref. Annexure-Table 1]. Steep decline of fed fund rates (indicative of cost of funds for the home mortgage originators) along with fairly stable home mortgage yield, since 2000, is apparent from the chart. Thus mortgage loans and mortgage related securities became more profitable since 2000. Enhanced profitability along with booming house prices made mortgage related securities the ideal destination for the individual and the corporate investors.

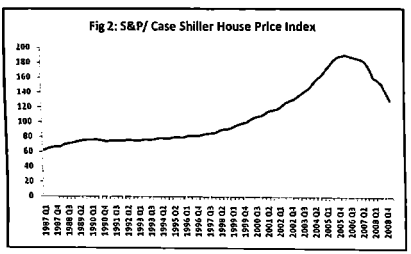


Source: Economic Report of President (2009) available at *http://www.gpoaccess.gov/eop/2011/pdf/ERP-2009.pdf* [data taken from Table -73, Bond yields and Interest Rates, 1929–2009 (in per cent) is represented in Table 1.

Note : Home Mortgage Yield is taken as the effective rate (in the primary market) on conventional mortgages, reflecting fees and charges as well as contract rate and assuming average repayment at end of 10 years].

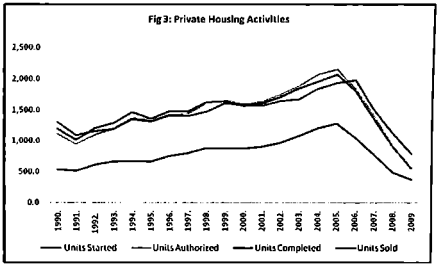
Better profitability in the mortgage loan segment induced the financial intermediaries to extend credit to individuals and companies with relatively poor financial records. Investors were forced to reallocate their portfolios in favour of riskier products in order to preserve the purchasing power of their investment.

With soaring house prices, mortgage loans became very attractive to the borrowers as home equity (excess of value of house over mortgage loans) formation became easy. Baker (2002) showed that inflation adjusted house prices remained unchanged (more or less) during 1953-1995, while Shiller (2006) analysed government data to show that real house prices remained essentially unchanged for 100 years prior to 1995. The boom and the bust of the housing bubble is apparent from Annexure-Table 2, which shows that the S&P/ Case-Shiller house price index increased from 118.00 in 2002 (1st quarter) to 189.93 in 2006 (2nd quarter) and declined steadily since then as the said index decreased from 189.93 in 2006 (2nd quarter) to 183.17 in 2007 (2nd quarter) and further plummeted to 129.20 during 2009 (1st quarter). Thus the period 2002 (1st quarter) to 2006 (2nd quarter) may be identified as the boom of the housing market bubble while the period 2006 (3rd quarter) to 2009 (1st quarter) may be indicated as the bust of the bubble.



Source : Data available at *http://www.macromarkets.com/csi_housing/sp_caseshiller.asp*. (Refer to Annexure-Table 2)

This boom and bust of the housing market bubble is also evident from the data on private housing construction activities (housing units started, authorized, completed and sold [Annexure- Table 3]). The private housing activities (excluding government supported activities) data for the period 1990-2008 is represented in Figure 3 below. It is apparent from the figure that private housing construction activities which increased up to 2005-2006, declined significantly indicating the deepening of the housing crisis. Consequently mortgage loans dried up and mortgage related securities became less profitable.



Source : Economic Report of President available at *http://www.gpoaccess.gov/eop/2009/pdf/ERP-2011.pdf* [Table B–56. New private housing units started, authorized, and completed and houses sold, 1962–2009].

The house price bubble was a result of two significant developments: (a) 'stock wealth'[10] created during 1990s and (b) reduction of interest rates initiated in 2000. Baker (2008) opined that the wealth accumulated through increase in stock prices during 1990s induced a surge in demand of housing as people found investment in house a good alternative which triggered the housing bubble. It has been earlier noted (Fig 1) that the yield from mortgages remained stable though the average cost of funds fell considerably. This implied increase in profitability of mortgages which enormously increased the issuance of mortgage related securities.

5. The Subprime Mortgage

Due to excess supply of funds, 'zero down-payment' loans, 'teaser' rate ARMs (adjustable rate mortgage)[11], 'low/no documentation' loans were devised to attract new borrowers including those with improper credit history, earlier denied of mortgage loans, categorized as the subprime and Alt-A borrowers. Regarding subprime loans, the U.S. Treasury issued the following guidelines in the year 2001:

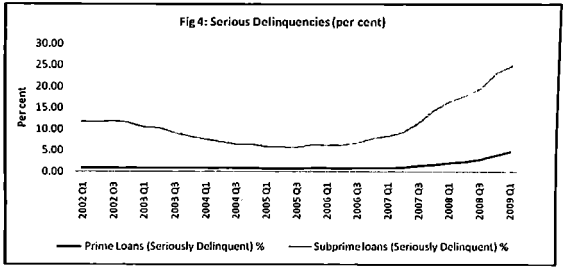
> *"Subprime borrowers typically have weakened credit histories that include payment delinquencies and suffer from severe problems such as charge-offs, judgments, and bankruptcies. They may also display reduced repayment capacity as measured by credit scores, debt-to-income ratios, or other criteria that may encompass borrowers with incomplete credit histories".*

The subprime mortgage was designed by the financial institutions and other intermediaries on the assumption that the dominant form of wealth for the low and moderate income (LMI) households is potentially their home equity (defined as the value of the property less the mortgage held). Gorton (2010) noted that 'No other consumer loan has the design feature in which the borrower's ability

to pay is so sensitively linked to the appreciation of the underlying asset'. Thus mortgages were developed as 'teaser' rates and 'hybrid' structures (2/28 or the 3/27 Hybrid ARM) with 'reset' dates when the mortgages shifted from FRM to ARM. Home equity is built up in the initial years with appreciation in home prices. The implicit design of the subprime mortgage is such that after the initial years when sufficient home equity has been built up, the subprime borrower would sell off the first house and use the proceeds to pay off the mortgage debt and use the surplus wealth as down payment for the second mortgage for financing the second house. But the 'catch' was that these loans came with prepayment penalties which acted as a deterring factor in foreclosure of loans. Thus the subprime mortgages solely depended on house price appreciation.

The subprime mortgages were riskier than the prime mortgages. The National Delinquency Survey[12] which shows that in 2004 (1st quarter) 'serious delinquency rate'[13] of subprime loans was 9.5 times higher than that of prime loans (serious delinquency rate on subprime loans was 7.72 per cent, while the rate on prime loans was 0.81 per cent) [Annexure-Table 4]. However, it is observed (Table 5) that subprime loan origination which was 8.01 per cent of the total loan origination in 2002, increased significantly to 20.13 per cent in 2006. It may be noted that in spite of riskiness of these subprime mortgages, its share rose significantly during 2002-2006. Since these mortgages were riskier, the mortgage originators followed the 'originate to transfer' model. More and more of these subprime loans were off loaded from the Balance Sheet of the originators and securitization of subprime mortgages increased from 50 per cent in 2001 to 80.50 per cent in 2006. This supports the argument that the loan originators were well aware of the riskiness of the subprime mortgages and therefore preferred the 'originate to transfer' model in order to get rid of the risk associated with the subprime mortgages off their Balance Sheet.

Decline in house prices resulted in negative home equity ushering critical problem in the subprime mortgage market. As the value of the houses fell below the outstanding amount of mortgages, it did not make much financial sense to keep on paying the mortgage loans. This led to widespread defaults, especially in the subprime segment. During 2007 (3rd quarter), serious delinquency rate of subprime loans reached 11.38 per cent and further shoot up to 24.88 per cent in 2009 (1st quarter).Whereas increase in serious delinquency rate of prime loans was modest as it increased to 1.31 per cent in 2007 (1st quarter) and 4.70 per cent in 2009 (1st quarter) [Annexure-Table 4]. In Figure 4, serious delinquency rates on prime and subprime loans during 2004 (2nd quarter) to 2009 (1st quarter) is plotted. The windfall increase in serious delinquency rate of subprime loans, since 2006 (2nd quarter) is apparent. A slender increase in serious delinquency rate of prime loans since 2007 (4th quarter) is also evident.



Source : Historical Data, *National Delinquency Survey, 2006 Q4, 2009 Q1*, Mortgage Bankers Association

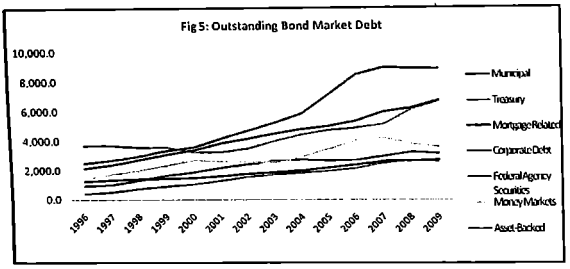
6. From 'Subprime' to 'Global'

In financial literature the spread of a crisis is termed the 'contagion' effect. Two specific kinds of 'contagion' effects have been identified. 'Direct contagion' involves co-movements in asset prices and other financial developments that reflect tangible and direct financial linkages. This creates serious impacts via trade relationships and consequentially a major banking crisis in one country results in losses for investors in other countries. The other, known as 'indirect contagion' is the residual category and includes all those channels that are not covered under direct contagion. Irrational panics and herding behaviour are essential aspects of this category and are more important in the era of instantaneous communication (Kamin & DeMarco, 2010). Karolyi (2003) referred to some other channels for the spread of a financial crisis. He argues that these channels are entirely rational, though not associated with the contagion effects discussed earlier. One of this is the 'wake-up call' hypothesis that has been referred as the main reason for the rapid spread of the Asian financial crisis (Goldstein, 1998).

Only the direct contagion effect of the subprime crisis has been considered in this paper though the magnitude of the crisis suggests that the indirect contagion and other transmission channels referred by Karolyi (2003) also played significant role in the transformation of the U.S. housing slump into a global financial crisis. This section deals in the mortgage related securities issued in the U.S. financial market along with the exposures of various countries to such securities. The simple proposition of this paper is that since the value of the mortgage backed securities became valueless owing to increasing default rates of the subprime mortgage loans, countries with more exposures to these toxic mortgage securities (subprime loans as the underlying asset) suffered more loss and thus the 'subprime' crisis spread like forest fire and resulted in a 'global' financial crisis.

An increasing proportion of the subprime mortgage loans were securitized as earlier pointed out. It is also evidenced that mortgage related securities which was $2486.1 billion in 1996 (20.27 per

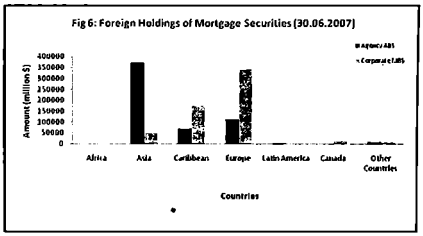
cent of the total bond market debt) increased moderately to $4127.4 billion in 2001 (21.97 per cent of the total bond market debt). Since then the share of outstanding mortgage related securities increased sharply to $ 8913.4 billion in 2007 representing 27.82 per cent of the total outstanding bonds issued in the U.S. economy[14]. Figure 5, represents an overview of the U.S. outstanding bond market during 1996-2009 (Annexure-Table 6). Significant increase in outstanding mortgage related securities since 2001 is apparent from Figure 5.



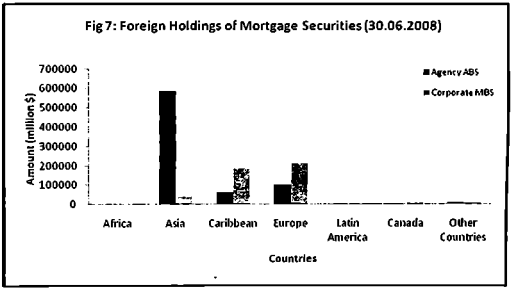
Source: U.S. Department of Treasury, Federal Reserve System, *Securities Industry and Financial Market Association.* Available at *www.sifma.org/research/pdf/overall_outstanding.pdf* (analyzed in Annexure-Table 6).

The mortgage related securities are mainly MBSs which are traded by the mutual funds, pension funds and hedge funds and sold all over the world to institutional investors as low risk (high investment grades) investments with attractive rate of return. Since these MBSs are held by institutional investors (worldwide) on a 'mark to market' basis, the default in underlying mortgage loans made these products valueless which led to huge losses. In 2008, foreign holdings of U.S. long term asset-backed securities (ABSs) were $1532210 million which comprised of $772538 million agency ABSs[15] and $759673 million corporate ABSs (of this $458374 million was MBSs) [Annexure-Table 7&8]. Thus, $1230912 million (agency ABS and corporate MBS) of the total foreign institutional investments was backed by mortgages (MBSs) which represented 80.34 per cent of the total ABSs issued in U.S. On analyzing the country wise break up of US mortgage bond holdings it is apparent that investments in agency ABSs are primarily held by Asian countries, in fact, increased from $373910 million (2007) to $587452 million (2008), while European countries invested primarily in corporate MBSs (Figures 6 and 7 below). There has been huge redemption of corporate MBSs held by the European countries during 2007-2008 as these reduced from $342011 million in 2007 to $215059 million 2008. Department of Treasury (2008) observes that Indian institutional investment in asset backed securities issued by U.S. agencies was merely $2 billion

dollars (2008) and was nil in corporate MBS. Thus, the subprime mortgage crisis which originated in the U.S. mortgage market transformed into a 'global' financial crisis but India remained insulated as its exposure to these toxic assets was very low.



Source: Report on Foreign Portfolio Holdings of U.S. Securities (2007). Department of Treasury, Federal Reserve Bank of New York, Board of Governors of the Federal Reserve System.

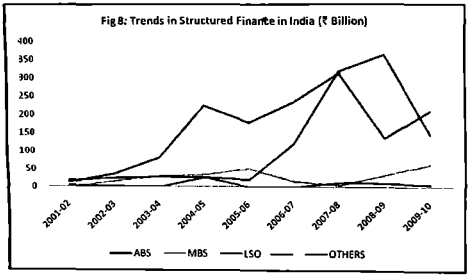


Source: Report on Foreign Portfolio Holdings of U.S. Securities (2008). Department of Treasury, Federal Reserve Bank of New York, Board of Governors of the Federal Reserve System.

7. Securitization in India

The inception of the Indian HFS is rather late in comparison to the U.S. system. In 1971, Housing and Urban Development Corporation (HUDCO) was started by Government of India (GOI) with the

objective of implementing social housing projects. Mortgage financing was initiated with the establishment of Housing Development Finance Corporation (HDFC), in 1977. In 1988, National Housing Bank (NHB) was started as a development finance institution to formally create a structured HFS in India. Mortgage finance was simply financial assistance by primary lending institutions for acquiring a house. These entities depended on traditional sources of finance for funding their housing loans as secondary mortgage market was absent in India prior to the year 2000. NHB, in partnership with HDFC and LIC Housing Finance Ltd, issued India's first MBS in August 2000 (The size of the transaction was '10.35 billion comprising 11106 individual housing loans of HDFC and LIC HFL). For enabling the securitization process 'The Securitization and Reconstruction of Financial Assets and Enforcement of Security Interest' (SARFAESI) Act was enacted in 2002. As observed in Figure 8, the proportion of mortgage backed securities was significantly low in comparison to the other structured finance instruments available in the Indian securitization loan market.



Source: website of various credit rating agencies

There have been some serious impediments to growth of secondary mortgage market in India. In the following lines some of the impediments have been outlined.

a) Lack of effective foreclosure laws prohibits the growth of securitization. In India the SARFAESI Act was enacted in 2002, prior to which the existing foreclosure laws were not lender-friendly and increased the risks associated with MBS.

b) The definition of 'securities' in the Securities Contracts (Regulation) Act (1956) did not cover pass-through certificates (PTCs)[16] which prohibited stock exchanges from listing these instruments.

c) Ambiguity under the SARFAESI Act regarding the formation of an SPV trust for securitization process[17]

d) The mortgage market in India is found to be dominated with ARM (popularly known as variable rate mortgages or VRM in India) which makes securitization difficult in absence of standardized products.

e) The PTCs have not been allotted the status of 'reserve' securities that encourage trading by commercial banks. This results insufficient liquidity support for secondary market trading of residential mortgage backed securities.

f) Credit rating of the individual borrower was absent in India. Though CIBIL has been started in 2004 which maintains database on all borrowers, similar to FICO in US, the process of information dissemination is not yet efficiently available.

g) In the Indian HFS there is a handful of housing loan originators and the investor base is also limited. Institutional investors are apprehensive about the quality of the MBSs and prefer government securities.

h) There are insufficient guidelines and accounting policies for treatment of the subordinate tranche on the originators balance sheet (both with respect to taxation and capital adequacy requirements).

These impediments, to the growth of secondary mortgage market, have insulated the Indian HFS from a housing market crisis and has actually helped policy makers to develop a fail-safe secondary market for free trading of the PTCs.

8. Conclusion

This paper appraises the transformation of the 'subprime' crisis into a 'global' financial crisis. The crisis which ensued in the subprime mortgage market due to sudden increase in delinquencies of subprime mortgage loans erupted into a much bigger crisis due to 'securitization'. The enormity of the crisis was due to the volume of issuance of MBSs and the domino effect of the crisis was due to investments made by banking and other financial institutions (worldwide) in these securities. India's exposure to US mortgage securities has been negligible. Further, the impediments in the Indian secondary mortgage market have stalled the growth of the MBSs market in India. This paper proposes that these impediments are boon in disguise as lessons can be taken from the U.S. mortgage market crisis in developing a fail-safe secondary market for trading of MBSs. First and foremost the PTCs should not be allowed to be traded in the stock exchanges and individual investors should be barred from trading in MBSs. Secondly, a tight regulatory check should be maintained by the NHB on the secondary market. Thirdly, role of HUDCO should be broadened to reduce housing shortage and easy loans (like the subprime loans or the Alt-A loans) should not be devised for extending financial assistance to financially-weak borrowers. Fourthly, NHB should keep better control on the rate of delinquencies on housing loan and should publish data on the delinquency rate like the National Delinquency Survey in U.S. It is also important that government does not make drastic changes in its monetary policies, especially to such sensitive issues like interest rate on which the mortgage market depends. Though the Indian mortgage market is far from a crisis in the nature of the subprime crisis, the above proposals may help the Indian housing finance industry reap the benefits of securitization at the same time remain insulated from the vagaries of securitization.

References

Baker, D. (2008). The Housing Bubble and the Financial Crisis, real-world economic review, issue no. 46. Center for Economic and Policy Research, USA. Available at www.sbilanciamoci.info/content/download/248/1707/file/Baker46.pdf.

Buckely, R.M. and Kalarickal. (ed.) (2006). "Thirty Years of World Bank Shelter Lending: What have we learned?", *World Bank*, Available at http://siteresources.worldbank.org/Resources/339552.11531631005 18/Thirty_Years_Shelter_Lending.pdf.

Chiquier, L., Hassler, O. and Lea, M. (2004). "Mortgage Securities in Emerging Markets", *Financial Sector Operations and Policy Department, The World Bank*, World Bank Policy Research Working Paper 3370.

Chomsisengphet, S. and Pennington-Cross, A. (2006). "The Evolution of the Subprime Mortgage Market", Federal Reserve Bank of St. Louis Review, January/February, 88(1).

Department of Treasury (2007). Report on Foreign Portfolio Holdings of U.S. Securities, *Federal Reserve Bank of New York*, Board of Governors of the Federal Reserve System.

Department of Treasury (2008). Report on Foreign Portfolio Holdings of U.S. Securities, *Federal Reserve Bank of New York*, Board of Governors of the Federal Reserve System.

Frankin, A. and Gale, D. (2007). *Understanding Financial Crises*, Oxford University Press, New York.

Goldstein, M. (1998). "The Asian Financial Crisis," Peterson Institute for International Economics, Policy Brief 98-1, March.

Kamin, S.B. and DeMarco, L.P. (2010). "How did a domestic housing slump turn into a global financial crisis?", International Finance Discussion Papers, Board of Governors of the Federal Reserve System, 994, Available at http://ssrn.com/abstract=1585195.

Karolyi, G. (2003). "Does International Financial Contagion Really Exist?", International Finance, 6(2).

Lea, M. (1996). "Innovation and the cost of Mortgage Credit: A Historical Perspective", *Housing policy Debate* Fannie Mae Foundation 1996, 7 (1).

Lea, M. (1998). "Models of Secondary Mortgage Market Development," in M. Watnabe, ed. *New Directions in Asian Housing Finance*, International Finance Corp.

Lehnert, A. (2005). Overview of US mortgage markets, BIS Quarterly Review. Available at www.bis.org/publ/wgpapers/cgfs26lehnert.pdf.

Renaud, B. (1999). The Financing of Social Housing in Integrating Financial Markets: A View from Developing Countries, *Urban Studies*, *36*(4):755–73.

White, B.T. (2010). "Underwater and Not Walking Away: Shame, Fear and the Social Management of the Housing Crisis", *Arizona Legal Studies, The University of Arizona, Discussion Paper No.* 09-35.

Endnotes

1 The term 'HFS' refers to a financial service delivery system in which various intermediaries compete in performing three main functions: funding, lending, and servicing of housing loans.

2 The sale of entire pool of housing loans were popularized by saving and loan associations in the US during 1960s and 1970s.

3 The GSEs (Fannie Mae, Freddie Mac, Ginnie Mae and Federal Home Loan Banks) are government

chartered, limited purpose corporations at secondary (i.e., not the loan origination) level. They enjoy a number of tax and regulatory privileges that translate into lower funding costs (Lea, 1999).

4 The 3-6-3 rule states that the managers of HFIs followed a simple strategy; they took finance at 3%, lent at 6% and went to play golf at 3 P.M.

5 Bullet Payment refers to lump sum payment of principal amount outstanding at the end of the loan tenure and regular payment of interest during the tenure of the loan.

6 The savings and loan associations of US and the building societies of UK are commonly known as thrifts. In US, the conventional loans of the thrifts are not insured by FHA and are therefore called privately insured loans (as they are often provided insurance by private insurance companies) where as those originated by commercial banks and mortgage banks are insured by FHA and securitized through the Fannie Mae.

7 St. Germain Depository Institutions Act of 1982 [Specifically, Title VIII—the 'Alternative Mortgage Transaction Parity Act of 1982', Sec.803 (A)] introduced mortgages 'in which the interest rate or finance charge may be adjusted or renegotiated' which is better known as the adjustable-rate mortgage (ARM).

8 Tranches are categories within a collaterized debt obligation on the basis of varying degree of riskiness of the mortgage backed security. The categorization is made on the priority in payment of principal and Interest.

9 In the United States, the federal funds rate is the interest rate at which private depository institutions (mostly banks) lend fund balances (federal funds) with the Federal Reserve to other depository institutions, usually overnight. It is the interest rate which banks charge each other for loans. (*http://en.wikipedia.org/wiki/Federal_funds_rate*).

10 Baker (2008) referred the wealth accumulated through increase in stock price as 'stock wealth'.

11 The teaser rate ARM are adjustable rate mortgages on which the initial coupon rate of interest is significantly low and the interest rate is realigned to the market rate of interest on the reset date (which is typically 2/3 years later).

12 This quarterly report is published by Mortgage Bankers Association (*www.mortgagebankers.org/research*). For this paper National Delinquency Survey (Q1, 2009) has been referred.

13 Serious delinquency rate means the percent of housing loans on which installments is past due for more than ninety days plus inventory of housing foreclosures during the quarter.

14 Data is available from US Department of Treasury, Federal Reserve System, Dealogic, Thomson Financial, Bloomberg, Loan Performance, SIFMA. *(www.sifma.org/research/pdf/overall_outstanding.pdf)*

15 Securities issued by Fannie Mae, Ginnie Mae and Freddie Mac are called Agency ABSs. These are necessarily backed by mortgage loans and may be classified as MBSs. Thus agency ABSs is considered as mortgage securities. For a detailed analysis see Table 5 and Table 6 of Annexure.

16 Pass through securities are specific kind of mortgage backed securities used in India.

17 This ambiguity has been resolved as the Reconstruction Companies (ARCs) and Securitization Companies (SCs) registered with the RBI has been allowed to establish multiple SPV Trusts, through specific provision incorporated in 7 (2A) of the SARFAESI Act (2002).

Annexure

Table-1 : Bond Yields and Interest Rates [percent per annum]

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Hom Mortgage	10.05	9.32	8.24	7.20	7.49	7.87	7.80	7.71	7.07	7.04	7.52	7.00	6.43	5.80	5.77	5.94	6.63
Yield Fed Fund Rates	8.10	5.69	3.52	3.02	4.21	5.83	5.30	5.46	5.35	4.97	6.24	3.88	1.67	1.13	1.35	3.22	4.97

Source: Economic Report of the President available at http://www.gpoaccess.gov/eop/2011/pdf/ERP-2009.pdf [Table 73, Bond yields and Interest rates,1929-2008 (in Per cent)

Table 2 : S&P Case Shiller Index

Year (Quarter)	S&P/ Case Shiller Index
2002 Q1	118.00
2007 Q1	184.83
2002 Q2	122.24
2007 Q2	183.17
2002 Q3	126.13
2007 Q3	180.01
2002 Q4	128.58
2007 Q4	170.75
2003 Q1	130.48
2008 Q1	159.36
2003 Q2	134.20
2008 Q2	155.93
2003 Q3	138.41
2008 Q3	150.48
2003 Q4	142.29
2008 Q4	139.42
2004 Q1	146.26
2009 Q1	129.20
2004 Q2	152.92
2004 Q3	158.53
2004 Q4	163.06
2005 Q1	169.19
2005 Q2	176.70
2005 Q3	183.08
2005 Q4	186.97
2006 Q1	188.66
2006 Q2	189.93
2006 Q3	188.11
2006 Q4	186.44

Source : *http://www.macromarkets.com/csi_housing/sp_caseshiller.asp*

Table-3 : New private housing units started, authorized, and completed and houses sold, 1962-2009 (thousands)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Units Started	1192.7	1013.9	1199.7	1287.6	1457.0	1354.1	1476.8	1474.0	1616.9	1640.9	1568.7	1602.7	1704.9	1847.7	1955.8	2068.3	1800.9	1355.0	905.5	553.8
Units Authorized	1110.8	948.8	1094.9	1199.1	1371.6	1332.5	1425.6	1441.1	1612.3	1663.5	1592.3	1636.7	1747.7	1889.2	2070.1	2155.3	1838.9	1398.4	905.4	572.2
Units Completed	1308.0	1090.8	1157.5	1192.7	1346.9	1312.6	1412.9	1400.5	1474.2	1604.9	1573.7	1570.8	1648.4	1678.7	1841.9	1931.4	1979.4	1502.8	1119.7	796.0
Units Sold	534	509	610	666	670	667	757	804	886	880	877	908	973	1,086	1,203	1,283	1,051	776	485	374

Source : Economic Report of President available at http://www.gpoaccess.gov/eop/2011/pdf/ERP-2009.pdf, [Table B-56. New private housing units started, authorized and completed and houses sold, 1962-2009]

Table 4 : Delinquencies

	Prime Loans (Seriously Delinquent) %	Subprime Loans (Seriously Delinquent) %
2004 Q1	0.81	7.72
2002 Q1	0.80	11.81
2002 Q2	0.78	11.63
2002 Q3	0.80	11.92
2002 Q4	0.86	11.49
2003 Q1	0.84	10.48
2003 Q2	0.82	10.35
2003 Q3	0.83	9.10
2003 Q4	0.87	8.33
2004 Q1	0.81	7.72
2004 Q2	0.77	7.05
2004 Q3	0.78	6.47
2004 Q4	0.80	6.52
2005 Q1	0.73	5.96
2005 Q2	0.69	5.81
2005 Q3	0.71	5.68
2005 Q4	0.86	6.32
2006 Q1	0.77	6.22
2006 Q2	0.75	6.24
2006 Q3	0.79	6.78
2006 Q4	0.86	7.78
2007 Q1	0.89	8.33
2007 Q2	0.98	9.27
2007 Q3	1.31	11.38
2007 Q4	1.67	14.44
2008 Q1	1.99	16.42
2008 Q2	2.35	17.85
2008 Q3	2.87	19.56
2008 Q4	3.74	23.11
2009 Q1	4.70	24.88

Source : *Inside Mortgage Finance, The 2007 Mortgage Market Statistical Annual, Key Data (2006), Joint Economic Committee (October, 2007)*

Table 5 : Mortgage Originations and Subprime Securitizations

Year	Total Mortgage Originations (Billions)	Subprime Originations (Billions)	Share of Subprime in Total Originations (%)	Subprime Mortgage Backed Securities (Billions)	Share of subprime mortgages securitized (%)
2001	2215	190	8.58%	95	50.00%
2002	2885	231	8.01%	121	52.38%
2003	3945	335	8.49%	202	60.30%
2004	2920	540	18.49%	401	74.26%
2005	3120	625	20.03%	507	81.12%
2006	2980	600	20.13%	483	80.50%

Source : *Inside Mortgage Finance, The 2007 Mortgage Market Statistical Annual, Key Data (2006), Joint Economic Committee (October, 2007)*

Table 6 : Outstanding US Bond Market Debt $ Billion

Year	Municipal	Treasury	Mortgage Related	Corporate Debt	Federal Agency Securities	Money Markets	Asset-Backed	Total
1996	1261.6	3666.7	2486.1	2126.5	925.8	1393.9	404.4	12265.0
1997	1318.7	3659.5	2680.2	2359.0	1021.8	1692.8	535.8	13267.8
1998	1402.7	3542.8	2955.2	2708.5	1302.1	1977.8	731.5	14620.6
1999	1457.1	3529.5	3334.3	3046.5	1620.0	2338.8	900.8	16227.0
2000	1480.5	3210.0	3565.8	3358.4	1853.7	2662.6	1071.8	17202.8
2001	1603.6	3196.6	4127.4	3836.4	2157.4	2587.2	1281.2	18789.8
2002	1763.0	3469.2	4686.4	4132.8	2377.7	2545.7	1543.2	20518.0
2003	1876.8	3967.8	5238.6	4486.4	2626.2	2519.9	1693.7	22409.4
2004	2000.2	4407.4	5862.0	4801.7	2700.6	2904.2	1827.8	24503.9
2005	2192.1	4714.8	7127.7	4965.8	2616.0	3433.7	1955.2	27005.3
2006	2363.5	4872.3	8452.8	5344.6	2651.3	4008.8	2130.4	29823.7
2007	2580.1	5081.5	8931.4	5946.8	2933.3	4172.0	2472.4	32117.5
2008	2635.3	6082.2	8897.3	6205.1	3207.8	3791.7	2671.8	33491.2
2009	2669.9	6630.8	8856.8	6722.9	3141.4	3580.3	2598.6	34200.7

Source : *www.sifma.org/research/pdf/overall_outstanding.pdf*

Table 7 : Foreign holdings of U.S. long term asset-backed securities as on June 30, 2008 ($ Billions)

Region	Total Long Term ABS	Agency ABS	Corporate ABS		
			Total	MBS	Non-MBS
Africa	304	67	237	43	194
Asia	676088	587452	88636	40623	48014
Caribbean	295319	64815	230504	186613	43891
Europe	515494	103945	411549	215059	196490
Latin America	7005	4101	2904	327	2577
Canada	16752	1561	15191	8098	7093
Others	21248	10597	10651	7611	3040
Total	1532210	772538	759673	458374	301299

Source: Report on Foreign Portfolio Holdings of U.S. Securities (2008). Department of Treasury, Federal Reserve Bank of New York, Board of Governors of the Federal Reserve System.

Table 8 : Foreign holdings of U.S. long term asset-backed securities as on June 30, 2007 ($ Billions)

Region	Total Long Term ABS	Agency ABS	Corporate ABS		
			Total	MBS	Non-MBS
Africa	404	67	337	117	221
Asia	454017	373910	80106	51442	28664
Caribbean	295690	69534	226156	179885	46271
Europe	670408	112584	557824	342011	215813
Latin America	6538	3377	3160	376	2784
Canada	23046	1084	21962	10606	11356
Others	21841	9168	10651	9298	3377
Total	1471944	569724	902220	593735	308486

Source : Report on Foreign Portfolio Holdings of U.S. Securities (2007). Department of Treasury, Federal Reserve Bank of New York, Board of Governors of the Federal Reserve System.

Table-9 : Trends in Structured Finance in India (Rs. Billion)

Type	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
ABS	12.9	36.4	80.9	222.9	178.5	234.2	313.2	135.8	209.7
MBS	0.8	14.8	29.6	33.4	50.1	16.1	5.9	32.9	62.5
CDO/LSO	19.1	24.3	28.3	25.8	21	119	318.2	364.4	145.8
OTHERS	4	2.3	0.5	26	–	–	13	11.6	7.9
TOTAL	36.8	77.8	139.3	308.1	249.6	369.3	650.3	544.7	425.9

Source : Websites of various rating agencies, ICRA, CRISIL, etc.