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Gaping Fault Lines in the Global Financial Stability Architecture: Lessons from the US Sub-Prime Crisis*

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The US sub-prime crisis has been a prime revelation of monumental failure by every responsible agent in the market, starting from macroeconomic policy makers, to regulators, to rating agencies, to international standard setting bodies to even the smartest of all investment bankers. This paper aims at identifying the key unpleasant policy challenges that have surfaced in the aftermath of the crisis, while also trying to decipher the sub-prime black box. In the process of documenting the wide ranging and thought provoking post-crisis suggestions from the scattered literature, the paper highlights the gaping fault lines in the existing global financial stability architecture.

Keywords: Sub-prime Crisis, Housing/Mortgage Finance, Financial Stability, Financial Crisis

1. INTRODUCTION

The global economy in 2008 came under severe pressures from simultaneous occurrence of an energy crisis, a food crisis, and the sub-prime related financial crisis. While the first two contributed significantly to the worsening inflationary conditions all over the world, the financial crisis dented the confidence on the global financial system and also triggered a global economic slowdown. The sub-prime crisis in particular has been a prime revelation of monumental failure by every responsible agent in the market, starting from macroeconomic policy makers, to regulators, to rating agencies, to international standard setting bodies to even the smartest of all investment bankers. The toxic waste in the sub-prime mortgage sector has contaminated the entire global financial system, and the magnified impact is being seen increasingly as the worst financial crisis in last 60 years. The initial estimated loss for the banking system, which was about USD 50 billion in mid 2007 as per the Fed, increased to USD 400 billion by February 2008 as revealed during the G-7 Finance Minister's meet in Tokyo, and escalated further to about USD 945 billion by April 2008, and then to USD 1405 billion in October 2008 (according to Global Financial Stability Reports of the IMF). Assuming that banks operate with a leverage of about 8 to 10 on their capital, pessimistic outlooks suggest that sharp erosion in banks' capital arising from such large losses could translate into a severe credit squeeze of close to several USD trillions, notwithstanding the fact that most of the affected international banks have succeeded in bolstering their capital since the onset of the crisis. The severe credit squeeze, and the snowballing depression in market confidence also translated into sharp corrections in stocks prices by October 2008,

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and the aggregate wealth loss from the depressed stock and housing markets could have easily run into several trillions of dollar. The end result has been clear signs of a serious global recession, with frequent comparative references being made to the great depression of 1930s.

The myth of increasing resilience of the financial systems, because of sound supervision and prudential regulations, better distribution of risk and hedging of risk in the derivatives markets, and improvements in risk assessment and management capabilities of banks, has been seriously exposed. Irrational complacency of the lenders, irrational exuberance of the investors driven by greed, and growing market indiscipline under the shadow of thick information fog all around, have been compounded by irresponsible ratings that make even toxic garbage look gold, in addition to the moral hazard associated with "Greenspan Puts"- which aim at preserving the status of capitalism as a perpetual winner, even under conditions of severe stress.

The learning curve that may emerge from *post facto* analyses of this sub-prime crisis could be particularly useful for all policy makers around the world, who in fact are expected to remain ahead of the curve all the time to be able to ensure stable and resilient financial systems. This paper aims at identifying certain unpleasant questions, which policy makers have preferred to gloss over in the past, and at times even dubbed as relevant only for academic debate. These unpleasant issues explain the gaping fault lines in the existing global financial stability architecture. Section-II of this paper narrates the changing nature of the housing finance market – from "originate and hold" pattern to "originate to distribute" motive – so as to explain how a problem starting in a small segment of bank lending could affect the entire financial system. Extending the discussions presented in Section-II, Section-III documents in brief the "the contamination channel," to give an impression about the sequence of events that gave rise to the global market swoon. Section-IV outlines the list of unpleasant policy issues that have come to the forefront from the analyses of the crisis related black box so far. Some concluding observations are presented in the final section.

2. SECTION-II: CHANGING DYNAMICS OF HOUSING FINANCE FROM 'ORIGINATE AND HOLD' TO 'ORIGINATE AND DISTRIBUTE'

Under any conventional banking arrangement, when a bank originates a housing loan, it has to assume the credit risk (*i.e.* the risk of borrower default), the market risk (*i.e.* the risk of interest rate changing over the tenure of the loan), and the liquidity risk (since long term illiquid housing loans could be issued against liquid deposit liabilities). Prior to 1938, the mortgage financing structure in the US was almost entirely of the "originate and hold" variant. With the advent of Fannie Mae in the housing market scene in 1938, as a matter of Government policy, the focus shifted to creating a secondary market in mortgages. Fannie Mae started buying mortgages from banks and other originators, which allowed banks to shift credit risk, market risk and liquidity risk to Fannie Mae (Randall, 2007). Because of longer-term liabilities of Fannie Mae (unlike short-term deposit liabilities of banks), it was better suited to manage liquidity and market risk. It managed the credit risk through diversified large volume of mortgages, as well as its policy of buying only such mortgages that conformed to certain underwriting standards (conforming mortgages were equivalent of prime mortgages). Thus, there was little scope for sub-prime mortgages to be shifted from the books of banks.

In 1968, the activities of Fannie Mae were privatized and de-linked from the Federal budget, and the emphasis shifted to mortgage backed securities (MBSs), which intended to help Fannie Mae shift credit, market and liquidity risk to the market by pooling mortgages, securitising them and then selling those in the market. The MBSs derived their value from the cash flows associated with the pool of mortgages. In 1970, Freddie Mac arrived on the scene, to give competition to the privatized Fannie Mae, while also providing further boost to MBSs market. Large percentage of 'prime' home loans, thus, could be securitised and sold as MBSs in the market through these two institutions. Thus, the housing finance market was on a transition from "originate and hold" to "originate and distribute." Banks and other originators of housing loans, thus, could first shift the loan from the balance sheet, and at the same time also invest in MBSs. With large institutional buyers of MBSs, they were relatively more liquid than any housing loan held on banks' balance sheet. While issuers of MBSs could earn underwriting fees, Freddie Mac and Fannie Mae, by guaranteeing the securities, could earn guarantee fees. The Wall Street investment bankers and insurers noticed the scope for making fortunes from underwriting fees and guarantee fees, and as a result, the MBSs market structure started to change.

From 2003 in particular, private banks became the major issuer of MBSs/ABSs (Asset backed securities), and the underwriting standards also started to fall as MBSs were issued against high risk sub-prime mortgages and 'Alt-A' mortgages (which are less risky than sub-prime mortgages but riskier in relation to prime mortgages). Given the high risk of sub-prime mortgage backed securities, it became a challenge to get buyers for such securities. The creative minds in finance found two innovative ideas to get out of the logjam; the Collaterised Debt Obligations (CDOs) and the support of good rating. Because of the CDOs, sub-prime loans could be pooled together and then sliced into different tranches of risk-return profile, with the "senior tranche" having the first claim on the payments associated with the pool of sub-prime mortgages, and also receive the highest investment grade rating, which is a reflection of low risk of the senior tranche. "Mezzanine tranche" comes next, with much greater risk and return in relation to the senior tranche, and hence also carries below investment grade ratings. The "equity tranche," the third and final layer in the slicing, is the most risky and generally carries no rating. Default on the underlying pool of MBSs would imply maximum loss to the equity tranche. In the absence of default, however, the return on the equity tranche will be the highest. The risk transformation through CDOs of mortgage backed securities, however, entails the risk of 'information fog' (*i.e.* other than rating, no information to assess the risk exposure), 'illiquidity' (in the absence of exchange traded secondary market for CDOs), and 'shady valuation' (where the valuations are marked-to-model, or rather marked-to-myth, as viewed by Warren Buffet, rather than marked-to-market).[1] Because of the slicing of risk, and stratified assignment of ratings, however, CDOs could be marketed to investors having different appetite for risk. Investors looking to maximize yield with higher risk exposure get the equity tranche of the CDOs. Hedge funds, which operate with high leverage and search for high returns, could often build up large leveraged positions in the equity tranche of the CDOs, and in the eventuality of rising default on underlying sub-prime loans, could suffer heavy losses that may wipe out their entire

[1] The asymmetric information (or the Ackerlof's lemon) problem could be at its best in the case of CDOs, with buyers having absolutely no information about the underlying risk and blindly believing in ratings, while the seller taking advantage of this to sell high risk underlying assets as low- risk highly rated assets.

capital. (Assuming a leverage of 6 times, with a capital of USD 100 million, USD 600 million portfolio of CDOs could be built up, and if the value of CDOs falls by about 20 percent because of the default in the underlying MBS, then that cloud drive the hedge fund to insolvency. In reality, the value of the CDOs fell by as high as 60 percent, with a recovery rate of less than 40 cents on a dollar, and at times even that was difficult). Hedge funds create leverage by borrowing against the assets they add to their investment portfolio (like CDOs and MBS), and in a falling market and the associated decline in the value of the collaterals, the Hedge Funds face margin calls (or hair cuts) from brokers (*i.e.* demand for more assets to back the leverage). Fire sale in a market condition of no buyer for such papers could only increase the losses.[2] Hence, the other option was to default.

How then the banks got affected so much by developments taking place in the CDOs/MBSs market? It is because banks' balance sheets had remained exposed to the sub-prime market developments indirectly, through a number of SIVs (Structured Investment Vehicles) or conduits they had sponsored off balance-sheet, who (particularly SIV-lites) were investing in CDOs/MBSs by borrowing in the short-term commercial paper (CP) market. They had been making decent profits by running liquidity mismatch, with little capital devoted for such activities, which could not have been possible for on-balance sheet positions. Bank-sponsored off-balance sheet SIVs and their transactions, thus, are often seen as reaction of banks to the capital adequacy requirement of Basel-I[3] (besides their other reactions in the form of use of securitization of loans as well as buying protection in the CDS market to shift risk to the market, and thereby free capital for further expansion of the balance sheet). The credit bubble, thus, was partly in response to Basel-I, which allowed a process of continuous shifting of risk to the market, and then free capital on-balance sheet for more lending; this created a "shadow banking system," which remained almost completely unregulated.

With the fast growth in SIVs, and markets for ABSs, MBSs, CDOs and CDSs, the shadow banking system fuelled a credit bubble that went largely unnoticed by the conventional indicators of money and credit. The SIVs, with little capital, could use high leverage by borrowing short in the CP market (often using the reputation of the sponsored Wall Street banks), and then invest in CDOs/MBSs. They were, thus, exposed to the dual risk of liquidity (*i.e.* inability to roll over the short-term borrowings from the CP market) and credit (*i.e.* the risk of fall in the value of CDO portfolio), even though some of the SIVs had hedged part of their credit risk by buying protection/insurance, which in fact subsequently affected the credit default swap (CDS) market. The Asset Backed Commercial Paper

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[2] Two hedge funds of Bear Sterns had large-scale leveraged exposure to CDOs. When the sub-prime default concerns gripped the market, the values of the CDOs were marked down, requiring the hedge funds to meet the margin calls. Investors in the Hedge Funds recognized the potential for loss, and suddenly asked them to return their invested amount. For the hedge funds the options were to either borrow more (which was difficult and costlier in the face of credit squeeze) and repay the impatient investors, or to go for fire sale (of CDOs at falling value) and face the investors call on their investment with them. The more extreme option was to freeze redemption (*i.e.* not to pay the investors back on demand). Bear Stern's share prices fell by 30% as it closed down the two hedge funds and took a loss of USD 1.5 billion (*The Wall Street Journal*, November 2-4, 2007, pp. 12-13). Subsequently it had to be completely bailed out by the Fed, and taken over by JP Morgan.

[3] John Plender explains how "Basel Accord sits at the root of the ongoing banking crisis," *Financial Times*, November 7, 2007, p. 30.

(ABCP) market also reacted to the falling value of toxic assets by declining access to new borrowings/roll over of maturing CPs, with CP interest rates also rising considerably. The lending squeeze in a tense CP market turned the market sentiment from greed to fear. Losses of SIVs were effectively contingent liabilities for the sponsoring banks, which were not recognized before the crisis. With inability to rollover maturing CPs, the only options left for the SIVs were to either get substantial liquidity support from the sponsoring banks, or to go for fire-sell of their assets (*i.e.* CDOs/MBSs) in an already falling market. Leading Wall-Street banks, after initial hesitation, felt it as appropriate to take the off-balance sheet losses on-balance sheet, which in turn created concerns about their 'capital adequacy' and 'earnings' – the two most important indicators of financial soundness.

As the CDO market started to wilt, it had its repercussions on the USD 50 trillion CDS market as well, since many had hedged their risk exposure in the CDO market by taking protection in the CDS market. With no buyers for CDOs, the "originate to distribute" model also chocked. Banks had been using CDS as another means to shift risk from their balance sheet (besides securitization), and as the CDS spreads started rising under the credit squeeze, the cost of protection against default also started to become expensive. As a mid 1990s innovation, CDS offered an opportunity to bankers to hedge their on-balance sheet risk. A bank could pay an annual premium (CDS spread) while buying insurance protection underlying a CDS from the protection seller, to ensure full repayment of principal and interest to the bank in the eventuality of an actual default by the borrower of the bank. In a low default market environment (as was the case before the sub-prime crisis), the sellers of CDS could make money, and the CDS spreads may also remain low. With sudden change in market conditions, however, the sellers of the protection had to bear the brunt, and the premium charged (or CDS spread) for protection also rose significantly. One particularly notable, and in some sense worrisome aspect of the CDS market is that even though it started as a hedging instrument, soon it acquired the status of heaven for speculative trading.

Investors could buy and sell CDS, as equivalent of selling and buying a bond. An investor, for example, who may be optimistic about the outlook of a company, instead of buying the bonds of that company, could as well sell CDS, and thereby get regular premium income, which could be a strong source of profit in a low default regime. Similarly, another investor, who has a pessimistic view about the same company, could sell the bond of that company, or as well buy a CDS, which will protect him against the ramifications of a default on the bond. Thus, CDS not only emerged as a substitute for any bond for investment and trading, but rather it offered the opportunity for magnifying the market size significantly in relation to the underlying bonds or loans. The size of the bond market could grow only in relation to the demand for financing from corporates. But the demand of speculators to trade in credit is several times that of the needs of the corporates for funds through issuance of bonds. CDS had to meet this demand, and being a largely unregulated market, there was little restriction to stem the mushrooming growth of the CDS market to more than 10 times the size of the bond market.[4] (CDSs effectively are like insurance, but they are designed as

[4] A Dublin based venture, named Structured Credit Company (SCC), with no ratings, that started operations in 2006 with a capital of just USD 200 million, wrote default protection on USD 5 billion equivalent of credit risk, and the buyers of such credit protection included leading names like Merrill Lynch, Morgan Stanley, Bear Stearns, Deutsche Bank and HSBC, who completely neglected the counterparty risk while buying protection from a new unrated venture like SCC. As SCC came under the pressure of rising CDS spreads, its clients who had bought protection from it could get only 5

swaps – with one paying regular premium and the other paying only in case of default – and hence, they are not as tightly regulated as insurance.) Because of the nature of the derivative market, if there is any default in the underlying instrument, the final impact on the market could be large. For example, on an outstanding corporate bond size of USD 1 billion, CDS contracts worth USD 10 billion could be written. If such a company defaults, and if the market value of USD 1 bond falls to 60 cents (implying a recovery rate of 60 percent and loss of 40 percent), then the bondholders may loose USD 400 million, but in the CDS market the loss for the sellers of loss protection could be as large as USD 4 billion.

The ease at which CDS contracts could be created was the most worrisome part of the market.[5] With growth in demand for speculation in credit derivatives, trading in CDS indices (as against individual underlying bonds) became popular. iTraxx in Europe and CDX in the US emerged as the two well-known CDS indices, and spreads on these two indices are closely watched to monitor the credit market. The CDS spreads widened considerably after the sub-prime crisis. For example the iTraxx crossover spread (which tracks the cost of purchasing protection against default of a basket of 50 sub-investment grade European corporate names) rose from around 200 basis points to more than 600 basis points (implying it could cost 600,000 euros to insure against the default of 10 million euros). With rising concerns about default, the sellers of protection were exposed to large scale losses.[6]

Banks which were exposed to un-hedged CDOs/MBS, had to take on the assets of the battered SIVs on-balance sheet with large write-offs, having associated implications for their earnings and capital. In respect of the hedged part of the exposure, the performance of the sellers of insurance protection could further increase the pressure on banks. Insurance by nature is a zero sum financial game; if the insurers honour the claims of those insured, then they absorb part of the burden from banks. But if (thinly capitalized) insurers fail to honour the claims, then the impact on the buyers of protection (like banks) could increase further. The banks, thus, started realizing the risk of double default, *i.e.* first on the un-hedged

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percent of what actually SCC owed to them, resulting in total losses of close of USD 250 million for the leading banks (Source: Robert Cookson, Sarah O'Conner and Paul J. Davies, "Painful lessons to be learnt for CDSs," *Financial Times*, January 11, 2008, p. 27).

[5] As outlined by Gillian Tett and Paul J Davis, credit derivatives do not face the same constraints as the bond market because "… If investors want to trade more contracts, bankers can simply create them by pressing a few computer keys (always assuming that a buyer and seller can agree on price, limited only by investors' appetite for risk). CDS thus offer bankers a 21st century cyber-heaven: a virtual financial world that can be conjured up by traders rather than tangible companies themselves." (Source: "How a market storm has seen derivatives eclipse corporate bonds," *Financial Times*, August 8, 2007, p. 7).

[6] According to Bill Gross of Pimco (world's largest Bond Fund), given the CDS market size of USD 45 trillion, if the corporate default rate (comprising all bonds and loans, and not only sub-prime) returns from the current low levels to the normal level of 1.25 percent, then USD 500 billion worth of CDS insurance could be triggered, and assuming a recovery rate of 50 percent on the defaulted papers, the sellers of protection may have to bear an estimated loss of USD 250 billion (Source: Investment Outlook, January 2008, www.pimco.com). Robert Pickel, however, viewed that net exposure (of about USD 1 trillion) is more relevant than gross exposure of USD 45 trillion for estimating the losses, and assuming a higher default of 2 percent and lower recovery rate of 25 percent, the losses could be about USD 15 billon (Source: "Net exposure is the best guide to derivatives' market impact," *Financial Times*, January 29, 2008, p. 26).

CDOs/MBSs exposures because of the fall in value, and second by even the sellers of insurance protection on the hedged part of CDOs/MBSs and other loans.

The performance of 'monolines' (*i.e.* those selling insurance against default on bonds), thus, came to a sharper focus during the sub-prime crisis. Banks exposed to the CDOs/MBSs market initially avoided taking the full impact of fall in the prices of these toxic papers in the form of write offs, because part of the exposure had been insured by monolines. If the monolines also default, there was the risk of forced recognition of more write offs on not only the CDO/MBS exposure, but also other bonds and loans in their asset portfolio against which banks had bought insurance. Monolines, when they started, had the primary goal of making municipal bonds marketable. As tax free bonds, they were more attractive in any case, but because of the unknown default risk, there was a need for some guarantee ensuring payment of interest and capital on these bonds, and monolines did exactly that in exchange for annual insurance premium. Municipal bonds benefited from the AAA ratings of monolines, and in turn, monolines had to only manage a good rating to earn regular premium income, at the risk of guaranteeing large amount of bonds against thin capital. The high leverage of monolines is evident from the fact that they used to guarantee bonds that could be 150 times (in value terms) of their capital. Default spreads for monolines increased significantly after the sub-prime crisis (almost close to 1000 basis points), and the risk of rating downgrades affecting the entire CDS market, and associated need for taking more write-offs on-balance sheet of banks, led to further tightening of the credit squeeze.

3. SECTION-III: THE MARKET SWOON – EXPLAINING THE CONTAMINATION CHANNEL

How problems that started in a small segment of bank lending could contaminate the whole financial system with such severe consequences for the global economy? A brief narration of the sequence of events could explain the "contamination channel."

The sharp reduction in US Fed Funds Target Rate from 6.5 per cent to 1 percent (over mid-2000 to end of 2003) created a liquidity glut, which, along with large capital inflows into the US driven by the global savings glut made access to credit easy, even for the sub-prime borrowers. Easy access to funding at low cost encouraged use of high leverage, and constant search for higher returns. Mortgage lenders, including banks, started to lend heavily to sub-prime borrowers (with sketchy credit histories), using 2/28 type attractive teasers, under which borrowers may have to pay low starting interest rates for first 2 years, and then for the remaining 28 years the interest rates could be 3 percentage points higher than the rate applicable to a prime customer (known commonly as adjustable rate mortgages or ARMs). Sub-prime loan originations increased from just about USD 52 billion in 2001 to about more than USD 400 billion in 2005 as well as in 2006.[7] As per the 20-city average S&P Case-Shiller residential housing price index, house prices in the US rose by more than 125 percent between 1997 and 2006. Rising house prices created the impression of rising value of the collateral, and correspondingly there was significant erosion in credit standards.[8] To a large

[7] *The Wall Street Journal*, August 7, 2007, p. 32.

[8] According to *The Wall Street Journal*, August 7, 2007, p. 32, "about 45 percent of all sub-prime loans in 2006 went to borrowers who did not fully document their income, making it easier for them to overstate their creditworthiness." Moreover, certain mortgage underwriters used "cut and paste"

extent, this trend in falling credit appraisal standards coincided with the rising tendency among banks to: (a) shift risks from balance sheet to the market through securitisation, and (b) take risks indirectly through off-balance sheet conduits or SIVs. Those originating sub-prime loans were motivated by constant demand for feeding the market for mortgage backed securities, and the easy scope for shifting of risk to the market through securitisation implied little sense in devoting time and resources for sound credit appraisal. Issuance of structured products (comprised of CDOs, ABSs and MBSs) exceeded USD 2.5 trillion in 2006,[9] and issuance of residential mortgage backed securities (RMBS) touched USD 800 billion in 2006 from just about USD 100 billion in 2001.[10] The shares of sub-prime and Alt-A (which are inferior to prime mortgages but better than sub-prime) in total RMBS rose sharply from less than 10 percent in 2001 to close to 40 percent in 2006. Bank sponsored conduits (SIVs/SIV-lites together) had built up such assets comprising structured products of about USD 1400 billion by 2006, with exposure to toxic CDOs of close to about USD 400 billion, mostly funded by the ABCP market. The ABCP market grew to USD 1200 billion by mid 2007, three times of what it was in 2002.[11]

The Fed Funds Target Rate was raised sharply from 1 percent to 5.25 percent between mid-2004 and mid-2006, and then remained at that level till the crisis surfaced in mid-2007. While housing prices started to decline somewhat in 2007 (though still not significant, and just by about 6 percent as per the Case-Shiller Index), rising interest rates started affecting the sub-prime Adjusted Rate Mortgages (ARMs). The combined effect of falling housing prices and rising interest payment obligations was manifested in gradual increase in the delinquency (*i.e.* default in timely payments) and foreclosure (*i.e.* repossession of the house because of default) rates in the sub-prime mortgages. By the end of 2007, 21 percent of such mortgages had become 90 days or more delinquent.

This created panic like situation in the market for structured financial instruments, whose valuations were supposed to be linked directly to the cash flows of the underlying sub-prime loans, but in practice no information was available either on correct valuation, or on the size of the market for such papers. Those who thought that risk was shifted to the market, they in fact had accumulated large exposures. As the prices of CDOs started crashing (with no taker for such papers in the absence of any idea about correct value of such papers), banks realized they may be having an indirect exposure to substantial risk through their sponsored conduits. The first major entities to be affected by the falling market for such instruments were hedge funds and the bank sponsored SIVs. Investors in hedge funds wanted their money back, which required hedge funds to go for fire-sell in a falling market, or to raise additional funding to meet the calls of the investors. Similarly SIVs faced the pressure of maturing commercial papers (the key source of funding for buying CDOs), and required additional liquidity support from the sponsors to avoid fire sale of CDOs, which could magnify losses. Thus, the financial market suddenly faced a situation of very tight 'funding liquidity' and tight 'market liquidity'. As the credit risk of the MBSs/CDOs which were bought against

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techniques to fabricate documents they needed to get loans approved (*The Wall Street Journal*, June 28, 2007, p. 15).

[9] *Financial Times*, September 13, 2007, p. 9.

[10] *Financial Times*, June 28, 2007, p. 7.

[11] As noted in the *Financial Times*, September 11, 2007, p. 29, many investors "loved ABCP because it yielded 10 to 20 basis points more than comparable assets. Nobody asked how this yield pick up was possible."

issuance of ABCPs became a concern, the ABCP market almost stopped supplying funds, and roll over became expensive. The outstanding size of the ABCP market shrank to almost half (signifying the extent of squeeze), and the cost of funds in the ABCP market also hardened. While some of the hedge funds were forced out of the market (like the two hedge funds run by Bear Stern), most of the off-balance-sheet losses of leading Wall Street banks were gradually shifted to the balance-sheets of banks, resulting in large pressures on their earnings and capital. By early 2008, banks had already written off more than USD 120 billion of such toxic assets, and were closely watching the CDS market, since problems in the CDS market could imply the need for more write-offs, depending on the extent of protection bought against default of loans and bonds by individual banks in the CDS market.

The extent of market fall in these toxic papers was particularly alarming. Value of some of the CDOs fell below 40 cents on dollar (*i.e.* 60 percent loss). As per one report, when Citadel Investment Group bought about USD 3 billion of debt of E*Trade Financial Corp., it paid just 27 cents on dollar (implying a loss of 73 percent for E*Trade).[12] The junk value of some of these papers was revealed quite late, and by that time the market had grown fast into a significant size. The market naturally turned wild, as fear took over complacency and greed. This led to sharp increases in risk aversion, and liquidity became scarce. Inter-bank interest rates spiked, much beyond the target policy rates of central banks, and central banks were forced to inject large scale liquidity into the market fearing further market disruptions. While inter-bank rates kept rising, there was a sudden wave of flight to safety, which not only led to yield on safe Government papers to fall but also yield spreads on other bonds to rise. The cost of buying protection against default also increased significantly. As per the iTraxx crossover index, the CDS spread widened from about 200 basis points to more than 600 basis points (implying annual premium payment of 600,000 euros for buying protection against default on bonds/loans of 10 million euros.) For the monolines (*i.e.* sellers of protection against default), the CDS spreads exceeded even 1000 basis points. The business of monolines had changed so much by 2006 that as against insuring about USD 199.4 billion of Municipal bonds in 2006 (which was their core business when they started operations), the monolines had insured USD 341.5 billion of asset backed securities (ABS) in 2006.[13] Since the CDS market had grown to about USD 45 trillion by 2007, with protection bought not only for the affected structured products but even for other bonds and loans in the entire financial market, the slender capital of the protection sellers, and the fear of rating agencies reacting with rating downgrades for the monolines, raised the chances of large losses arising even from the CDS market. With reports of losses affecting key market players – ranging from banks, to monolines, to rating agencies – their stock prices kept sliding, in the face of urgent need to beef up capital to meet the minimum capital requirements. The overall decline in global stock markets, that initially reacted only to the sub-prime crisis, but subsequently more strongly to the fears of US recession and associated global slowdown, also implied large erosion in market capitalization.

The unsettling developments turned for the worst in September 2008, as a number of systemically important institutions, the so called "hall of shame," failing one after the other. While the March 2008 bailout of Bear Stearns (with a takeover by JP Morgan Chase using Fed's USD 29 billion loan) was dubbed then as the limit of moral hazard, the bailout packages announced together by countries all over the world came close to USD 3.5 trillion

[12] *The Wall Street Journal*, December 4, 2007, p. 23.

[13] *Financial Times*, January 9, 2008, p. 18.

in October 2008. First came the bailout of Fannie Mei and Freddie Mac in early September, given the fact that these two together had owned and guaranteed almost half of the USD 12 trillion mortgage markets in the US. Then came the remaining 4 leading investment banks, which also had large exposures to sub-prime toxic assets. Lehman Brothers announced bankruptcy, and was then taken over by Barclays. Merill Lynch was taken over by Bank of America, and both Morgan Stanley and Goldman Sachs preferred to migrate to conventional banking, in order to benefit from the Fed's emergency liquidity facilities. The failure of Lehman Brothers created concerns about counterparties, which snowballed into a major confidence scare. Lehman's creditors had bought protection in the Credit Default Swaps market, and there was a fear that sellers of CDS contracts may have to face demand to the extent of USD 400 billion, relating to Lehman alone. AIG, as a major seller of protection in the CDS market, had to go down next, and it was bailed out with a loan of USD 85 billion from the Fed, which is the highest amount ever used so far in bailing out any single institution. The disappearance of trust led to a severe credit squeeze, where nobody wanted to lend to anybody. That required grand rescue packages from the Governments, targeted at defreezing the markets. While the US came up with USD 700 billion Troubled Asset Relief Programme (TRAP), the comparable plans elsewhere included Pound Sterling 400 billion in UK, Euro 500 billion in Germany, Euro 360 billion in France, and all countries around the world put together, the amount was almost as high as USD 3.5 trillion. These packages aimed at injecting fresh capital into weak institutions, guaranteeing debt liabilities of the banks, and buying back bad assets from the affected banks. Some of the Governments even went ahead with announcing open ended deposit insurance schemes, covering all deposits, to avoid run on banks (such as Ireland, Australia, New Zealand, and UAE). The grand bailout plans had one common objective, *i.e.* to avoid another Great Depression.

Leading Central Banks around the world, whose liquidity injection actions had immense significance for the world financial markets, persistently tried to avoid any liquidity scare, and injected unprecedented magnitude of liquidity over very short time horizon, besides also providing liquidity over longer-term to the term-money market, against collaterals that were not eligible earlier (like asset backed securities), and even made liquidity available to non-banks (like the primary dealers, and for bailing out Bear Stearns and AIG). To meet the USD liquidity needs in different local markets, many developed country central banks started swaps with the Fed. In the first week of October, six leading central banks of the developed countries also decided to cut interest rate by 50 basis points jointly, that took the US Fed Funds target rate to 1.5 percent from 5.25 percent before the crisis.

Central banks of major emerging market economies also injected large liquidity into domestic banking systems, besides intervening in the foreign exchange markets to meet the sudden increases in demand for USD liquidity because of non-resident outflows from local stock markets, which also precipitated declines in the stock prices of these markets. Given the limited extent up to which sudden increases in demand for USD could be met from Central Bank's foreign reserves, many countries rather allowed their exchange rates to depreciate. Banking system of countries like Iceland, Korea and Hungary, which had used large short-term foreign currency liabilities to fund fast expansion in assets, faced the heat of global market squeeze, and also needed bailout plans. The decoupling argument, that emerging markets may weather the crisis and impart some stabilising influence to the world economy, had clearly started to fade by October 2008.

4. SECTION-IV: THE UNPLEASANT POLICY QUESTIONS

Financial crisis in a matured and advanced market economy could leave completely different lessons for policy makers in relation to crises witnessed in the past in emerging markets because of "crony capitalism." The learning curve, which is emerging from the analysis of the sub-prime black box, raises many valid questions for the policy makers all over the world.

Central Banks Never Prick Any Asset Price Bubble, but Pour In Limit-Less Liquidity When The Bubbles Burst

Inflation focused central banks seem to be generally guided by their established perception that as long as asset price bubbles and bursts do not affect either the domestic inflationary environment or the growth outlook, they need not act. In capitalism, market has to be supreme, and policy authorities cannot brand any market determined price as irrational or misaligned. Given the fear of being easily targeted as anti-market, authorities even refrain from talking the market down, which though they could easily do, given their increasing emphasis on monetary policy communication (*i.e.* "open-mouth policy" could be more effective than "open-market policy" in a market economy with an advanced financial system). They in turn look for rational justifications to neglect irrational bubbles, and only occasionally express their helplessness through open mouth policy by harping on "irrational exuberance" driving the markets. In this context while Martin Wolf argued that central banks "can surely lean against the wind," even if they cannot eliminate bubbles, Alan Greenspan, despite his "irrational exuberance" concerns, viewed that "I know of no instance in which such a policy (of leaning against a bubble) has been successful."[14] In the aftermath of the sub-prime crisis, greater clarity on the role of monetary policy to deal with asset price inflation has become an unavoidable necessity.[15]

The Greenspan Put – and the License to Neglect Risk

The market perception that every time there is pressure on the market, the Fed would contest that, fearing the adverse implications of a falling market on the real economy, has led to a situation where the market participants in general get free access to "put options," supplied in plenty by the Fed. With a view to moderating the impact of the severe sub-prime related credit squeeze, the use of the put-option was taken to the extreme, giving official acceptability to "too big to fail" proposition, which in turn ensured bailout of the "hall of shame" (such as Bear Stearns, Fannie Mai, Freddie Mac and AIG), USD 700 billion Troubled Asset Relief Programme (TRAP), and massive injection of liquidity by the Fed, not constrained by the nature of collaterals and the nature of the institutions. The Fed also aggressively reduced the interest rate target from 5.25 percent to 1.5 percent. Thus, the

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[14] Alan Greenspan (2008), "The Fed is Blameless on the Property Bubble," *The Financial Times*, April 7, 2008, p. 11.

[15] The current Central Banking thinking is driven by the general perception that bubbles are hard to identify until they actually pop, and more importantly, central banks lack any clear mandate and any effective instrument to lean against the bubble.

degree of moral hazard embodied in open ended Greenspan Puts aggravated by leaps and bounds, and degenerated into "Joint Fed-Treasury puts." Avoiding another Great depression could be a rational justification for the actions of the Fed and the Treasury, but after the restoration of normalcy, policy makers cannot avoid the question as to why the market should care about risk given the prospect of easy access to such put options. The current incentive to neglect risk must be replaced by strong disincentives over time, unless of course more nationalisation and Government control dominates policy preference in future.

The moral hazard associated with this Greenspan put, or more commonly the Fed-put now, encourages investors to afford to become less risk averse. When there is no risk of market fall being translated into large losses, why worry about asset price bubbles and un-sustainability of high returns? The common form of Greenspan Put- which is the most dangerous one- is reflected in sharp easing in monetary policy stance by the central banks to counter the adverse real effects of falling markets and failing banks, which creates the impulses for future crises. The Greenspan put, or the easy monetary policy response to bursting of IT bubble and the 9/11 developments in the market, has in fact given Greenspan the status of a "serial bubble blower," according to John Taylor.[16] The convenient argument supporting the Greenspan put is that "save the economy by saving finance." The important question that policy makers must address then is the relevance of "saving finance by creating moral hazard." As noted by Posen (2008), "… the perception of the Fed interest rate being driven in response to equity market distress rather than financial instability or the general outlook (of a recession) is a dangerous one." This problem amounts to Fed favouring capital over labour interests.

'Central Banks' Liquidity Assessment Myth – and the Growing Irrelevance of Conventional Monetary Aggregates

One important offshoot of financial innovations has been that instead of commercial banks and the central banks, unregulated financial entities may be creating an increasing part of the liquidity in the financial system. A commercial bank creates liquidity by holding illiquid long-term assets against liquid short-term liabilities, and in that process it makes the non-banking sector liquid. Thus, more a bank remains illiquid, greater is the liquidity created by it for the rest of the system. Maturity mismatch (*i.e.* borrowing short and lending long), thus, is the key process through which a commercial bank creates liquidity for the non-banking sectors.

The liquidity creation function of commercial banks, however, has received severe jolt from two very commonly practiced prudential regulations, *i.e.* the asset-liability mismatch (ALM) norms, and the minimum capital requirements. The response from commercial banks to such regulations has been reflected in the form of: (a) securitisation of assets, including mortgage backed securities – transforming thereby their illiquid assets into liquid assets, but limiting in the process their capacity to make the non-banks to remain liquid, and (b) raise illiquid liabilities in the form of various debt securities, as opposed to liquid deposits, which implied corresponding decline in liquidity creation process by the banking system. Because of tight capital requirements, by shifting part of the risky assets through securitisation, the capacity of a bank to lend further, though, increased considerably. Banks also increasingly relied on buying protection in the CDS market, to contain on-balance sheet (as well as

[16] 'Housing and Monetary Policy,' September 1, 2007, www.kc.frb.org.

hidden off-balance-sheet) risks. Alongside this liquidity tightening response of banks, new unregulated entities like private equity funds and hedge funds have started creating liquidity by borrowing short and investing long in illiquid securities like the MBS. Many banks indirectly added to liquidity through off-balance sheet SIVs (Structured Investment Vehicles), who could borrow short (from the asset backed commercial paper – ABCP – market) and then lend long (in the form of investment in ABSs and CDOs, which are non-tradable and illiquid). Thus, the job of holding liquid liabilities and creating illiquid assets to make the overall financial system more liquid, is increasingly being done by unregulated shadow banks, which are neither part of any conventional money supply analysis, nor of any liquidity assessment exercise. Dangerously, unlike the commercial banks' liquidity, the liquidity created by these new unregulated entities goes almost entirely to fuel asset price bubbles. Thus, conventional monetary aggregates in the age of financial innovations may often put the central banks on the wrong foot. The assessment of De Grauwe (2007) could be most appropriate in this context: "… hedge funds create inflation not in the grocery stores but in asset markets. A central bank that cares about more than just prices in the stores may want to worry about these developments … the money stock is not giving the right signals about the things a central bank cares about."

Liquidity also has a self-fulfilling characteristic. In a phase of growing real estate prices, default won't affect liquidity, since the house can be repossessed and sold at a higher price to recover the loan. In that sense, there may not be any default, since the borrower can renegotiate the loan, repay the previous loan, and still be left with a part of the new loan amount for raising spending limits. As the asset price bubble bursts, however, not only that default rates may increase, but even sale of the underlying asset may drag the prices down further, making thereby the mortgage, and any paper backed by the mortgage, increasingly illiquid (*i.e.* one cannot sell it without accepting lower price). Thus, liquidity may appear 'costless' in a rising market, but becomes 'very costly' as the market turns down. If a Central Bank, through easy liquidity injection, allows the cost of liquidity to remain cheap, then those who neglect every aspect of risk, including liquidity risk, get the reward for their complacency. Cutting interest rate to make liquidity rather cheap is in fact a tax on common man's savings, since they are deprived of the benefit of higher return just because complacent investors have to be bailed out with low cost access to liquidity from central banks (Rajan 2007). The Fed has repeatedly given the impression to the market that it favours the interests of capital over labour, and this perception may not be good for promoting market discipline.

While the money supply process has generally become endogenous (*i.e.* driven by demand for liquidity, which a central bank has to accommodate to keep the targeted interest rates within its policy level interest rate corridor), the sub-prime crisis revealed that a central bank my experience complete loss of monetary "independence", as it has to supply liquidity "depending" on what the failing banks and falling value of low grade papers may demand, and it has to also reduce the interest rates sharply to deal with slowdown concerns associated with the financial crisis, notwithstanding the growing concern of inflation and the inflation centric mandate of the central banks. The general neglect of monetary aggregates in favour of interest rates for the conduct of policy has taken place despite the consensus that "inflation is always and everywhere a monetary phenomenon." Financial innovations, unstable relationship between money, output and prices, and difficulties encountered in correct measurement of the money stock data might have been the driving force behind growing neglect of money, and the subsequent argument that has gained ground among policy makers

now is that "we didn't abandon the monetary aggregates, they abandoned us." The growing resultant emphasis of central banks on supply shocks (like oil and non-oil commodity price and food price increases), pass-through effects of exchange rate depreciations, wealth effects of asset price bubbles, *etc*. to explain the inflation process clearly undermines the relevance of strong money and credit growth, which was the most common factor in several of the countries experiencing high inflation in 2007-08. All the often stated non-monetary sources of inflation, whether commodity price shocks, exchange rate depreciation or the wealth effect of bullish asset prices, imply in essence higher associated demand for money, and given the endogenous money supply process, central banks just have to accommodate the rising demand for money with corresponding supply, otherwise the market interest rates would overshoot their interest rate targets. High growth in money supply is still the main source of inflation; while the orthodox monetarist analysis established the causality directly between exogenous money supply created in the banking system and inflation, the endogenous money supply process highlights that the direction of causation could start from all factors that increase the demand for money, including inflation itself, and this demand may be accommodated fully by the central bank through corresponding supply of money, given their interest rate targets, which, thus, indirectly explains the relationship between money and inflation. Limitless injection of liquidity under conditions of financial stress, as was revealed during the sub-prime credit squeeze, is another source of endogenous monetary expansion, which may subsequently decline though if growth slowdown concerns and bearish assets markets lead to decline in demand for money, besides the obvious contractionary effects of weak commercial bank balance sheets on money supply aggregates because of the crisis. Drawing policy relevant inferences from the behaviour of monetary aggregates has become increasingly complex over time, even though the relationship between money growth and inflation remains as robust as in the past. Hetzel's (2004) remarks could be most relevant in this context; "… because central banks do not use money as an indicator or target, an 'out of sight out of mind' confusion about the role of money in price level determination can arise." More strikingly, the information content of the interest rate, which has generally replaced monetary aggregates in the conduct as well as communication of the stance of monetary policy, could actually be much less than the monetary aggregates.[17]

Credit Markets are Much Less Amenable to Central Bank Actions, unlike Money Markets

Central banks could at best inject more liquidity into the system, but much of that could remain in the short end of the credit market, depending on the quality of the papers against which access to liquidity is allowed. In the face of a credit squeeze, however, the injected

[17] As noted by Bernanke (2003) "… in the financially complex world we live in, money growth rates can be substantially affected by a range of factors unrelated to monetary policy *per se*, including such things as mortgage refinancing activity (in the short run) and the pace of financial innovation (in the long run) …. The imperfect reliability of money growth as an indicator of monetary policy is unfortunate, because we don't really have anything satisfactory to replace it … nominal interest rates are not good indicators of the stance of policy, as a high nominal interest rate can indicate either monetary tightness or ease, depending on the state of inflation expectations …. The absence of a clear and straightforward measure of monetary ease or tightness is a major problem in practice."

liquidity may not get distributed in the system. It is the role of the credit market, led by banks, to distribute available liquidity to weaker borrowers and over longer terms. As it happened during the sub-prime crisis, not only that banks turned conservative in lending to each other (that drove the inter-bank rates to overshoot the target policy rates- like the Fed Funds Target Rate), lending to every other segment of the credit market also became costlier due to sudden reprisal of risk (leading to loading of larger risk premiums on new financing, and sharp increases in yield spreads in the secondary markets) and the access to credit also tightened (due to pressures on banks' capital on the one hand, and also because of the overall tightening of credit assessment standards). The distribution of liquidity injected by the central bank to everybody in need, thus, primarily depends on the commercial banks, and sudden increase in their degree of risk aversion, implying tightening of "funding liquidity," could in turn exacerbate the problem of "liquidity of financial instruments" in a falling market. "Funding liquidity" and "trading liquidity" are, thus, interdependent. George Soros (2007) highlighted in this context "… the circular connection between the willingness to lend and the value of the collateral. Ease of credit generates demand that pushes up the value of property, which in turn increases the amount of credit available." When the value of the collateral falls, credit contraction sets off a self-fulfilling credit squeeze. It is important to note that traders enhance the liquidity of instruments (*i.e.* buy and sell at ease without any change in the price because of the buy/sell decision), but they depend on "liquid funding" to meet capital and margin requirements. Similarly, when the market remains liquid, demand for funding liquidity is much less. One important aspect of this interdependency is that easy access to funding liquidity may allow large leveraged positions and spurt in trading activities (as by hedge funds and private equity funds), which could enhance liquidity of the markets. In turn, when the market panic sets in, and fear takes over greed, injection of liquidity by a central bank does not imply that those who need funding liquidity can get it easily. A credit squeeze implies tightening of access to funding liquidity, which conventional lender of last resort function of a central bank cannot address. Hence, there has been a demand for central banks to function as "market maker of last resort," besides their conventional "lender of last resort function." Three leading central banks, *i.e.* the BoE, the ECB and the Fed in fact functioned in a sense like "market maker of last resort" when they opened up the innovative swap windows exchanging gilts against Asset Backed Securities, despite the significant accentuation of "moral hazard" problem in that process.

Search for 'Market Maker-of-Last-Resort'- not 'Lender-of-Last-Resort'

As per the Bagehot tradition of a central bank's "lender of last resort (LOLR)" function, a central bank should readily provide liquidity access, but at penal interest rates, and against good collateral. In a market where the valuation of structured products keeps sliding and there is no certainty about their valuation, the LOLR function of a central bank could turn completely ineffective to alleviate the credit squeeze. Hence, the innovative proposal came from Buiter and Sibert (2007), suggesting the central banks to also function as the 'buyer of last resort'-and thereby prevent the syndrome of 'forced fire sale and further decline in the value of assets.' At some stage, the US Treasury even conceived the idea of a "super fund" of about USD 100 billion, contributed by the affected banks, which could have been used for buying the CDOs and stabilising the limitless fall of these papers under the pressure of fire sale. As it turned out at the end, adding another layer of moral hazard to the market was avoided at that stage (though subsequently in October the USD 700 billion rescue package

had to be announced, whose initial aim was essentially to make available a "a buyer of the last resort" facility to the market).[18] The focus in turn shifted to Sovereign Wealth Funds (SWFs), who were looking for strategic investments in key areas like western countries' banking. The sub-prime losses driven pressures on the capital of some of the leading international banks created the opportunities for both; for the affected banks to bolster their capital and for the SWFs to get access to strategic investment which was not possible just a couple of years ago in the US. This development has added another important dimension to the current wave of globalisation, namely funds from other Governments coming to the rescue of ailing banks in the US. As leading Wall Street financial entities started to fall one after the other in September 2008, the SWFs must have been forced to revise their investment strategies.

Credit Inflation – Driver of Asset Price Inflation?

The high growth in money and credit all over the world in recent years remains unexplained by the conventional money, output and price relationships (*i.e.* the perception that economic growth and inflation together provide leading information about expected annual rate of growth in demand for money). Where then this excess credit has gone (over and above the savings glut in the world)? May be to fuel asset price bubbles through use of excessive leverage? The feast-to-famine turnarounds in credit cycles often exhibit strong co-movement with asset price cycles. As highlighted by Magnus (2008), "… The most recent feast can be appreciated by looking at the credit intensity of the gross domestic product, or the amount of credit generated per $1 of GDP growth. This remained at about $1.50 for decades after 1950, eventually rising in the 1980s and peaking at $3 during the 1990s. The credit machine went into top gear again and by 2007, nearly $4.50 of credit was being generated per $1 of GDP growth." Besides the large increase in credit, there was an equally strong growth in financial sector debt. "Between 2003 and 2007, over 70 per cent of the $4,500 billion increase in credit market debt was raised by issuers of asset backed securities, US government agencies and other housing related entities." Hedge funds and private equity funds often use high leverage to constantly search for undervalued assets, and in that process every removal of undervaluation creates ample scope for over valuation. In a bullish market, the bigger fool syndrome decides the valuation (*i.e.* if one can sell an asset at very high valuation to another, that becomes the right valuation of that asset at that point of time, and this constant search for bigger fools allows the bubble to grow, without any reference to underlying fundamentals). Can central banks regulate the credit growth to influence the asset price cycles?

What is even more worrisome for any central bank is that in a globalised world no central bank could successfully control liquidity. Highlighting the very high money supply growth witnessed in several emerging market economies in recent years, and their role in sustaining

[18] The Fed finally became a sort of market-maker-of-last-resort for the Residential Mortgage Backed Securities (RMBS) when on March 11, 2008 it allowed an expansion of its securities lending programme, under which it could lend USD 200 billion of (liquid) Treasury Securities for 28 days against (illiquid) RMBS. The stock market reacted favourably to this news with a strong recovery, driven by the stocks of banks and mortgage financing companies, but this decision certainly created another window of moral hazard that Fed's put will not only ensure "funding liquidity,' but "market liquidity" as well.

the exuberance in the global financial markets, the Economist (2007a) noted that "… many … assume that 'global' monetary conditions are set by the central banks of the rich economies. Yet over the past years, a staggering three-fifths of the world's broad money supply growth has flowed from emerging economies … The days when central bank watchers could just focus on the Fed and perhaps the ECB in order to assess 'global' monetary conditions are over. They no longer control the amount of money sloshing around the world." During the Latin American debt crises of the 1980's, surges in petro-dollars were recycled into emerging markets in a manner that could be best described as "too much money chasing too few lending opportunities," and the associated complacency about risk in emerging markets. In the context of the recent global savings-glut and an even stronger surge in petro-dollars, a new dangerous recycling has taken place. As highlighted by Reinhart and Rogoff (2007), "… a large chunk of money has effectively been recycled to a developing economy that exists within the United State's own borders. Over a trillion dollar was channelled into the sub-prime mortgage market, which is comprised of the poorest and least credit worth borrowers within the United States." The flawed pattern of recycling of global savings (besides the well known water flowing up-hill argument) had two grave consequences; first, the asset price bubble in the US, and second, high return on financial investments in relation to return on real investment.

The wave of asset price bubble sustained in the US by the recycling of global savings in the face of falling savings in the US created large scale market distortions. According to Stephen Roach (2008), "… Reinforced by a monstrous bubble of cheap credit, there was little perceived need to save the old fashioned way – out of income. Assets became the preferred vehicle of choice … America's current account deficit is due more to bubbles in asset prices than to a misaligned dollar. A resolution will require more of a correction in asset prices than a further depreciation of the dollar." The second grave consequence of the credit bubble was the unrealistic levels of high returns on financial investments, which may appear irrational despite high growth and productivity in the real sector of the economy. As noted by Martin Wolf (2008), "… The US itself looks almost like a giant hedge fund. The profits of financial companies jumped from below 5 percent of total corporate profits, after tax, in 1982 to 41 percent in 2007, even though their share of corporate value added only rose from 8 to 16 percent." Without relative value creation in the underlying real sector, how large profits could be made on a sustained basis by banks, and what was the role of the credit machine available to them in this age of financial innovations?

Very High Return on Bank Capital – Implies Financial Stability Initiatives not Working?

Given the extent of time and resources (using public money) devoted to financial regulation and supervision, and even more time and resources devoted in individual banks and financial institutions for risk management, greater financial stability should imply less risk associated with banks' equity capital, and hence, the return on bank equity should fall. This is particularly so because systemically important banks have to be bailed out with public money in any case, implying no downside risks. High return on bank equity in itself, therefore, has to be viewed as a market indication of high risk in banking. The claims of regulators and supervisors on progress made by them in promoting financial stability never justifies high and rising return on equity in banks. The sub-prime crisis, however, validated the market indication that banking continues to be a high risk business, and the fake claim on

progress in financial supervision as a means to promote financial stability is somewhat like 'money illusion' (that nominal increase in wages in the face of rising inflation is a real increase in purchasing power, which may be true only in the short-run). Supervisory and regulatory responses have all along been backward looking (*i.e.* reactionary), and every progress made in this arena could still remain inadequate, which gets revealed only when the next crisis arrives. Otherwise, why the average return on equity is so high for banks?

The Wrong Incentive Mechanism in the Market – Fat Bonus and Irresistible Perks

Investment bankers' rush for fat bonus year after year often sustains the asset market bubble, with their creative minds adding every day to the list of complex financial instruments, then marketing those to greedy investors in search of irrational returns by presenting ever optimistic analysis about market valuations, and also providing the trigger for vigorous use of leverage on the back of rising value of mortgages/asset prices. No regulator ever questions as to how many investment bankers deserve this fat bonus, and how the virus of fat bonus must be addressed at some stage before it contaminates the arteries of the financial markets further. As emphatically highlighted by Rajan (2008), no bonus could be justified for returns that may be generated by managers assuming *beta* risk, whereas return arising from *alpha* risk needs to be rewarded handsomely, since there are only few sources of profitable *alpha* (such as abilities to identify under valuation like Warren Buffet, value created by venture capitalists, and some financial engineering). Since much of the profits of the banking community could be derived from assumption of *beta* risk, or business growth in a booming business and asset cycle, the wrong incentive mechanism of fat bonus must deserve a closer look for the markets to function more efficiently. Quoting an example from Rajan (2008), if an investment in AAA tranche of CDOs generated 50 basis point higher returns in relation to AAA rated corporate bonds, that excess return was the result of 'tail' risk associated with possible default, and the funds manager has no right to any part of this excess 50 basis point. The entire amount should be due to the shareholders, since unknowingly they assume the entire risk, even though in a rising market condition they are given the impression that the excess return is the result of financial ingenuity of the funds managers. Similarly, when the SIVs borrowed short in the CP market to invest in illiquid CDO market, they were heavily exposed to the liquidity risk, even though managers could have easily justified fat bonus as compensation on the ground of their abilities to identify arbitrage opportunities. As it turned out at the end, it is the shareholders who finally had to bear the impact of this enormous liquidity risk, in the form of significant erosion in their stock prices. How to address this adverse incentive problem in the market should be a big challenge for the policy makers. At the moment nobody seems to question the current mad rush for high bonus and perks, and their relevance for deep and efficient markets. For every financial market operator, including lead analysts, there may be little motivation to go against the fads and fashions that drive the markets. As highlighted by Meltzer (2007), "…In 2004 and 2005, the managers reported great earnings and received magnificent bonuses. Straying from the herd by refusing to participate is likely to cost not just the bonus but the job." It was just appropriate that the bail out packages announced by some of the European countries in October 2008 clearly aimed at restricting salary and bonuses in the form of preconditions for allowing access to the bail out options.

What is the Incentive for the Supervisors?

Supervisors and regulators are expected to remain ahead of the curve, for effective crisis prevention. But what incentives and motivation they have to do that? As highlighted by Goodhart and Persaud (2008), authorities are supposed to "remove the punch bowl before the party starts getting. But parties are fun. Underpaid supervisors cannot easily squeeze past powerful and rich lenders, borrowers with seemingly worthy projects and politicians taking credit for good times, to take away the bowl of punch." Just like the need for aligning the investment bankers' bonuses to longer term outcomes (rather than only short term profits), they suggested "… If supervisors received large annual bonuses that were withheld for five years and paid conditionally on successful supervision during this period, they might be more willing to remove the punch in time – thereby limiting bankers' bonuses in the first place."

The Dark Side of 'Derivatives'- Lessons for the Hawks of Financial Sector Reform

When Warren Buffet (2002) dubbed derivatives as the "financial weapons of mass destruction," no body had realised that by 2007 derivatives could emerge as the largest, potentially most lucrative and also the most destructive market in the world. The concern of Buffet was evident from his assessment that "… parties to derivatives have enormous incentives to cheat in accounting. Those who trade in derivatives are usually paid (in whole or part) on earnings calculated by mark to market accounting. But often there is no real market and 'mark to model' is utilised. This substitution can bring on large-scale mischief. … In extreme cases, mark to model degenerates into what I would call mark-to-myth." The opportunity to make speculative money, and thereby maximise bonus, has created a powerful lobby of investment bankers who could easily dub a financial market as inefficient in the absence of derivatives. The benefits of derivatives have often been overstated, since instead of helping in distributing risk (*i.e.* transferring risk to those who can bear and manage), there could actually be risk concentration (primarily because of the information fog surrounding the OTC derivatives); similarly, instead of facilitating price discovery, speculative trading could drive prices to levels far in alignment with the underlying fundamentals. The need for hedging through use of derivatives has clearly been overtaken by the mad search for maximising earnings through speculation. Hedge funds at times use such high leverage to take large exposures in the derivatives market that the failure of the market, and possible default by the sellers of protection, could endanger even those who might have used derivatives just for hedging (the prime example of which is the case of possible default by the monolines, and as a result banks being forced to take more write offs on-balance sheet, despite buying protection from the monolines against default on CDOs/MBSs). It was clearly evident during the LTCM crisis that hedge funds could use 100 percent leverage in the "total return swap" market.

Derivatives were a prime source of crisis even during the 1987 crash, when 'portfolio insurance' or computerised hedging had become the fashion in the market. Portfolio insurance refers to a practice of using futures contracts as an insurance against market fall. While one could benefit from the rising stock markets, hedging himself against a market fall could be possible by taking short positions in the index futures. The portfolio insurance strategy failed because when the market started to fall in October 1987, there was a rush for

short selling, which actually precipitated the fall. A common risk management strategy using derivatives, thus, made the world a riskier place.

How credit derivatives like CDS could precipitate market fall is evident from the example given by Das (2008) relating to default by Delphi (a car parts company) in the spring of 2007, leading to fall in the price of its bonds to 40 cents on dollar. As against USD 5.2 billion of its outstanding bonds and loans, the volume of outstanding CDS issued against these bonds was as high as USD 28 billion. (Shortage of deliverable bonds has led to use of protocols – allowing cash settlement as a substitute for physical delivery in the CDS market). As per the protocol in the case of Delphi the settlement price was 63.38 percent (*i.e.* the recovery value), and as a result the protection buyers got USD 3.662 million per USD 10 million of CDS contract. Here the crucial thing to notice is the role of speculation (*i.e.* some may be holding large long positions in the CDS market, without having any real exposure in the underlying bond market, but just because the bond goes into a default, these speculators make large profits by receiving the cash settlement amount as per the protocol). The risk of triggering a sharp market fall results from the strong incentives among protection buyers to force a default and drag the recovery price on the defaulted bond to the lowest (since the resultant cash settled profits in the CDS market could then be large). As underscored by Jackson (2008), quoting one University of Texas study in this context, "… In the old days, if you had $100m invested in a company's bonds it was very much in your interests to avoid bankruptcy, which might leave you with – say – 40 cents in the dollar. Now, if you also have CDS insuring your entire holding, you have an incentive to vote for bankruptcy rather than an out-of-court settlement, since default will trigger the derivative and pay all your money back." The incentive to go for bankruptcy could be even stronger, if you have higher long positions in CDS, in which case the motivation would be to not only go for bankruptcy, but at the lowest possible value for the bond (since the net gain from the open net CDS position then will be much higher).

In the aftermath of the sub-prime crisis, the hawks of financial innovations persist that more regulation is not the answer, and instead the emphasis should be on better self regulation with adequate market discipline. The champions of financial sector reform in many countries, however, have to recognise the perils of speculation in the derivative market. Ensuring financial stability is a much more important goal than any personal ambition of being part of a country's history of champion reformers. Moreover, changing the CDS market from OTC platform to exchange traded platforms with central clearing houses may not be enough in itself to address the concerns that have surfaced from derivatives because of the crisis. The conventional faith on "finance-and-growth" relationship faces serious challenge from derivatives.

Financial Innovations Do Not Promote Economic Growth - Tax Them

Hence curb them to ensure that a stable and efficient financial system continues to promote economic growth. Stiglitz (2008) noted in this context that Wall Street financial innovations did not contribute to productivity growth. "… The financial products being created did not manage risk; they enhanced risk …. The irony is that the scientists making the advances that enable technology based growth, and the venture capital firms that finance it were not the ones reaping the biggest rewards in the heyday of the real estate bubble. These real investments are overshadowed by the games that have been absorbing most participants in financial markets …. If the foundations of economic growth lie in advances in

science and technology, not in speculation in real estate markets, then tax systems must be realigned." If one has to pay tax for buying goods and services in the market, why the speculative derivatives trade be excluded from the tax bracket? The sub-prime crisis revealed that derivatives facilitated speculation, and instead of the often argued price discovery, derivatives actually allowed and precipitated serious mis-pricing. The example of Altman (2008) is most pertinent in this context; the Credit Default Swap (CDS) market witnessed a sharp increase from US 5 trillion in mid 2005 to US 50 trillion after two years. "… This is 10 times greater than the total value of all bonds that could be insured. So this growth had nothing to do with protecting against defaults. Instead, it was just betting on markets." If gambling and betting are seen as either illegal, or legal but taxed, then why should derivative trades unrelated to any underlying exposure in need for hedging should be spared from taxes?

Mark-to-Model (rather than Mark-to-Market) – A Test for the Regulators

Innovations like securitisation and credit derivatives like CDS – which encourage and facilitate shifting of risk from the balance sheets of banks – were part of the overall response by the banking system to deal with the capital punishment of Basel-I. Basel-II, in principle, addresses this anomaly now, but it places such great emphasis on "model based quantification of risk" and 'rating' that, the post sub-prime deficiencies of mark-to-model valuation of CDOs and misleading ratings of such papers have created new concerns for the regulators. The challenge associated with the use of mark-to-model valuation in case of structured products like the CDOs is explained by Singh and Saiyid (2008) with the chain of factors, namely: (a) valuation models breakdown once a crisis starts (particularly because correlations increase suddenly), (b) illiquidity of certain securities (like CDOs) make things worse, and (c) rating downgrades further complicate valuation. Structured products like CDOs not only derive value from the cash flows of the underlying pool of ABS, but they are sliced into different tranches, detaching thereby any direct link from specific CDO to specific underlying ABSs. The sellers of the CDOs, therefore, use a model based on certain assumptions, and using the certification of the valuation through a rating agency, they sell those to the buyers. Higher the assumption of correlation (in valuation of senior, mazenine and equity tranches of the CDOs), higher is the overall loss when the underlying asset (MBS) falls. In turn, lower the assumption of correlation, fall in MBS impacts only the equity tranche with a loss. As narrated by Singh and Saiyid (2008), "… The impact of correlation on the equity tranche of CDOs may appear nonintuitive; thus the analogy to a ship going through a strait that contains hidden mines may help. When the mines are clumped together (high correlation), the ship will likely miss the mines (that is, avoid losses), compared with the situation when they are widely scattered (low correlation). In the higher correlation case, if the ship hits one mine then it will hit some of the others too, leading to a large loss compared with a low correlation case when it will likely just hit one mine." Sudden increase in correlation during a crisis could make excessive reliance on model-based valuation a clear source of exposure to unknown risk. The extent of increase in foreclosure/delinquency in the sub-prime loans does not justify the extent of fall seen in the valuation of MBSs and all tranches of the CDOs. Large speculative positions in these structured products because of easy access to leverage in a condition of global savings glut magnified the extent of damage to the financial system. One has to wait and watch how the Pillar-1 (minimum capital requirement) and Pillar-2 (supervisory review) foundations of Basel-II would evolve keeping

in perspective the weaknesses of mark-to-model valuations that have emerged from the sub-prime crisis. The challenge for Pillar-3 (*i.e.* market discipline) could be even more, since both rating and validation of the models by the national supervisors may lack credibility. The risk of excessive dependence on value at risk (VAR) models under Basel-II, and the consequences of neglect of stress-tests and VAR-driven increase in comfort level could be enormous.[19] Models often create the false impression that risks have been quantified, and hence, that in itself could be a source of rational complacency, which the regulators have to address. Neglect of low-probability but high impact scenarios under stress-tests (which should complement the model quantified risk exposures) could be partly deliberate so as to keep the capital requirement artificially depressed. Correlations/co-variances are crucial to risk models, and historical correlations never remain constant. Models, howsoever complex, also fail to capture reality. The other reality of increasing emphasis on models, as highlighted by John Kay (2008), is that "… the greater sophistication of risk models has widened the gulf between those with quantitative skills and those with more qualitative insight. Every additional complication increases the division between technicians and managers."

Rating – The Lagging Indicator of Crisis

On too many occasions in the past episodes of crisis, rating downgrades have followed after the onset of the crisis. Ratings, by nature, however, are meant to be the leading indicators. In the case of the sub-prime crisis, what was worse is that even after clear evidence of problems in the sub-prime loans and the resultant fall in the value of sub-prime mortgage backed securities, rating downgrades were hard to come by, and when downgrades actually started, the credibility of the rating agencies had gone for a toss, with their sliding stock prices validating the market view about rating agencies. As long as sellers of garbage (like CDOs) pay the rating agencies to get a rating, the credibility of rating for the investors would remain an area of concern. Self-regulation, and the fear of loss of credibility as a disciplining factor, has not worked in the past, and policy makers cannot ignore this aspect in the post sub-prime crisis period. Rating agencies have already initiated discussions with plans for repairing their tattered image, and also for escaping regulatory interventions from the policy makers who are vested with the responsibility of ensuring financial stability and avoiding financial crises. One has to see whether the regulators themselves retain their faith on rating while implementing Basel-II. The extent of mischief that rating agencies delivered to the market while rating CDOs is evident from the fact that CDOs with ***Baa*** rating had 10 times higher rate of default in relation to similar rated bonds, and much of the analyses coming from the rating agencies (for which they charge fees) were no better than average journalism.[20] The systematic bias of rating agencies offering persistent inflated ratings in favour of structured finance products, and the equally sudden and large downgrades are effected by them after the crisis reveal that rating could be another source of market uncertainty, and self regulation may not be enough to enforce the desired discipline and accountability among the rating agencies.[21]

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[19] Nassim Taleb (1998), "Roundtable on limitations to VAR," DerivativesStrategy.Com, April.

[20] "The Moody's Blues," *The Wall Street Journal*, February 19, 2008, p. 11.

[21] For extensive discussions on the plans to amend the rating processes for structured products after the crisis, please see the BIS, CGFS (2008) paper titled "Ratings in Structured Finance: What Went Wrong and What can be done to Address Shortcomings."

Basel-II Suddenly Looks Inadequate: The emphasis of Basel-II on model based risk measurement and ratings have received a severe jolt because of the sub-prime crisis. Under Basel-II banks are expected to use models to quantify risk exposure, and if the models are acceptable to regulators under the Pillar 2 'supervisory review' process, then the minimum capital requirement could depend on that. Sub prime crisis, however, brings to the fore the deficiency of excessive reliance on models, since sophisticated global banks are already using these models, and these are the banks that have to contend with the pressure of capital shortfall because of large sub-prime related losses. As stressed by Benink and Kaufman (2008), "… recent events challenge the usefulness of important elements in Basel-II. The need to recapitalise banks reveals that the internal risk models of many banks performed poorly and greatly underestimated risk exposure … this reflects the difficulties of accounting for low probability but large events." More strikingly, several quantitative impact studies (QISs) conducted in advanced countries concluded that capital requirements of banks may decline after migration from Basel-I to Basel-II. Post sub-prime, even those QISs need to be re-run, to account for "low probability but high impact scenarios." As it stands today, each of the three pillars of Basel-II looks deficient. Minimum capital requirement (*i.e.* Pillar-1) based on models and ratings no longer appear credible. Supervisory review (*i.e.* Pillar-2) cannot be effective if the regulators remain behind the curve all the time, as clearly revealed during the sub-prime and other previous financial crises. Even the market discipline pillar (*i.e.* Pillar-3) cannot work in the face of thick information fog, non-stop model revision exercises of the rating agencies, and growing number of unregulated entities in the market who lack transparency. In this context, the suggestion of Benink and Kaufman (2008) to supplement the Basel-II risk weighted capital requirement with non-risk weighted "leverage ratio requirement" and mandatory requirement for large banks to issue "non-insured subordinated debt as part of regulatory capital requirement" merit closer look by the regulators. Macro-prudential regulation, under which the capital requirement may have to vary as per the business and asset cycles also merits policy attention. Goodhart and Persaud (2008) suggest in this respect the need to raise capital requirement counter cyclically, besides using a variable maximum loan-to-value ratio for mortgages as part of regulations. The other option could be to link capital adequacy requirements progressively to the growth in the value of bank assets, just like progressive income tax, with the emphasis being to moderate excessive lending and to build-up of large reserves during a boom. The regulators must realise the challenge arising from the fact that growth in risk-weighted assets (used for capital adequacy purposes) has remained generally significantly lower in relation to fast growth in aggregate banks assets, all over the world. Mark-to-market accounting, which in itself became a source for sudden appearance of crisis in otherwise sound financial institutions, has already created pressures on regulators for undertaking urgent review and necessary amendments.

From "too-big-to-fail" to "too-interconnected-to-fail" – The need for more Empowered Central Banks

Moving over to Basel-III even before Basel-II is implemented properly may not address the challenges that have surfaced from the sub-prime crisis for the regulators. The sub-prime crisis revealed one major fault line in existing financial supervisory architecture *i.e.* the presence of multiple regulatory agencies and the practice under which some entities like banks are excessively regulated, some have more liberal regulations, and others are not regulated at all (like hedge funds, private equity funds, and the conduits), besides the lack of

transparency among SWFs who may soon own more assets for investment in international markets than the total foreign reserves of the central banks. "Shadow banks," over the years, have acquired greater prominence in the financial markets in relation to "regulated banks." According to the Financial Times,[22] activities of the so called parallel or unregulated banking could be about USD 5.9 trillion as against USD 9.4 trillion for regulated banking. Use of high leverage by some of the unregulated entities (like the hedge funds and the SIVs), and explosive growth in derivatives have given rise to a situation that could be described as market operators are "too inter-connected-to-fail," as opposed to the erstwhile Central Banks' emphasis on "too-big-to-fail", and they are also "too-difficult-to-save" without grand bailout packages. As a result, even the unregulated entities have to be bailed out by the Central Banks through liquidity support, to avoid systemic instability, even though they are not empowered to regulate them. During Bear Stearns bail out, which being an investment bank was regulated by the SEC and not the Fed, whether direct liquidity support should be provided by the Fed to unregulated entities became an issue. Finally, the Fed had to put USD 29 billion in that bail out related direct intervention, which was taken subsequently to the unprecedented level of USD 85 billion to save the insurance giant AIG. Even for LTCM, an unregulated hedge fund, Fed had to broker the bail out. The new "too-interconnected-to-fail" syndrome suggests the need for one major reform in the financial supervision architecture, *i.e.* assigning the overall responsibility of financial stability only to the Central Banks, and empowering them correspondingly to extend their ambit of regulation to any entity in the financial system they may feel necessary. Other regulators' mandate could then be restricted to consumer or investor protection and promotion of market discipline, besides supporting the central banks as the country's apex "market stability" regulators. Interconnected markets, multilayered regulatory requirements for different market operators, and growth in the complexity and volume of derivative products suggest that centralisation of responsibility with adequate empowerment is essential to promote the goal of financial stability more effectively. This in itself may not ensure complete crisis prevention, since centralisation of responsibility should not mean excessive regulation. Two of the six principles for a new regulatory order suggested by Summers (2008) could be most appropriate in this context. Regulations must recognise the "inability of institutions or their regulators to predict future market conditions with much confidence." Hence, more than crisis prediction, regulators must try to "assure resilience of the system" to shocks. Stress–tests for extreme low probability outcomes should be better incorporated into pre-planned regulatory responses to financial crises. Moreover, regulatory authorities must also recognise that "to a substantial extent self-regulation is deregulation." The far too unsatisfactory performance of the rating agencies in the past crises suggests though that they do not deserve self regulation.

5. SECTION-V: CONCLUDING OBSERVATIONS

The problem of illiquidity, bad assets, inadequate capital, excessive leverage, faulty market incentives, information fog, asset bubbles, spiralling growth in money and credit, and similar usual suspects continue to challenge the effectiveness of any progress in the evolving architecture for promoting financial stability. The 2008 global financial crisis offers another

[22] Gillian Tett, Krishna Guha and Joanna Chung, "The Cost of a Lifeline," *Financial Times*, April 24, p. 11.

opportunity to undertake a major revamp of the architecture, given particularly the growing challenge to the prime international brand – "free market economy." The sub-prime crisis has clearly brought to the fore the possibility of sudden swings in re-pricing of risk in the markets, abrupt and simultaneous evaporation of market as well as funding liquidity, inadequacy of capital cushions available even to the leading international banks, tendency for emergence of shadow banking to emerge as a reaction to regulations, mushrooming growth of non-regulated entities and their growing influence over the financial markets, the growing unreliability of ratings, the weaknesses in model-based risk analyses, the information fog surrounding the market even in matured and advanced financial systems, and above all, the wrong and unregulated incentives in the market which reward risk taking handsomely without corresponding penalty for the consequences of large exposures to risk. Unclear policy positions on certain old unresolved issues have also vitiated the atmosphere further, which include uncertainty surrounding appropriate monetary policy response to asset price cycles, systemic liquidity support *versus* guaranteed standing bailout packages, financial openness *versus* appropriate restrictions, falling information content of the conventional macro-economic and financial soundness indicators and the associated challenges to deal with the complications for the conduct of effective policies, and the appropriate approach to manage the devil of derivatives. Moreover, past achievements of the authorities in promoting financial stability could on their own may create new risks to the financial system , as fall in 'risk premium' and rising 'irrational complacency' could at times may result from the perception that progress on financial stability architecture is adequate enough to provide a buffer against crisis.

The global financial stability architecture has evolved over the years as a result of both pro-active and reactive responses by the concerned international and the national institutions that have been empowered and mandated to promote financial stability as a public good. The sub-prime crisis provides another opportunity to all these entities – ranging from the IMF, the international standard setting bodies for the financial sector led by the BIS, to international rating agencies, to national central banks and regulatory authorities – to react and revamp the architecture. Sub-prime crisis revealed that credit, market, liquidity, operational and other risks could be highly inter-linked, as one could lead to the other, suggesting the need for an Enterprise Risk Management (ERM) approach. Stress tests and scenario analyses are meant to focus on the down side risks, which must be conducted in a broad ERM canvas. Implementation of Basel-II prior to the crisis might have helped in addressing some of the sub-prime related problems, as it would have ensured capital charges even for off balance-sheet exposures assumed through shadow banking conduits, more risk sensitive treatment for securitisation related exposures, greater risk differentiation while changing the exposure from prime to sub-prime loans or from corporate lending to leveraged lending, capital charge for operational risk, and more rigorous risk assessment frameworks within the banks. But in the presence of severely flawed ratings and the deficiencies in internal mark-to-market models for valuation of illiquid assets, even Basel-II could not have prevented the sub-prime crisis. The Basel Committee on Banking Supervision has already announced in April 2008 new measures to enhance the resilience of the banking systems to financial shocks, which include sufficient capital requirement for off-balance sheet exposures, complex structured products and liquidity support extended to conduits; recognise the possibility of growing share of illiquid assets in the trading books of banks and the limitations of value-at-risk framework to ensure capital requirement assessment for risk exposure in the trading book and, hence, the possible use of "incremental default risk"

concept to capture the remaining potential event risk in the trading book; new Pillar-2 supervisory review guidelines for banks' stress testing practices, management of off-balance sheet exposures, risk management practices relating to securitisation activities, and assessment of banks' valuation practices; and enhanced disclosure under Pillar-3, particularly relating to structured finance and securitisation exposures as well as activities of the bank sponsored conduits. The Basel Committee also aims at strengthening the liquidity management systems of banks, emphasizing the need for adequate liquidity cushions with banks to weather prolonged periods of market stress, contingency funding plans, and stress testing that accounts for institution specific as well as market wide potential liquidity shocks. While the regulatory responses in individual countries to lessons from the sub-prime crisis could differ depending on the respective market conditions, and while the international standards may still take some time to evolve and stabilise, as underscored by the IMF, "rush to regulate" should not happen at the cost of "stifling market innovations." Central banks in general have to search for options to limit the moral hazard associated with limitless supply of funding liquidity during a crisis, that too over longer time duration, to broader groups of counterparties and against wider range of securities, given particularly the close relationship between funding liquidity and market liquidity during a crisis. The conflicting policy options for the central banks to ensure both financial stability and low and stable inflation became clearly evident as rising inflation in 2008, requiring tighter monetary policy, coincided with a financial crisis, which necessitated sharp easing of monetary policy stance. The effectiveness of grand bailout plans in saving finance and preventing another Great Depression would be known only in future.

Blending of banking and capital markets, in the face of scope for generating high return from speculation in financial markets, is fraught with the risk of banks working primarily to feed capital markets by first shifting risks from the balance sheet (through securitisation or by buying protection against default in the credit derivatives market), and then helping in repackaging that into opaque instruments (such as CDOs and CLOs, and even CDO-squared or re-securitisation), and encouraging leveraged speculation in these instruments to maximize profits in relation to slender capital, all of which though may appear perfectly legal from the stand point of not violating existing regulations. Credit, in that process, however, is increasingly getting traded in both cash and derivative markets, and the regulators have increased their faith in both ratings and models in their financial stability assessment architectures, which at best create illusory comforts, at the risk of leaving the dangerous impression that risk has been assessed correctly. The sub-prime crisis revealed that the sellers of insurance against default and the rating agencies jointly could convert toxic garbage into most sought after financial instruments; while bonus-driven investment bankers have the incentive to sell these papers, greed driven leveraged investors create an unsatiated demand for such papers. This suggests that the flawed incentives of those who expose the financial systems to risk, and the activities of the unregulated entties (like hedge funds, private equity funds, sovereign wealth funds, off-balance-sheet conduits, *etc.*) must receive adequate global policy response. Markets, however, continue to remain so powerful that any new regulation aimed at promoting financial stability could be easliy ridiculed by the market agents as anti-market. Markets, however, must recognise that use of ratings, models, and hedging instruments have persistently encouraged complacency by creating illusory perceptions of comfort about risk.

Complex derivatives and fast growth in that segment is a clear risk to financial stability, since despite the often highlighted benefits of derivatives in terms of scope for hedging and

distribution of risk as well as improved price discovery, derivatives over time have become a heaven for speculation, and instead of price discovery, actually accumulation of misalignments has supported assets price bubbles. As the sub-prime crisis revealed, instead of risk distribution, there could rather be significant risk concentration, and it may not also be that easy to know who may be holding the risk. It is possible that in response to the crisis a new wave of "dis-dis- intermediation" process may start, involving return to more conventional banking and new innovations like SIVs, CDOs *etc*. turning out of favour. The sudden disappearance of the big-5 investment banks explain that the process has already started. If such a market driven self-corrective reaction does not happen, then policy makers may have to intervene, with clearer views on ratings, models and derivatives. In the sphere of policy making, one could expect increasing role for macro-prudential regulations, stress-testing of low probability but high impact scenarios, and much greater emphasis on transparency and information disclosure for all non-regulated entities, if not the pressure of even regulating all of them.

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