UNDERSTANDING THE CURRENT FINANCIAL CRISIS

by

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EXECUTIVE SUMMARY

Financial markets suffered their one of the worst decline as the cost of borrowing for corporations continued to rise and some investors urged policymakers to help. Economists predicted that the tightening credit market would be a drag on the economy. Signs were emerging that the nation's credit problems were spreading in unpredicted ways due to the financial credit risk instruments used.

The aim of this final management project is to provide an understanding of the current financial crisis. It evaluates the fundamental causes which have lead to this crisis including a discussion of the main type of financial instruments which have been used, pricing issues, risk involved with those instruments, the economic impacts and some suggestions to rebuild market confidence in current financial downturn. Causes proposed include the inability of homeowners to make their mortgage payments, speculation, risky mortgage products, financial products that distributed, inaccurate credit ratings, affordable housing via the use of creative financing techniques, lack of transparency, unregulated over-the-counter (OTC) derivatives and fair value accounting

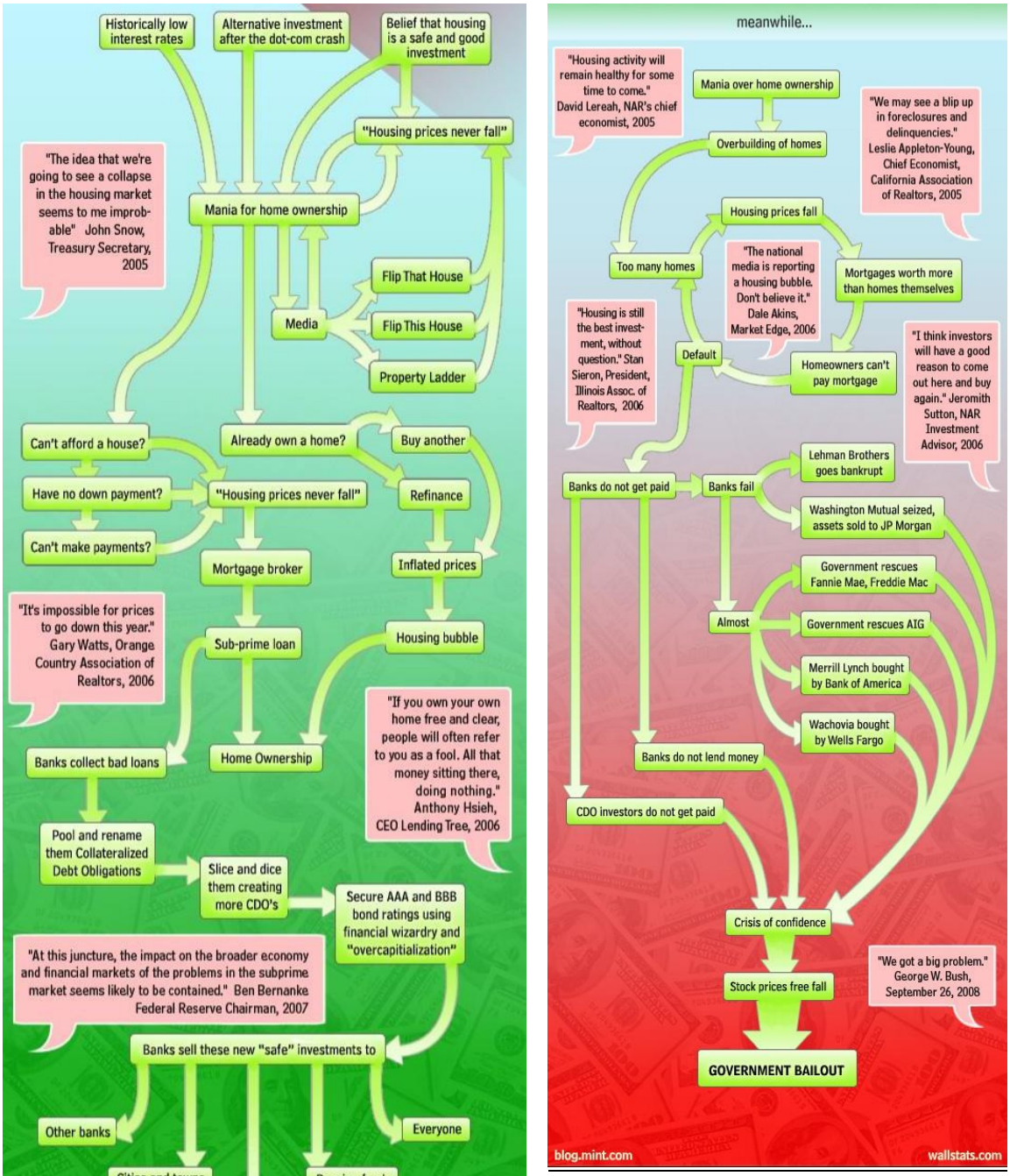
This paper recommends a strategy for this crisis resolution. Foremost, is to rebuild market confidence in structured assets by going back to "first principles" on issues such as market transparency, standardisation of contracts, accounting treatment, enhancement of the credit ratings system, securitization improvement and regulatory reform By reducing complexity on the trade of structured assets through simple deal structures and providing investors with the information they need to analyze collateral, for example by requiring SEC registration and public pricing of assets, much of the current liquidity problem is ameliorated.

1. BACKGROUND

The current financial crisis triggered by a dramatic rise in mortgage delinquencies and foreclosures in the United States, with major adverse consequences for banks and financial markets around the globe. The crisis became apparent in 2007 and has exposed pervasive weaknesses in financial industry regulation and the global financial system.

Figure 1 provides an overview of the financial crisis. Many USA mortgages issued in recent years are subprime, meaning that little or no downpayment was made, and that they were issued to households with low incomes and assets, and with troubled credit histories. When USA house prices began to decline in 2006, mortgage delinquencies soared, and securities backed with subprime mortgages, widely held by financial firms, lost most of their value. The result has been a large decline in the capital of many banks and USA government sponsored enterprises, tightening credit around the world.

Figure 1: Visual Guide of Financial Crisis



Source: http://www.mint.com/blog/finance-core/a-visual-guide-to-the-financial-crisis/

The crisis began with the bursting of the United States housing bubble and high default rates on "subprime" and adjustable rate mortgages (ARM), beginning in approximately 2005–2006 (Lahart 2007). Government policies and competitive pressures for several years prior to the crisis encouraged higher risk lending practices (Wallison and Calomiris 2008), Further, an increase in loan incentives such as easy initial terms and a long-term trend of rising housing prices had encouraged borrowers to assume difficult mortgages in the belief they would be able to quickly refinance at more favorable terms. However, once interest rates began to rise and housing prices started to drop moderately in 2006–2007 in many parts of the U.S., refinancing became more difficult. Defaults and foreclosure activity increased dramatically as easy initial terms expired, home prices failed to go up as anticipated, and ARM interest rates reset higher. Foreclosures accelerated in the United States in late 2006 and triggered a global financial crisis through 2007 and 2008. During 2007, nearly 1.3 million U.S. housing properties were subject to foreclosure activity, up 79% from 2006 (RealtyTrac 2008).

Structured products such mortgage-backed securities (MBS) and Collateralized Debt Obligation (CDO), which derive their value from mortgage payments and housing prices, had enabled financial institutions and investors around the world to invest in the U.S. housing market. Major banks and financial institutions had borrowed and invested heavily in MBS and reported losses of approximately US$435 billion as of 17 July 2008 (Onaran 2008). The liquidity and solvency concerns regarding key financial institutions drove central banks to take action to provide funds to banks to encourage lending to worthy borrowers and to restore faith in the commercial paper markets, which are integral to funding business operations. Governments also bailed out key financial institutions, assuming significant additional financial commitments.

The housing market downturn and subsequent financial market crisis were primary factors in several decisions by central banks around the world to cut interest rates and governments to implement economic stimulus packages. These actions were designed to stimulate economic growth and inspire confidence in the financial markets. Effects on global stock markets due to the crisis have been dramatic. Between 1 January and 11 October 2008, owners of stocks in U.S. corporations had suffered about $8 trillion in losses, as their holdings declined in value from $20 trillion to $12 trillion. Losses in other countries have averaged about 40% according to *Wall Street Journal* Oct. 11, 2008, p.1

Losses in the stock markets and housing value declines place further downward pressure on consumer spending, a key economic engine (Friedman 2008).Leaders of the larger developed and emerging nations met in November 2008 to formulate strategies for addressing the crisis (McKee and Kennedy 2008).

1.1. Sub-Prime Loan

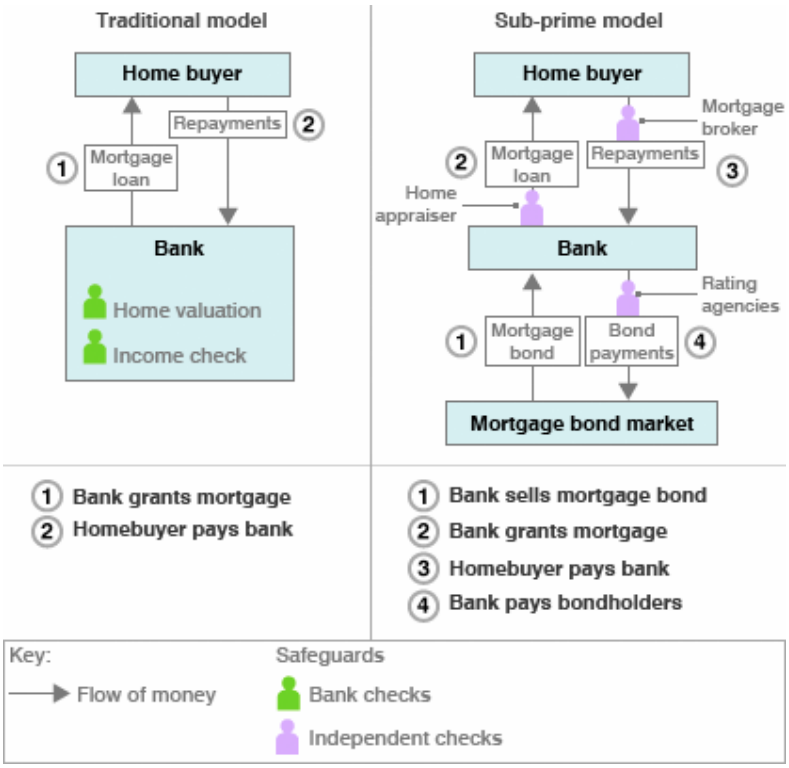
Subprime mortgage is the practice of lending for the purchase of residences, to borrowers who do not meet the usual criteria for borrowing at the lowest prevailing market interest rate. These criteria pertain to the downpayment and the borrowing household's income level, both as a fraction of the amount borrowed, and to the borrowing household's employment status and credit history. If a borrower is delinquent in making timely mortgage payments to the bank or other financial firm, the lender can take possession of the residence acquired using the proceeds from the mortgage, in a process called foreclosure.

The value of all outstanding residential mortgages, owed by USA households to purchase residences housing at most 4 families, was US$9.9 trillion as of year-end 2006, and US$10.6 trillion as of midyear 2008 (Board of Governors of the U.S. Federal Reserve System 2008). During 2007, lenders had begun foreclosure proceedings on nearly 1.3 million properties, a 79% increase over 2006 (RealtyTrac 2008). As of August 2008, 9.2% of all mortgages outstanding were either delinquent or in foreclosure (MBA Survey 2008). 936,439 USA residences completed foreclosure between August 2007 and October 2008 (Clifford 2008)

1.2. Default/Credit Risk

Credit risk arises because a borrower has the option of defaulting on the loan he owes. Traditionally, lenders/ banks the credit risk on the mortgages they issued. Over the past 60 years, a variety of financial innovations have gradually made it possible for lenders to sell the right to receive the payments on the mortgages they issue, through a process called securitization. Figure 2 is the comparison between traditional vs. subprime model. The resulting securities are called mortgage backed securities (MBS) and collateralized debt obligations (CDO). Most American mortgages are now held by mortgage pools, the generic term for MBS and CDOs. Of the $10.6 trillion of USA residential mortgages outstanding as of midyear 2008, $6.6 trillion were held by mortgage pools and $3.4 trillion by traditional depository institutions (Board of Governors of the U.S. Federal Reserve System 2008).

Figure 2: Comparison between Traditional Lending vs. Subprime Lending



Source: BBC News (see http://news.bbc.co.uk/2/hi/business/7073131.stm)

The payments received by MBS and CDO investors decline and the perceived credit risk rises when homeowners default. This has had a significant adverse effect on investors and the entire mortgage industry. The effect is magnified by the high debt levels (financial leverage) households and businesses have incurred in recent years. Finally, the risks associated with American mortgage lending have global impacts, because a major consequence of MBS and CDOs is a closer integration of the USA housing and mortgage markets with global financial markets.

MBS and CDOs investors can insure against credit risk by buying credit defaults swaps (CDS). As mortgage defaults rose, the likelihood that the issuers of CDS would have to pay their counterparties increased. This created uncertainty across the system, as investors wondered if CDS issuers would honor their commitments.

2. FINANCIAL INSTRUMENTS USED, PRICING AND ASSOCIATED RISKS

The financial market tensions were triggered subprime mortgage market and financial instruments related to structured finance.

There are two main categories of structured finance instruments. Firstly one participated an important role in the initiation and spread of the turmoil and includes mortgage-backed securities (MBS), asset-backed commercial paper (ABCP) and collateralized debt obligations (CDOs), both cash-flow and synthetic. Secondly those that have been more instrumental in monitoring the crisis; Credit default swaps (CDS) both single name and index contracts. An overview of the specific contagion channels involving various structured finance instruments will be discussed in the conclusion.

IMF (2008) has concluded that "… the proliferation of new complex structured finance products, markets, and business models exposed the financial system to a funding disruption and a breakdown in confidence" and that certain structured finance products "… likely exacerbated the depth and duration of the crisis by adding uncertainty relating to their valuation as the underlying fundamentals deteriorated".

Banks underrated their exposures to structured finance products and to specific "off-balance sheet" vehicles which play an important role in this type of finance. Moreover, certain banks invested heavily in structured finance products, with keeping large exposures to specific structured finance instruments such as collateralized debt obligations, but without understanding sufficiently their impact on the banks' capital and liquidity positions.

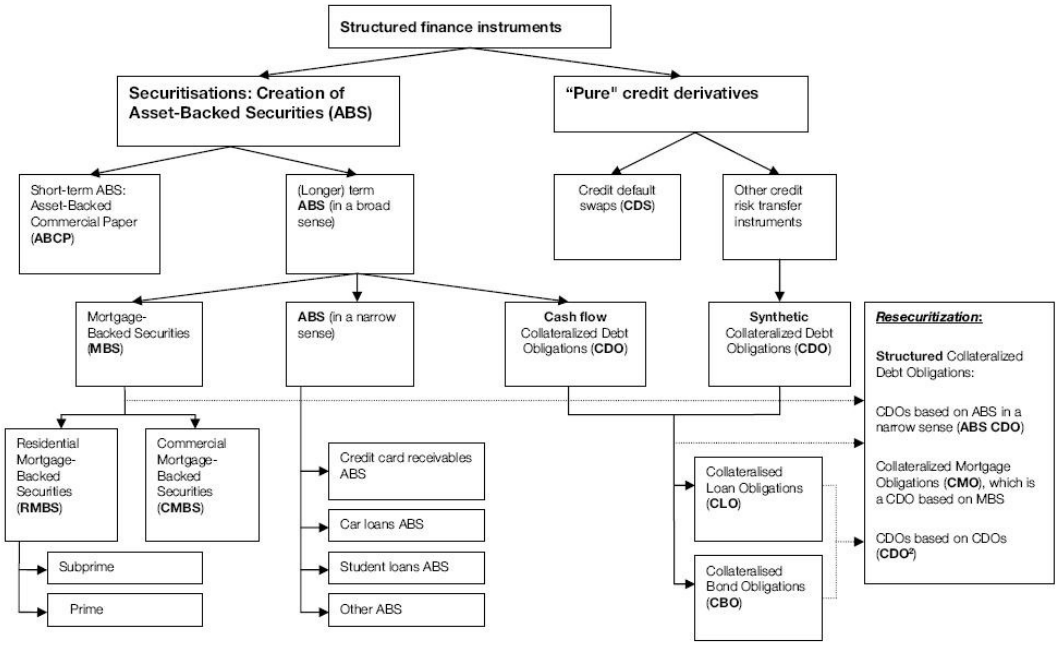
This chapter is organized as follows. Section 2.1 presents an overview of structured finance and discusses its specific characteristics. It also presents a detailed classification
of structured finance instruments that serves as a basis. Furthermore, it is explained that a number of structured finance instruments such as mortgage-backed securities (MBS), asset-backed commercial paper (ABCP) and collateralized debt obligations (CDOs) have been at the centre of the financial turmoil, whereas other instruments such as credit default swaps (CDS) have been more monitoring devices to assess the development of the financial turmoil. Section 2.2 pays attention to securitization and to the aforementioned specific structured

finance instruments that played an important role in the financial turmoil: MBS (section 2.2.1), ABCP (section 2.2.2) and (cash-flow) CDOs (section 2.2.3). Section 2.3 sets out the main characteristics of credit derivatives, in particular credit default swaps (CDS) (section 2.3.1) and synthetic CDOs (section 2.3.2).

2.1. Structured Finance

Structured finance is defined as a form of financial intermediation which is based on securitization technology: According to Fabozzi and Kothari (2007), structured finance is used almost interchangeably with securitization (see also: The Economist 2008; Blundell-Wignall 2007a, b; Citigroup 2007). Securitization involves the pooling of financial assets, especially those for which there is no ready secondary market, such as mortgages, credit card receivables, and student loans. The pooled assets serve as collateral for new financial assets issued by the entity (mostly GSEs and investment banks) owning the underlying assets.

Figure 3: Structured finance instruments and securitization



Source: Adapted from on Jobst (2003, 2006) and BIS (2005a).

Figure 3 provides an overview of the main structured finance instruments. In essence, these instruments can be divided in securitizations and credit derivatives. Securitizations consist of short-term ABS (Asset-Backed-Commercial Paper or ABCP) and longer-term ABS includes

three main categories: Mortgage-backed securities (MBS), asset-backed securities (ABS) and "cash flow" collateralized debt obligations (CDOs) (Jobst 2003, 2006; Vink and Thibeault 2007).

In relation to the financial turmoil of 2007-2008, different groups of structured finance instruments played different roles. First, due to uncertainties about their valuations and exposures to the US subprime mortgage markets, investors started to avoid them. The structured finance instruments involved: residential mortgage-backed securities (RMBS), asset-backed commercial paper (ABCP) and collateralized debt obligations (CDOs), including both "cash flow" and "synthetic" CDOs. Second, Credit Default Swaps (CDS) have been instrumental in monitoring pressures in specific market segments through CDS index contracts, which are representative for a group of companies, as well as uncertainties about the soundness and viability of individual commercial and investment banks and insurance companies through single name CDS contracts. Both groups of structured finance instruments related to the financial turmoil will be discussed in the subsequent sections.

2.2. Securitization and the creation of asset backed securities

This section explains the basic principles of securitization and the creation of asset-backed securities and presents examples of securitizations which have played the most prominent roles in the financial turmoil of 2007-2008. These are mortgage-backed securities (MBS), asset-backed commercial paper (ABCP) and (cash-flow) collateralized debt obligations (CDOs).

2.2.1. Mortgage-Backed Securities (MBS)

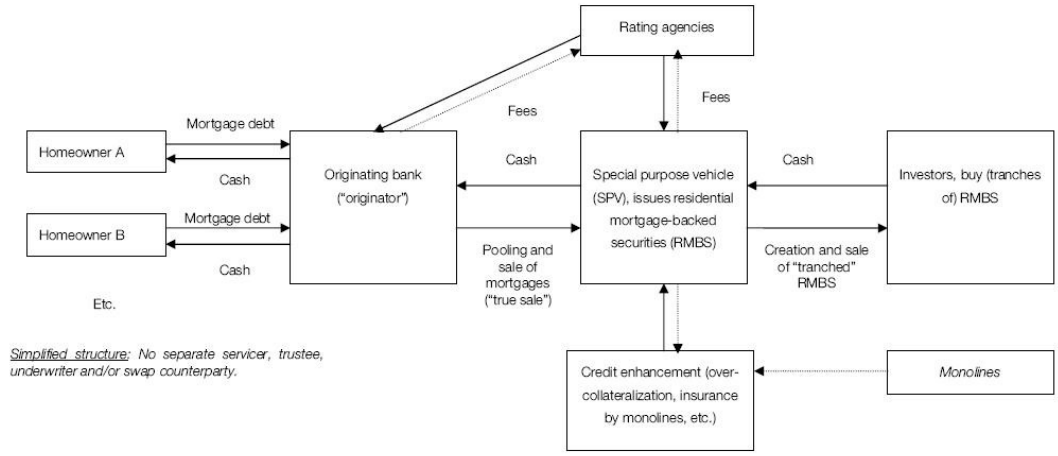
An ABS is a security created from a portfolio of loans, bonds, or other financial assets.
Suppose there are 10,000 subprime loans. Rather than keeping these as asset on the bank's balance sheet, it might sell them to special purpose vehicle (SPV), also known as conduit. The SPV issues securities that are backed by the cash-flow of the loans and sell them to investors. The investors' return solely depends on the cash flows from the loans. The bank earns a fee for originating and servicing the loans. However the credit risk associated with the loans is passed to the investors.

A mortgage-backed security (MBS) is an ABS whose cash flows are backed by the principal and interest payments of a set of mortgage loans. Payments are typically made monthly over the lifetime of the underlying loans.

Residential mortgages Backed Securities (RBMS) have option to pay more than the required monthly payment (curtailment) or to pay off the loan in its entirety (prepayment). Because curtailment and prepayment affect the remaining loan principal, the monthly cash-flow of an MBS is not known in advance, and therefore presents an additional risk to MBS investors.

Commercial mortgage-backed securities (CMBS) are secured by commercial and multifamily properties (such as apartment buildings, retail or office properties, hotels, schools, industrial properties and other commercial sites). The properties of these loans vary, with longer-term loans (5 years or longer) often being at fixed interest rates and having restrictions on prepayment, while shorter-term loans (1-3 years) are usually at variable rates and freely pre-payable

Figure 4: Creation of Cash-flow residential mortgage-backed securities (RMBS)

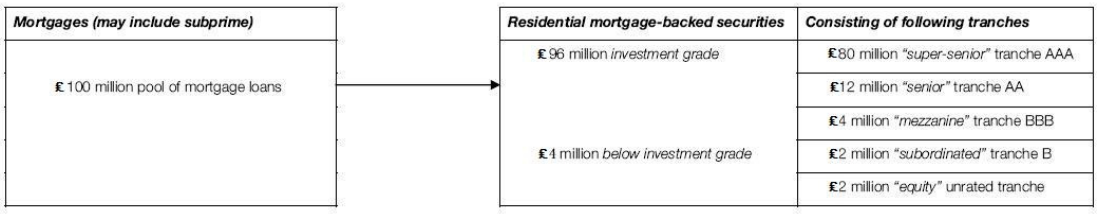


Source: Adapted from: ECB (2008a), Mengle (2007), Fabozzi et al. (2006), Elul (2005), Gorton and Souleles (2005), The Bond Market Association (2004) and Jobst (2003).

Figure 4 show the creation of RMBS. A bank provides mortgage loans to various homeowners A, B, etc., and puts these mortgages together in a pool of many mortgages. Subsequently, this bank that has "originated" these loans, sells the pool of mortgages to a SPV, in return for cash. In this "true sale" securitization, the mortgage loans disappear from

the balance sheet of the bank. In order to finance its purchase of the mortgage pool, the SPV issues RMBS and sells these securities to various investors. The RMBS sold are "tranched" in specific classes according to their credit risk rated by the rating agencies (Elul 2005; Citigroup 2007). Thus, a tranche can be defined as a specific portion of a securitized portfolio of assets (Morgan Stanley 2008), based on a group of assets with similar credit risk characteristics.

Figure 5: "Tranched" residential mortgage-backed securities



The process of tranching is shown in Figure 5. On the basis of a pool of mortgages of £100 million, RMBS are created which consist of £96 million of investment grade securities, subdivided in tranches rated "super-senior" AAA, "senior" AA and "mezzanine" BBB. And for the £4 million of below investment grade securities subdivided in tranches rated "subordinated" B and "equity" unrated tranche.

Investors can buy specific tranches depending on their specific risk preferences. For example, pension funds often may have a preference for the less-risky, higher-rated but lower yielding AAA or AA tranches, whereas more risk-prone investors such as hedge funds may invest in the more risky and higher yielding B or equity tranches. Thus, in the process of the creation of the RMBS, rating agencies are of enormous importance, as they rate the bank that originates the mortgage loans, the SPV that creates the RMBS and the specific tranches of the RMBS.

The SPV may use credit enhancement techniques to raise the credit quality of the RMBS tranches issued. This implies the use of certain mechanisms that elevate the credit quality of the financial instruments involved and consequently protect investors from losses incurred on the underlying assets (Standard & Poor's 2007). This is attractive for the SPV, because if it can raise the rating of some part of the RMBS issued, it can lower its financing costs on this debt. For example, by using credit enhancement techniques, it may be able to issue a greater

part of the RMBS tranches at investment grade level. Credit enhancement can take many forms but some common credit enhancements are over-collateralization and third-party guarantees by *financial guarantors* or *monolines* (see Figure 4). In the case of over-collateralization, the amount of RMBS issued is less than the amount of the underlying assets or collateral. In the case of monolines, they may guarantee that interest and principal of the RMBS issued will be paid on time and in full in the event of a default by the SPV issuing the paper. They can do this by either issuing financial guaranties (or "wraps") or by selling protection via credit default swaps (CDSs) (Moody's 2008).

The underlying mortgages of RMBS issues can be either of "prime" or "subprime" quality, depending on the creditworthiness of the respective borrowers. The financial turmoil that started in the summer of 2007 originated in the subprime mortgage markets and affected particular those structured finance instruments that were collateralized by these assets (Ashcraft and Schuerman 2007).

PRICING

The basis of MBS pricing are: default risk (credit risk) and interest rate (IR) exposure and early redemption (prepayment). The number of homeowners in residential MBS securitizations who prepay goes up when interest rates go down. One reason for this phenomenon is that homeowners can refinance at a lower fixed interest rate. Commercial MBS often mitigate this risk using call protection.

Solving mathematical models of MBS value is a difficult problem in finance since these two sources of risk (IR and prepayment) are linked. The level of difficulty rises with the complexity of the IR model, and the sophistication of the prepayment IR dependence, to the point that no closed form solution (i.e. one you could write it down) is widely known. In models of this type numerical methods provide approximate theoretical prices. These are also required in most models which specify the credit risk as a stochastic function with an IR correlation. Practitioners typically use Monte Carlo method or Binomial Tree numerical solutions.

Prepayment risk tends to occur when floating rates drop and the fixed income of the bond would be more valuable (negative convexity).To compensate investors for the prepayment risk associated, they trade at a spread to government bonds.

The credit risk of MBS depends on the likelihood of the borrower paying the promised cash flows (principal and interest) on time. The credit rating of MBS is fairly high because:

1. The mortgage originator will generally research the mortgage taker's ability to repay, and will try to lend only to the credit-worthy.
2. Some MBS issuers, such as Fannie Mae, Freddie Mac, and Ginnie Mae, guarantee against homeowner default risk. In the case of Ginnie Mae, this guarantee is backed with the full faith and credit of the US Federal government. This is not the case with Fannie Mae or Freddie Mac, but these two entities have lines of credit with the US Federal government; however, these lines of credit are extremely small when compared with the average amount of money circulated through Fannie Mae or Freddie Mac in one day's business. Additionally, Fannie Mae and Freddie Mac generally require private mortgage insurance on loans in which the borrower provides a down payment that is less than 20% of the property value.
3. Pooling many mortgages with similar default probabilities creates a bond with a much lower probability of total default, in which no homeowners are able to make their payments. Although the risk neutral credit spread is theoretically identical between a mortgage ensemble and the average mortgage within it, the chance of catastrophic loss is reduced.
4. If the property owner should default, the property remains as collateral. Although real estate prices can move below the value of the original loan, this increases the solidity of the payment guarantees and deters borrower default.

If the MBS was not underwritten by the original real estate & the issuer's guarantee the rating of the bonds would be very much lower. Part of the reason is the expected adverse selection against borrowers with improving credit (from MBSs pooled by initial credit quality) who would have an incentive to refinance (ultimately joining an MBS pool with a higher credit rating).

Most traders and money managers use Bloomberg and Intex to analyze MBS pools. Intex is also used to analyze more esoteric products. Some institutions have also developed their own

proprietary software. TradeWeb is used by the largest bond dealers ("primaries") to transact round lots ($1 million+).

If the buyer acquired a pool at a premium then they are at risk for prepayment. If the purchase price was 105, the investor loses 5 cents for every dollar that's prepaid, possibly significantly decreasing the yield. This is likely to happen as holders of higher-coupon MBS have good incentive to refinance.

Conversely, it may be advantageous to the bondholder for the borrower to prepay if the low-coupon MBS pool was bought at a discount. This is due to the fact that when the borrower pays back the mortgage he does so at "par". So if the investor bought a bond at 95 cents on the dollar, as the borrower prepays he gets the full dollar back and his yield increases. This is unlikely to happen as holders of low-coupon MBS have very little incentive to refinance.

The price of an MBS pool is also influenced by the loan balance. Common specifications for MBS pools are loan amount ranges that each mortgage in the pool must pass. Typically, high premium (high coupon) MBS backed by mortgages no larger than 85k in original loan balance command the largest pay-ups. Even though the borrower is paying an above market yield, they are dissuaded to refinance a small loan balance due to the high fixed cost involved.

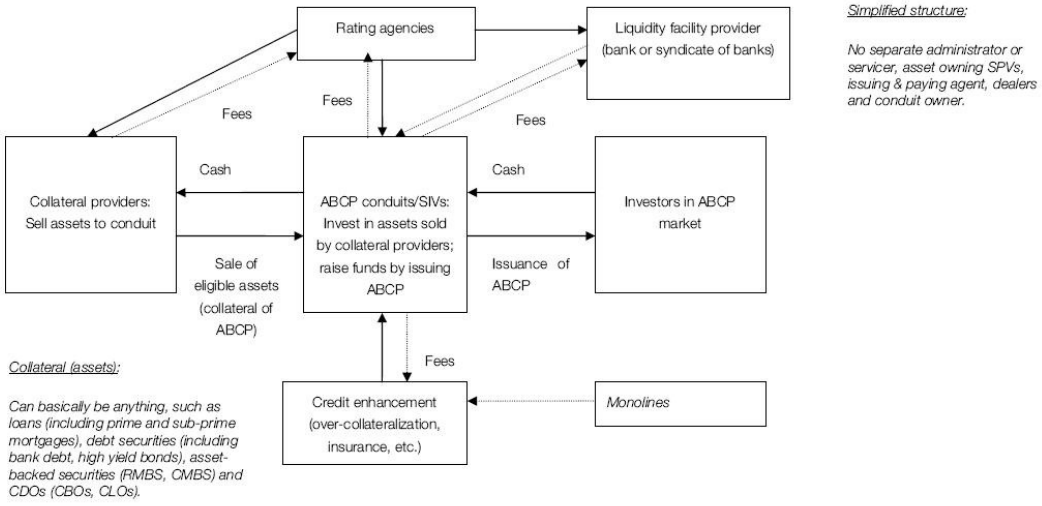
2.2.2. Asset-backed commercial paper (ABCP)

Asset-backed commercial papers (ABCP) are collateralized short-term debt instruments, which are constantly rolled over and issued by so-called conduits (which include Structured Investment Vehicles or SIVs) to finance investments in often longer-term securities (Fitch Ratings 2001; Moody's 2003). These securities can be regarded as the collateral underlying the ABCP issued, in other words are the "asset-backed" component of ABCP.

To obtain financing, certain investors/collateral providers which can be banks or other entities can sell certain assets to an ABCP conduit. Figure 6 explains the basic mechanism of ABCP. These assets need to be eligible to have a certain rating that allows the conduits to purchase them. The ABCP conduit finances its purchase of the eligible assets by issuing ABCP, which is subsequently bought by investors in the ABCP market. In order to make the paper more attractive for the investors, often credit enhancement is sought. Finally, an ABCP program involves the presence of a liquidity provider (bank or syndicate of banks), which commits itself to provide liquidity to the ABCP conduit in case of financing shortages (for example

when the conduit cannot issue sufficient amounts of ABCP and consequently experiences a financing gap). This liquidity support may be important, since the ABCP issued has short to very short maturities.

Figure 6: Creation of Asset-Backed Commercial Paper (ABCP) by ABCP conduits/SIV



Source: Adapted from: Fitch Ratings (2001, 2007), Moody's (2003).

Structured Investment Vehicles or SIVs specialized in investing in structured finance products were hit the hardest in the turmoil. An overview of these and other ABCP conduits is provided in Table 1

Table 1: Types of ABCP conduits

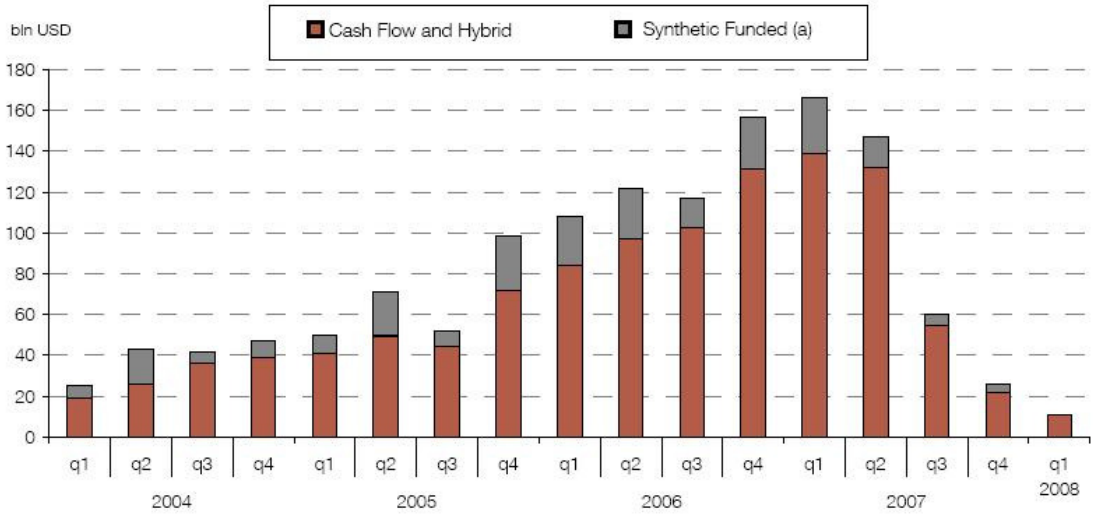
	% of total[1] (US, end-March 2007)	Types of conduits
Single-seller conduits	16%	Conduits based on a single collateral provider which sells assets to the conduit. These conduits are often managed by a finance subsidiary of a large company or by a bank for its own business. For example, Ford Motor Company has its own finance subsidiary ("Ford Motor Credit") which manages the conduit FCAR Owner Trust in order to finance specific activities of Ford (i.e. Ford Motor Company is the only seller of collateral).
Multi-seller conduits	54%	Conduits based on various collateral providers. For example, a bank can set up a multi-seller conduit to provide financing for a variety of bank clients. Collateral is mostly provided in the form of loans (i.e. trade, car, credit card, commercial and equipment loans/receivables). Limited exposure to mortgages and CDOs (8% respectively 4% of total collateral, end-March 2007).
Hybrid-conduits		Multi-seller conduits that not only invest in loans but also in securities.
Securities arbitrage conduits	15%	Conduits that have been especially established to exploit arbitrage opportunities. Most often used is "maturity arbitrage" (on the term structure of credit spreads) by issuing short-term ABCP and investing the proceeds in longer-term assets. Another possible form of arbitrage is arbitrage by banks, which seek arbitrage opportunities or capital relief associated with moving assets off the balance sheet. The exposure of these conduits to mortgages and CDOs is much larger than with single and multi-seller conduits (33% respectively 26% of total collateral, end-March 2007)
Structured investment vehicles (SIVs)	6%	Conduits which invest heavily in structured finance products (such as asset-backed securities) and obtain funds by issuing ABCP and medium-term notes (MTN) and long-term capital notes. SIV funds consist between one-third to more than 50% of ABCP; on average 35% of their liabilities consist of ABCP. SIVs also conduct "maturity arbitrage" by issuing short and medium-term paper and investing the proceeds in long-term credit assets. These conduits have significant investments in asset-backed securities. For example, as of end-October 2007, according to Moody's, SIV's assets comprised of prime US RMBS (11.3% of total assets), non-US RMBS (8.6%) and CMBS (7.4%). In addition, direct exposure to non-prime US RMBS was around 5%. Thus in total, almost one-third of SIV assets was linked to mortgage-backed securities. Further important assets were bank debt securities (29.4%) and CDOs (12.1%).
CDO program conduits (SIV-lites)	4%	Conduits that partly or fully finance specific CDO tranches by issuing ABCP. They operate more like CDOs than like "traditional" SIVs.
Other	5%	

Source: Moody's (2002, 2003, 2008a,b), BIS (2008d), Deutsche Bank (2007), JP Morgan (2007), Polizu (2007).

2.2.3. Cash-flow collateralized debt obligations (CDOs)

Collateralized debt obligations (CDOs) are securities that are based on the packaging of in particular higher risk assets, such as risky loans, mortgages, bonds and asset backed securities, into a new security (Cousseran and Rahmouni 2005; Lucas et al. 2007). There are a number of ways to classify CDOs. The main classification of CDOs is based on the specific way credit risk is being transferred, in accordance with similar practices in securitizations in general. If the SPE/SPV of a CDO owns the underlying debt obligations, the CDO is referred to as a *"cash flow"* CDO. In case the SPE/SPV does not acquire the portfolio of underlying debt instruments, but sells a credit default swap (CDS) to transfer the credit risk exposure of these instruments, the CDO is referred to as a *"synthetic"* CDO. As shown in Chart 1, the bulk of CDOs exist of cash flow" CDOs (including "hybrid" CDOs), with a much smaller share accounted for by "synthetic" CDOs.

Chart 1: Global CDO issuance by type

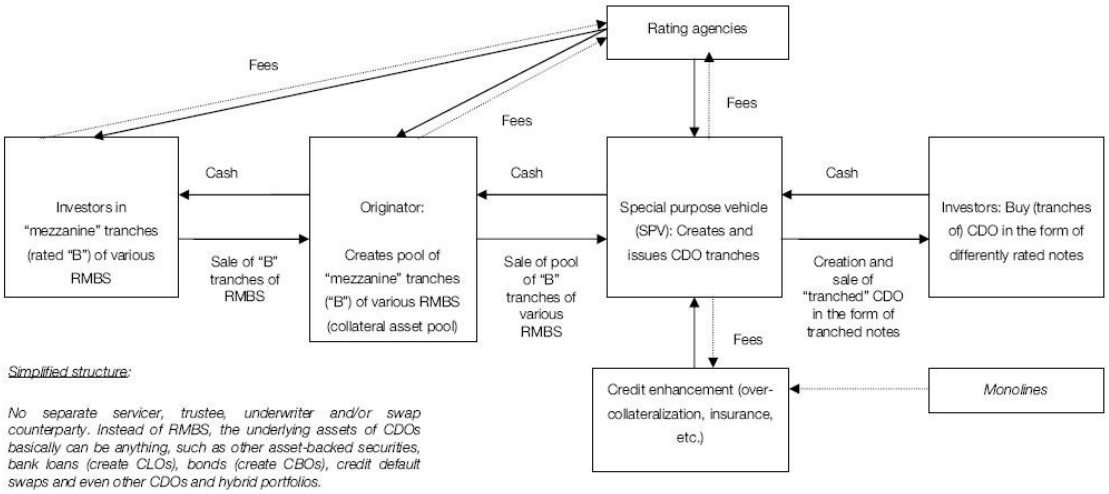


Source: SIFMA (Securities Industry and Financial Markets Association)

The creation of a "cash flow" CDO is presented in Figure 7. This is a CDO based on an underlying pool of "mezzanine" tranches of residential mortgage-backed securities (RMBS). The "mezzanine" tranches of RMBs are usually rated BBB, thus are relatively low rated. In the example, the originator creates a pool of "mezzanine" tranches from various RMBS and sells this pool to the SPV. The SPV finances its purchase of the pool by issuing a CDO in the

form of "tranched" notes, which are bought by various investors. According to their risk preference, these investors buy either lower or higher-rated tranches, with corresponding higher or lower yields.

Figure 7: Creation of a cash-flow CDO based on "mezzanine" tranches of RMBS



Source: Adapted from: ECB (2008a), Renault (2007), IMF (2006), Cousseran and Rahmouni (2005) and Tavakoli (2003).

Another example of a structured CDO is a CDO based on other CDOs, which is called a CDO*2* (Citigroup 2005, 2006a). Thus, structured CDOs constitute an element of re-securitization, in other words consist of a "double layered securitization" process. This process has also been described as a broadening of securitization. See BIS (2008a), p. 5.

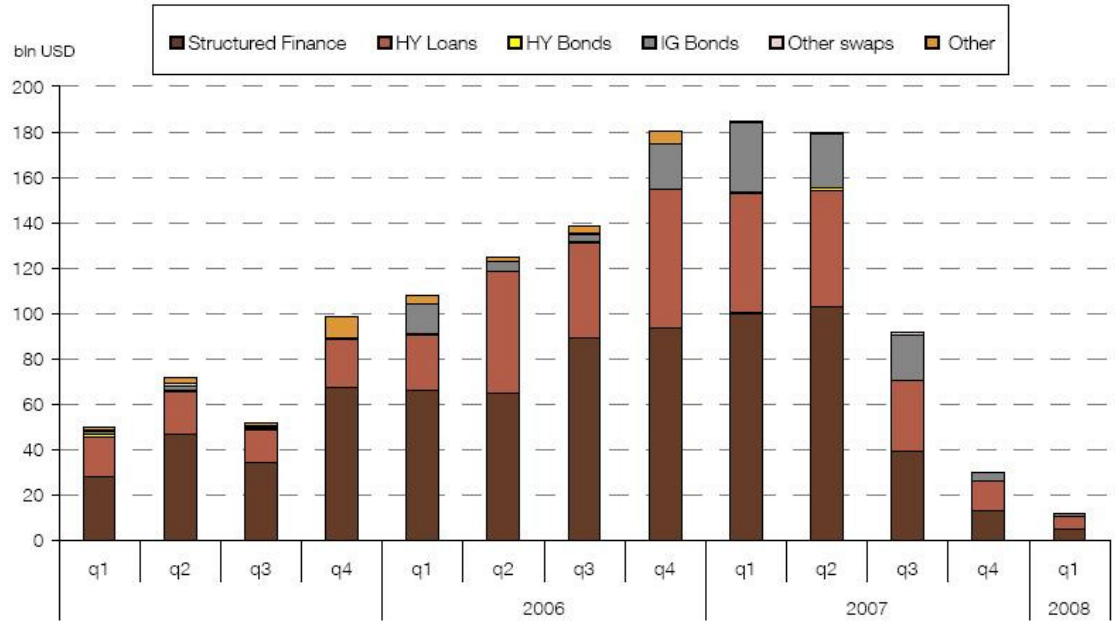
Table 2: Relationship between structured CDOs and the subprime crisis

	Types of CDOs based on various types of asset-backed securities (ABS) as collateral	
	CDOs with "high grade" rated ABS as collateral	CDOs with "mezzanine" rated ABS as collateral
Specific collateral:		
- Subprime residential mortgage-backed securities (subprime RMBS)	50%	77%
- Other residential mortgage-backed securities (RMBS)	25%	12%
- CDOs	19%	6%
- Other underlying collateral	6%	5%
	100%	100%

Source: BIS (2008a), p.3.

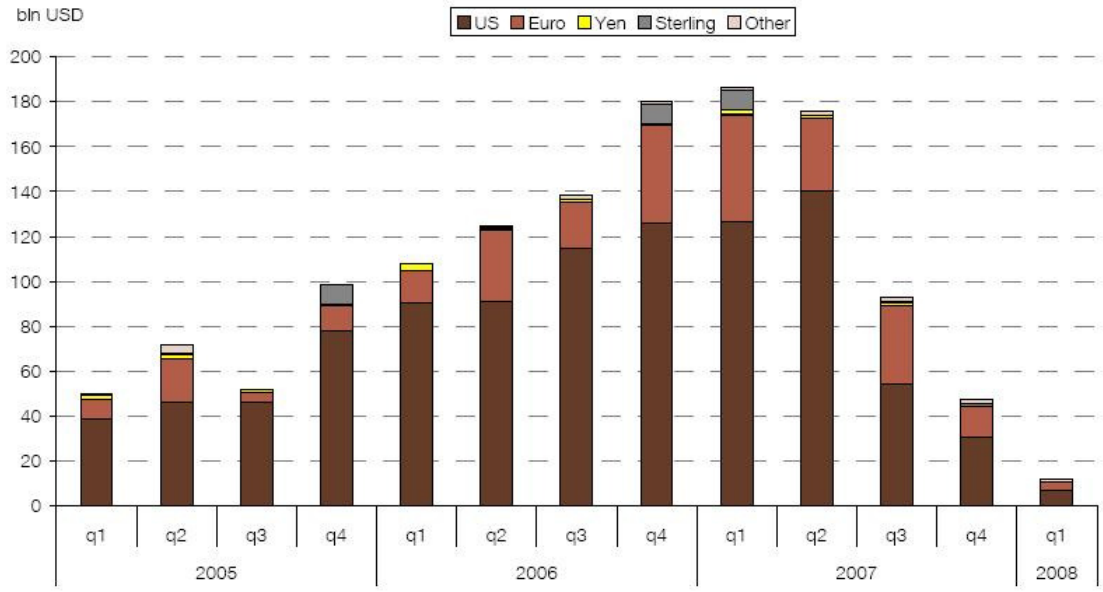
Table 2 shows how vulnerable in particular structured CDOs were to the US subprime mortgage crisis, in fact, they played a key role in the 2007-2008 financial turmoil (BIS 2008a) The table includes CDOs which are based on structured finance products, such as subprime and other residential mortgage-backed securities, CDOs and other underlying collateral. For example, 50% of the CDOs which were based on relatively highly rated "high grade" asset-backed securities (ABS) had in fact as collateral subprime residential mortgage-backed securities. For the CDOs based on lower rated "mezzanine" ABS this percentage was even 77%. Essentially what happened during the recent financial turmoil the credit spreads of these products widened drastically, inflicting huge valuation losses on investors (as prices went down sharply). Markets for these products completely dried up and as a result prices could not be established. Consequently, investors were not able to calculate their losses, which added to the growing uncertainty in global financial markets and led to a spill-over of the financial turmoil to other financial market segments. In the process, global CDO issuance completely collapsed, as is shown in Chart 1 (by type of CDO), Chart 2 (by type of collateral) and Chart 3 (by currency). This development intensified even more in the course of 2008.

Chart 2: Global CDO issuance by underlying collateral



Source: SIFMA (Securities Industry and Financial Markets Association)

Chart 3: Global CDO issuance by currency



Source: SIFMA (Securities Industry and Financial Markets Association)

2.3. Pure Credit Derivatives

Credit derivatives can be defined as private financial contracts under which an financial market participant buys or sells risk protection in a OTC market against the credit risk associated with a specific reference entity (or specific entities) (IMF 2007). The main credit derivatives are credit default swaps (CDS) and synthetic collateralized debt obligations (CDOs), with other instruments existing as well such credit-linked notes, total return swaps and credit spread options (BIS 2004; Mengle 2007; Partnoy and Skeel, Jr. 2007; Morgan Stanley 2008). The main types of credit default swaps are single name CDS and CDS index contracts, whereas an important category of synthetic CDOs are called index tranches-based CDOs. An overview of the development of these main credit derivatives is presented in Table 3, which shows that CDS index contracts expanded their market share rather significantly in recent years.

Table 3: Composition of credit derivatives market

	2000	2002	2004	2006
Single name CDS	38%	45%	51%	33%
CDS index contracts[2]	-	-	11%	38%
Synthetic CDO[3]	-	-	16%	17%
Others[4]	62%	55%	22%	12%
	100%	100%	100%	100%

Source: British Bankers' Association (2006).

A single-name credit default swap is a bilateral, off-balance-sheet agreement between two counterparties in which one party, the protection seller or writer, offers the other party, the buyer, protection or insurance against credit risk on a specified amount of face value of bonds (the notional principal) against a credit event by a third party (reference entity, reference asset) for a specified period of time, in return for premium payments (Chacko et al. 2006)

A credit default swap index contract can be interpreted as an insurance contract covering the default risk of the pool of debt instruments issued by the group of companies on which the index is based. Essentially, a CDS index contract is a private OTC transaction that enables

investors to take synthetic exposures or protection on a large diversified and standardized basket of reference entities, which may be as many as 125 corporate entities (Citigroup 2006b; Duffie 2007). A CDS index contract is divided in tranches (CDS index tranches), rather similar to other structured finance products. Technically, CDS index tranches are basically synthetic CDOs, which will be discussed in section 2.3.2

2.3.1. Credit Default swaps (CDS)

Credit default swap (CDS) is a contract that provides insurance against the risk of a default by particular company. The company is known as the reference entity and a default by the company is known as the credit event (Hull 2003).

As an example, imagine that an investor buys a CDS from ABC Bank, where the reference entity is XYZ Corp. The investor will make regular payments to ABC Bank, and if XYZ Corp defaults on its debt (i.e., misses a coupon payment or does not repay it), the investor will receive a one-off payment from ABC Bank and the CDS contract is terminated. If the investor actually owns XYZ Corp debt, the CDS can be thought of as hedging. But investors can also buy CDS contracts referencing XYZ Corp debt, without actually owning any XYZ Corp debt. This may be done for speculative purposes, to bet against the solvency of XYZ Corp in a gamble to make money if it fails, or to hedge investments in other companies whose fortunes are expected to be similar to those of XYZ.

If the reference entity (XYZ Corp) defaults, one of two things can happen:

- Either the investor delivers a defaulted asset to ABC Bank for a payment of the par value. This is known as physical settlement.
- Or ABC Bank pays the investor the difference between the par value and the market price of a specified debt obligation (even if XYZ Corp defaults, there is usually some recovery; i.e., not all your money will be lost.) This is known as cash settlement.

The price, or spread, of a CDS is the annual amount the protection buyer must pay the protection seller over the length of the contract, expressed as a percentage of the notional amount. For example, if the CDS spread of XYZ Corp is 50 basis points, or 0.5% (1 basis point = 0.01%), then an investor buying $10 million worth of protection from ABC Bank

must pay the bank $50,000 per year. These payments continue until either the CDS contract expires, or until XYZ Corp defaults.

All things being equal, a company with a higher CDS spread is considered more likely to default by the market, since a higher fee is being charged to protect against this happening. Both theoretical and empirical analysis have shown that the development of this spread provides important information about various risks faced by banks, such as overall credit risk and more specific counterparty and liquidity risk, and even have predictive power (see for example: Di Cesare 2006; Düllmann and Sosinska 2007). The actual movement of the spreads of banks' single name CDS contracts is indicative of specific tensions related to these banks and may be used to monitor how they have been affected by the 2007-2008 financial turmoil.

PRICING

The CDS pricing is based on two competing theories. First is ''probability model', takes the present value of a series of cash flows weighted by their probability of non-default. This method suggests that credit default swaps should trade at a considerably lower spread than corporate bonds. Second model, proposed by Duffie (2002) and also by Hull and White (2000), uses a no-arbitrage approach.

Under the probability model, a credit default swap is priced using a model that takes four inputs:

- the issue premium,
- the recovery rate (percentage of notional repaid in event of default),
- the credit curve for the reference entity and
- the LIBOR curve.

CDS price is the sum of the discounted premium payments if default events never occurred. So CDS pricing models have to take into account the possibility of a default occurring some time between the effective date and maturity date of the CDS contract. For the purpose of explanation we can imagine the case of a one year CDS with effective date t_0 with four quarterly premium payments occurring at times t_1, t_2, t_3, and t_4. If the nominal for the CDS is N and the issue premium is c then the size of the quarterly premium payments is Nc / 4. If we assume for simplicity that defaults can only occur on one of the payment dates then there are five ways the contract could end: either it does not have any default at all, so the four

premium payments are made and the contract survives until the maturity date, or a default occurs on the first, second, third or fourth payment date. To price the CDS we now need to assign probabilities to the five possible outcomes, then calculate the present value of the payoff for each outcome. The present value of the CDS is then simply the present value of the five payoffs multiplied by their probability of occurring.

For 'no-arbitrage' model proposed by Duffie, Hull and White, it is assumed that there is no risk free arbitrage. Duffie uses the LIBOR as the risk free rate, whereas Hull and White use US Treasuries as the risk free rate. Both analyses make simplifying assumptions (such as the assumption that there is zero cost of unwinding the fixed leg of the swap on default), which may invalidate the no-arbitrage assumption. However the Duffie approach is frequently used by the market to determine theoretical prices. Under the Duffie construct, the price of a credit default swap can also be derived by calculating the asset swap spread of a bond. If a bond has a spread of 100, and the swap spread is 70 basis points, then a CDS contract should trade at 30. However there are sometimes technical reasons why this will not be the case, and this may or may not present an arbitrage opportunity for the canny investor. The difference between the theoretical model and the actual price of a credit default swap is known as the basis.

Example from the market

In the case of Lehman Brothers, it is claimed that the widening of the bank's CDS spread reduced confidence in the bank and ultimately gave it further problems that it was not able to overcome. However, proponents of the CDS market argue that this confuses cause and effect; CDS spreads simply reflected the reality that the company was in serious trouble. Furthermore, they claim that the CDS market allowed investors who had counterparty risk with Lehman Brothers to reduce their exposure in the case of their default.

It was also reported after Lehman's bankruptcy that the $400 billion notional of CDS protection which had been written on the bank could lead to a net payout of $365 billion from protection sellers to buyers (given the cash-settlement auction settled at a final price of 8.625%) and that these large payouts could lead to further bankruptcies of firms without enough cash to settle their contracts (Duyn and Bullock 2008). However, industry estimates after the auction suggested that net cash flows would only be in the region of $7 billion (Duyn and Bullock 2008). This is because many parties held offsetting positions; for example if a

bank writes CDS protection on a company it is likely to then enter an offsetting transaction by buying protection on the same company in order to hedge its risk. Furthermore, CDS deals are marked-to-market frequently. This would have led to margin calls from buyers to sellers as Lehman's CDS spread widened, meaning that the net cash flows on the days after the auction are likely to have been even lower (ISDA 2008). Senior bankers have argued that not only has the CDS market functioned remarkably well during the financial crisis, but that CDS contracts have been acting to distribute risk just as was intended, and that it is not CDSs themselves that need further regulation, but the parties who trade them (Spectator Business 2008)

2.3.2. Synthetic CDOs

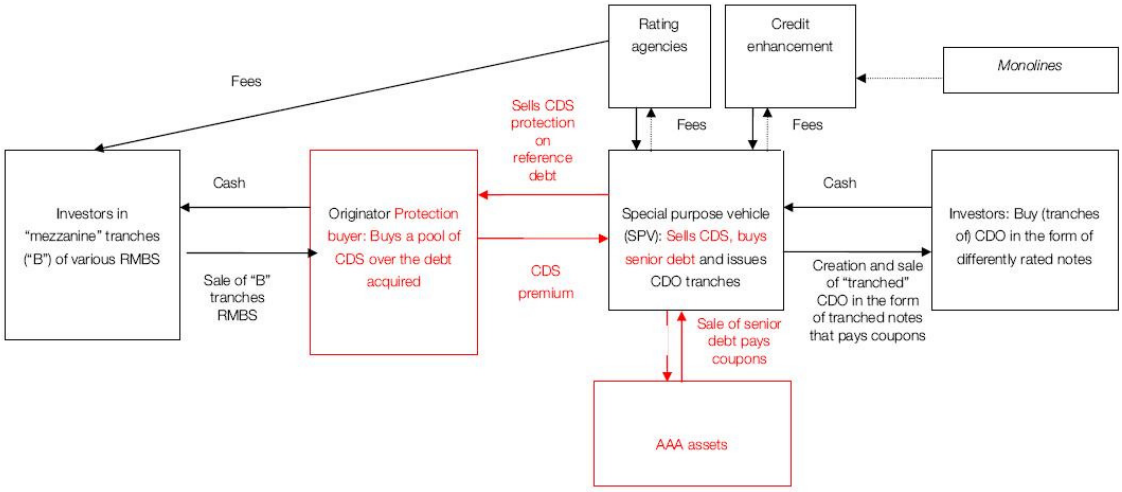
The structure we have described previously is known as a cash-flow CDO. A long position in a corporate bond has essentially the same credit risk as a short position in the corresponding CDS. Instead of forming a portfolio of corporate debt, the originator of the CDO forms a portfolio consisting of short positions in CDS. The credit risks are then passed on to tranches. A CDO created in this way is known as a synthetic CDO (Hull 2003)

In cash-flow CDO a number of different securities are created from a portfolio of corporate debt. There are rules for determining how credit losses are allocated. The result of the rules is that securities with both very high and very low credit ratings are created from the portfolio. A synthetic CDO creates similar set of securities from CDS. The standard market model for pricing both a kth-to-default CDS and tranches of a CDO is the one factor Gaussian copula model for time to default. Traders use the model to imply correlations from market quotes (Hull 2003)

An example of a synthetic CDO is shown in Figure 7b (with in red the changes from the "cash-flow" CDO). The originator only wants to get rid of the credit risk of the underlying pool of assets and not the physical assets themselves, in this case (similar as above) a pool of "mezzanine" tranches (rated "B") of various RMBS. The originator buys protection through a CDS contract with the SPE/SPV, which is the seller of protection and gets a CDS premium for the acquired exposure to the credit risk of the reference debt. The SPE/SPV transfers the credit exposure by issuing CDO tranches and selling it to investors (through the same process as in the cash-flow CDO). With the cash it receives from its investors, SPE/SPV buys senior low risk debt (rated AAA), receives the interest of that debt (coupons) and transfers a proportion of it to the investors. If a credit event occurs to the underlying debt, the SPE/SPV

sells the senior debt in order to pay the CDS protection to the originator. With the profit from the sale of this debt, the SPE/SPV also returns to the investors their principal-back payment. If the SPE/SPV lacks funds to fully repay all investors the principal amount that they invested in the tranched CDO, the order of payment follows the seniority of the tranches.

Figure 7b: Creation of a "synthetic" CDO based on "mezzanine" tranches of RMBS



Source: Adapted from Chacko et al. (2006).

Synthetic" CDOs played a rather active role in the propagation of the financial turmoil. In the context of actual and feared further downgrades of various financial guarantors (or monolines) and of CDOs by the rating agencies, a rapid unwinding of "synthetic" CDO positions by in particular hedge funds resulted in a further widening of credit spreads, as demand for these products collapsed (ECB 2008b).This process spilled over to other structured finance products such as residential and commercial mortgage-backed securities (RMBS and CMBS) and other asset-backed securities.

2.4. Risks associated with all the structured finance instruments

There are five primary categories of risk involved as a result of innovations in securitization:

1. Credit risk/Default risk: Traditionally, the risk of default/credit risk would be assumed by the bank originating the loan. However, due to innovations in securitization, credit risk is frequently transferred to third-party investors. The rights to mortgage payments

have been repackaged into a variety of complex investment vehicles, generally categorized as mortgage-backed securities (MBS) or collateralized debt obligations (CDO). Third-party investors receive a claim on the mortgage assets and related cash flows, which become collateral in the event of default. Another method of safeguarding against defaults is the credit default swap, in which one party pays a premium and the other party pays them if a particular financial instrument defaults.

2. Asset price risk: Structured products valuation is complex and related "fair value" or "mark to market" accounting is subject to wide interpretation. The valuation is derived from both the collectibility of subprime mortgage payments and the existence of a viable market into which these assets can be sold, which are interrelated. Rising mortgage delinquency rates have reduced demand for such assets. Banks and institutional investors have recognized substantial losses as they revalue their MBS downward. Several companies that borrowed money using MBS or CDO assets as collateral have faced margin calls, as lenders executed their contractual rights to get their money back. There is some debate regarding whether fair value accounting should be suspended or modified temporarily, as large write-downs of difficult-to-value MBS and CDO assets may have exacerbated the crisis
3. Liquidity risk: Companies and structured investment vehicles (SIV) often obtain short-term loans by issuing commercial paper, pledging mortgage assets or CDO as collateral. Investors provide cash in exchange for the commercial paper, receiving money-market interest rates. However, because of concerns regarding the value of the mortgage asset collateral linked to subprime and Alt-A loans, the ability of many companies to issue such paper has been significantly affected (Barr 2008).The amount of commercial paper issued as of 18 October 2007 dropped by 25%, to $888 billion, from the 8 August level. In addition, the interest rate charged by investors to provide loans for commercial paper has increased substantially above historical levels (Unmack 2007)
4. Counterparty risk: Major investment banks and other financial institutions have taken significant positions in credit derivative transactions, some of which serve as a form of credit default insurance. Due to the effects of the risks above, the financial health of investment banks has declined, potentially increasing the risk to their counterparties and creating further uncertainty in financial markets. The demise and bailout of Bear Stearns was due in-part to its role in these derivatives (The economist 2008a).

Systemic risk: The aggregate effect of these and other risks has recently been called systemic risk. According to Spence (2008) "systemic risk escalates in the financial system when formerly uncorrelated risks shift and become highly correlated. When that happens, then insurance and diversification models fail. There are two striking aspects of the current crisis and its origins. One is that systemic risk built steadily in the system. The second is that this buildup went either unnoticed or was not acted upon. That means that it was not perceived by the majority of participants until it was too late. Financial innovation, intended to redistribute and reduce risk, appears mainly to have hidden it from view. An important challenge going forward is to better understand these dynamics as the analytical underpinning of an early warning system with respect to financial instability."

3. CAUSES

The causes proposed for the crisis varied and complex. The crisis can be attributed to a number of factors pervasive in both housing and credit markets, factors which emerged over a number of years. Causes proposed:

Cause 1: Boom and bust in the housing market. The sustained price increase engenders the illusion in many actual and aspiring home owners that prices will never fall.

Cause 2: *Speculation*. During the housing boom, media widely reported condominiums being purchased while under construction, then being "flipped" (sold) for a profit without the seller ever having lived in them.

Cause 3: *High-risk mortgage loans and lending/borrowing practices*. Lender offer more loans to higher-risk borrowers including illegal immigrants (Kirchhoff and Keen 2007; Pasha 2005). One high-risk option was the "No Income, No Job and no Assets" loans, sometimes referred to as Ninja loans.

Cause 4: *Securitization practice*. Some believe that mortgage standards became lax because securitization gave rise to a form of moral hazard, whereby each link in the mortgage chain made a profit while passing any associated credit risk to the next link in the chain.

Cause 5: *Inaccurate credit ratings*. Critics allege that the rating agencies suffered from conflicts of interest, as they were paid by investment banks and other firms that organize and sell structured securities to investors.

Cause 6: *Affordable Housing via Creative Financing*. Boosting home ownership and home building was seen as a way to stimulate a sluggish economy. Nearly every mortgage lender in the U.S. incorporated the twin messages of “affordable housing” and “creative financing” into marketing, credit approval and product development efforts.

Cause 7 & 8: *Lack of transparency* and *Bad Regulation of Over The Counter Marke*t. Banks sell all the structured products via Over the Counter which is lack of transparency in major markets. The combination of OTC derivatives, risk-based capital requirements authorized by

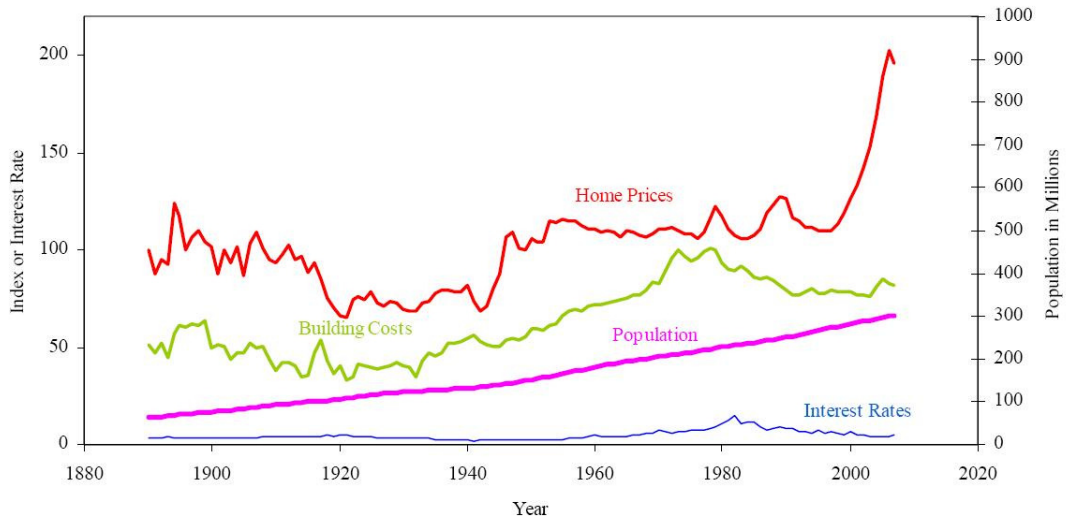
Congress in 1991 enabled Wall Street to create a de facto assembly line for purchasing, packaging and selling unregistered structured products a wide variety of institutional investors.

Cause 9: *Fair Value Accounting*. Since there currently is no market for CDOs and other structured assets, banks and financial institutions have no choice, under the fair value accounting rules, but to take a near total loss.

3.1. Boom and bust in the housing market

Low interest rates and large inflows of foreign funds created easy credit conditions for a number of years prior to the crisis. The USA home ownership rate increased from 64% in 1994 to an all-time high of 69.2% in 2004 (Callis and Cavanaugh 2007). Subprime lending was a major contributor to this increase in home ownership rates and in the overall demand for housing.

Figure 8: Abnormal rise in house prices in the new millennium



Source: Shiller (2005)

As Figure 8 shows, a prolonged period of low interest rates leads to a rise in house prices that was completely abnormal by historical standards. From March 1997 to June 2006 the Case and Shiller national index of real estate prices increased every month, except for two. During the same period the average increase in real estate prices was 12.4% per year. This increase

was in part fueled by extraordinary low interest rates. Between January 2002 and January 2004 the average 3-month T-bill rate was 1.3%, while the average in the previous forty years was 6.1%.

This sustained price increase engenders the illusion in many actual and aspiring home owners that prices will always go up. In a 2005 survey of San Francisco home buyers Case and Shiller find that the mean expected price increase over the next ten years was 14% per year, while the median 9% per year (Shiller 2008).

Table 4: Decline in Delinquency Rates During the Boom Among Major Investor Groups

Year-end	CMBS (30+ days and REO)	Life Companies (60+ days)	Fannie Mae* (60+ days)	Freddie Mac (60+ days)	Banks & Thrifts (90+ days)
12/31/1996	n.a.	1.79%	0.68%	1.96%	1.58%
12/31/1997	0.39%	0.90%	0.37%	0.96%	1.18%
12/31/1998	0.54%	0.48%	0.29%	0.37%	0.94%
12/31/1999	0.51%	0.25%	0.12%	0.14%	0.73%
12/31/2000	0.81%	0.28%	0.04%	0.04%	0.69%
12/31/2001	1.26%	0.12%	0.33%	0.15%	0.92%
12/31/2002	1.47%	0.28%	0.13%	0.13%	0.86%
12/31/2003	1.72%	0.12%	0.13%	0.05%	0.78%
12/31/2004	1.29%	0.08%	0.10%	0.06%	0.61%
12/31/2005	0.85%	0.05%	0.27%	0.00%	0.53%
12/31/2006	0.41%	0.02%	0.08%	0.05%	0.56%
12/31/2007	0.40%	0.01%	0.08%	0.02%	0.80%

Source: Mortgage Bankers Association (Commercial-multifamily delinquency survey).

As Table 4 shows, during the real estate boom delinquency rates dropped due to relatively good economic conditions and the sustained real estate price increase. Easy credit, and a belief that house prices would continue to appreciate, encouraged many subprime borrowers to obtain adjustable-rate mortgages. These mortgages enticed borrowers with a below market interest rate for some predetermined period, followed by market interest rates for the remainder of the mortgage's term. Borrowers who could not make the higher payments once the initial grace period ended would try to refinance their mortgages. Refinancing became more difficult, once house prices began to decline in many parts of the USA. Borrowers who found themselves unable to escape higher monthly payments by refinancing began to default.

By September 2008, average U.S. housing prices had declined by over 20% from their mid-2006 peak (The Economist 2008b).This major and unexpected decline in house prices means that many borrowers have zero or negative equity in their homes, meaning their homes were worth less than their mortgages. Borrowers in this situation have an incentive to "walk away" from their mortgages and abandon their homes, even though doing so will damage their credit rating for a number of years (Andrews and Uchitelle 2008). The reason is that unlike what is the case in most other countries, American residential mortgages are non-recourse loans; once the creditor has regained the property purchased with a mortgage in default, he has no further claim against the defaulting borrower's income or assets. As more borrowers stop paying their mortgage payments, foreclosures and the supply of homes for sale increase. This places downward pressure on housing prices, which further lowers homeowners' equity. The decline in mortgage payments also reduces the value of mortgage-backed securities, which erodes the net worth and financial health of banks. This vicious cycle is at the heart of the crisis (Feldstein 2008).

Increasing foreclosure rates increases the inventory of houses offered for sale. The number of new homes sold in 2007 was 26.4% less than in the preceding year. By January 2008, the inventory of unsold new homes was 9.8 times the December 2007 sales volume, the highest value of this ratio since 1981 (MSNBC 2008). Furthermore, nearly four million existing homes were for sale of which almost 2.9 million were vacant (Coy 2008). This overhang of unsold homes lowered house prices. As prices declined, more homeowners were at risk of default or foreclosure. House prices are expected to continue declining until this inventory of unsold homes (an instance of excess supply) declines to normal levels.

3.2. Speculation

Speculation in residential real estate has been a major cause of the crisis. During 2006, 22% of homes purchased (1.65 million units) were for investment purposes, with an additional 14% (1.07 million units) purchased as vacation homes. During 2005, these figures were 28% and 12%, respectively. In other words, a record level of nearly 40% of homes purchases were not intended as primary residences. David Lereah, NAR's chief economist at the time stated that the 2006 decline in investment buying was expected: "Speculators left the market in 2006, which caused investment sales to fall much faster than the primary market (Christie 2007)"

During the housing boom, homes had been treated as investments. Media widely reported condominiums being purchased while under construction, then being "flipped" (sold) for a profit without the seller ever having lived in them. Some mortgage companies identified risks inherent in this activity as early as 2005, after identifying investors assuming highly leveraged positions in multiple properties (Harne 2005)

Shiller (2008a) wrote that speculative bubbles are fueled by "contagious optimism, seemingly impervious to facts, that often takes hold when prices are rising. Bubbles are primarily social phenomena; until we understand and address the psychology that fuels them, they're going to keep forming." Keynesian economist Hyman Minsky described three types of speculative borrowing that contribute to rising debt and an eventual collapse of asset values (Wilson 2007; Shostak 2007)

- The "hedge borrower," who expects to make debt payments from cash flows from other investments;
- The "speculative borrower," who borrows believing that he can service the interest on his loan, but who must continually roll over the principal into new investments;
- The "Ponzi borrower," who relies on the appreciation of the value of his assets to refinance or pay off his debt, while being unable to repay the original loan.

Speculative borrowing has been cited as a contributing factor to the subprime mortgage crisis.

3.3. High-risk mortgage loans and lending/borrowing practices

Lenders/Banks offered more loans to higher-risk borrowers including illegal immigrants (Pasha 2005). A study by the Federal Reserve found that the average difference between subprime and prime mortgage interest rates (the "subprime markup") declined from 280 basis points in 2001, to 130 basis points in 2007. In other words, the risk premium required by lenders to offer a subprime loan declined. This occurred even though the credit ratings of subprime borrowers, and the characteristics of subprime loans, both declined during the 2001–2006 period, which should have had the opposite effect. The combination of declining risk premium and credit standards is common to classic boom and bust credit cycles (Demyanyk and Van Hemert 2008).

In addition to considering higher-risk borrowers, lenders have offered increasingly risky loan options and borrowing incentives. In 2005, the average down payment for first-time home buyers was 2%, with 43% of those buyers making no down payment (Knox 2006).For example is the interest-only adjustable-rate mortgage (ARM), which allows the homeowner to pay just the interest (not principal) during an initial period. Still another is a "payment option" loan, in which the homeowner can pay a variable amount, but any interest not paid is added to the principal. An estimated one-third of ARMs originated between 2004 and 2006 had "teaser" rates below 4%, which then increased significantly after some initial period, as much as doubling the monthly payment (Arnold 2007). Mortgage underwriting practices have also been criticized, including automated loan approvals that critics argued were not subjected to appropriate review and documentation (Ward 2004). In 2007, 40% of all subprime loans resulted from automated underwriting (Browning 2007). The chairman of the Mortgage Bankers Association claimed that mortgage brokers, while profiting from the home loan boom, did not do enough to examine whether borrowers could repay. Mortgage fraud by borrowers increased (Cowen 2008).

As a result of these favorable conditions, lending standards deteriorated. Dell'Ariccia et al. (2008), for instance, show that lending standards declined in areas of high home price appreciation and attribute this decline to increased competition among lenders. According to Mortgage Bankers Association, the share of low documentation mortgages went from 29% to 51% and the debt-to income ratio from 39.6 to 42.4.

3.4. Securitization practices

The traditional mortgage model involved a bank originating a loan to the borrower/homeowner and retaining the credit (default) risk. With the advent of securitization, the traditional model has given way to the "originate to distribute" model, in which the credit risk is transferred (distributed) to investors through MBS and CDOs. Securitization created a secondary market for mortgages, and meant that those issuing mortgages were no longer required to hold them to maturity.

Asset securitization began with the creation of private mortgage pools in the 1970s. Securitization accelerated in the mid-1990s. The total amount of mortgage-backed securities issued almost tripled between 1996 and 2007, to $7.3 trillion. The securitized share of subprime mortgages increased from 54% in 2001, to 75% in 2006 (Demyanyk et. al. 2008).

Alan Greenspan has stated that the current global credit crisis cannot be blamed on mortgages being issued to households with poor credit, but rather on the securitization of such mortgages (Stocks & economy - MSNBC.com 2008).

It is believed that mortgage standards became lax because securitization gave rise to a form of moral hazard, whereby each link in the mortgage chain made a profit while passing any associated credit risk to the next link in the chain (Purnanandam 2009) As Keys et al. (2008) show, loans with a higher probability of being securitized default at a rate 20% higher for comparable FICO score.

The quality of mortgages should have been checked by the capital market that bought them, but several problems made this monitoring less than perfect. First, pooled mortgages were resold in tranches that had different seniority. By using the historical record of defaults, the senior tranches were considered extremely safe; but historical records did not factor in the probability of a significant drop in real estate prices at the *national* level. Nor did these models factor the effect of the changes in the lending standards on the probability of default. As Rajan, Seru and Vig (2008) show, it under-predicts defaults especially at low FICO scores. Finally, these models did not properly account for the cross-correlation among defaults and between defaults and the rest of the economy. In the words of Darrell Duffie, one of the intellectual fathers of these models, "Banks, insurance companies and other financial institutions managing portfolios of credit risk need an integrated model, one that reflects correlations in default and changes in market spreads. Yet no such model exists," Duffie (2004).

In 1995, the Community Reinvestment Act (CRA) was revised to allow CRA mortgages to be securitized. In 1997, Bear Sterns was the first to take advantage of this law. Under the CRA guidelines, a mortgage issuer receives credit for originating subprime mortgages, or buying mortgages on a whole loan basis, but not holding subprime mortgages. This rewarded issuers for originating subprime mortgages, then selling them to others who would securitize them. Thus any credit risk in subprime mortgages was passed from the issuer to others, including financial firms and investors around the globe.

3.5. Inaccurate credit ratings

Investors buy securities backed by subprime mortgages due to high ratings. The reliance on agency ratings and the way ratings were used to justify investments led many investors to treat securitized products — some based on subprime mortgages — as equivalent to higher quality securities. This was exacerbated by the SEC's removal of regulatory barriers and its reduction of disclosure requirements, all in the wake of the Enron scandal (Hunt 2008). Critics allege that the rating agencies suffered from conflicts of interest, as they were paid by investment banks and other firms that organize and sell structured securities to investors (Buttonwood 2007). On 11 June 2008, the SEC proposed rules designed to mitigate perceived conflicts of interest between rating agencies and issuers of structured securities (U.S. Securities and Exchange Commission 2008).

In the past each customer, issuing only a couple of securities, had no market power over the rating agencies. With the diffusion of collateralized debt obligations, the major investment banks were purchasing hundreds of rating services a year. As a result, instead of submitting an issue to the rating agency's judgment, investment banks shopped around for the best ratings and even received manuals on how to produce the riskiest security that qualified for an AAA rating. For example, the Standard & Poor's website used to provide a CDO Evaluator Manual (Benmelech and Dlugoszb 2008). The CDO Evaluator is an optimization tool that enables issuers to achieve the highest possible credit rating at the lowest possible cost. One of the outputs of this evaluator was to provide the issuer with a measure of "excess collateral" which, according to S&P, "tells what percentage of assets notional needs to be eliminated (added) in order for the transaction to provide just enough support at a given rating level." (Benmelech et. al. 2008).

Between Q3 2007 and Q2 2008, rating agencies lowered the credit ratings on $1.9 trillion in mortgage backed securities. Financial institutions felt they had to lower the value of their MBS and acquire additional capital so as to maintain capital ratios. If this involved the sale of new shares of stock, the value of the existing shares was reduced. Thus ratings downgrades lowered the stock prices of many financial firms (Birger 2008a).

3.6. Affordable Housing via Creative Financing

Increasing home ownership was a goal of the Clinton and Bush administrations (Weller 2008; Brownstein 1999). There is evidence that the Federal government leaned on the mortgage industry, including Fannie Mae and Freddie Mac (the GSE), to lower lending standards (Holmes 1999; Wallison et. al. 2008). Also, the U.S. Department of Housing and Urban Development's (HUD) mortgage policies fueled the trend towards issuing risky loans (Leonnig 2008).

By the early part of the 21st century, nearly every mortgage lender in the U.S. incorporated the twin messages of "affordable housing" and "creative financing" into marketing, credit approval and product development efforts. Boosting home ownership and home building was seen as a way to stimulate a sluggish economy.

In 1995, the GSE began receiving government incentive payments for purchasing mortgage backed securities which included loans to low income borrowers. Thus began the involvement of the GSE with the subprime market (Leonnig 2008). From 2002 to 2006 Fannie Mae and Freddie Mac combined purchases of subprime securities rose from $172 billion to over $500 billion per year before dropping to $450 billion, thus fulfilling their government mandate to help make home buying more affordable (Washington Post 2006).

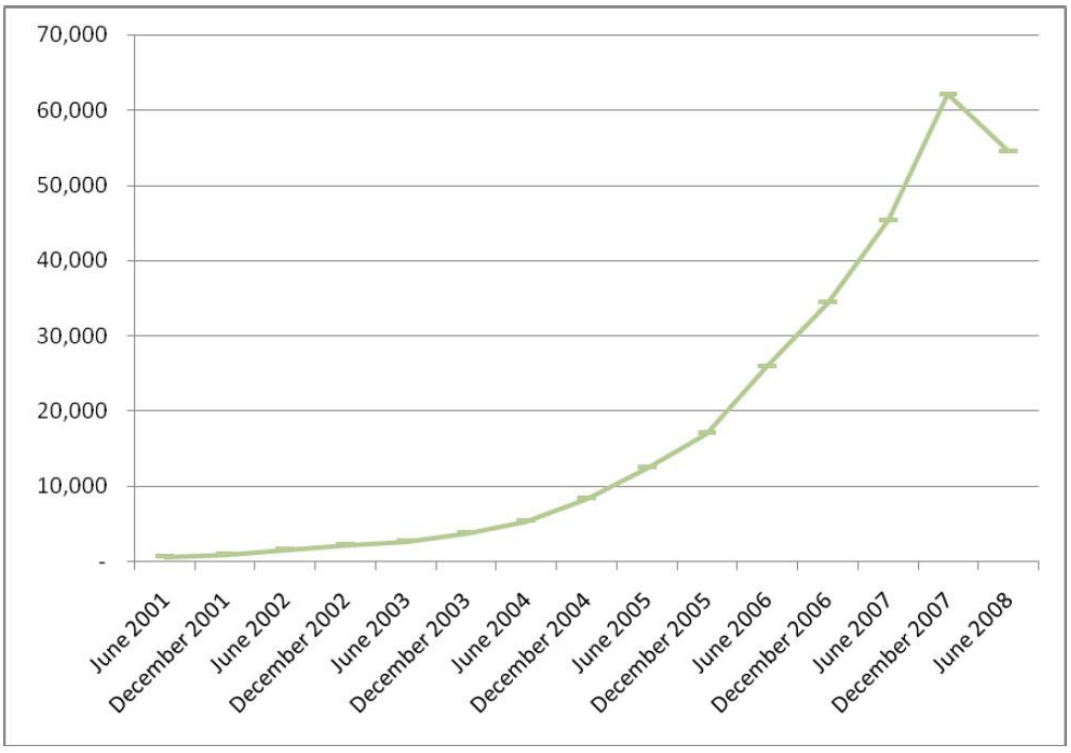
On September 10, 2003, U.S. Congressman Ron Paul gave a speech to Congress in which he predicted that the high-leveraging and tolerance of poor credit by the GSE would lead to a bailout, and he introduced a bill to abolish these policies, which was rejected.

Economists have also debated the possible effects of the Community Reinvestment Act (CRA), with detractors claiming that the Act encouraged lending to uncreditworthy borrowers (Liebowitz 2008) and defenders claiming a thirty year history of lending without increased risk (Ellis 2008).Detractors also claim that amendments to the CRA in the mid-1990s, raised the amount of mortgages issued to otherwise unqualified low-income borrowers, and also allowed for the first time the securitization of CRA-regulated mortgages even though some of these were subprime (Skousen 2008).

3.7. Lack of transparency

The other major source of problems that contributed to the crisis was the lack of transparency in major markets. As Figure 9 shows, during the last ten years the market for credit default swaps (CDS) grew unregulated from almost zero to more than $44 trillion (more than twice the size of the U.S. stock market). More importantly, the level of collateral posted for these contracts was very low or non-existent, generating the possibility of a systemic failure. If in the middle of the hurricane season all of a sudden all Florida homeowners lost the insurance for their house, there would be an enormous run to buy new insurance. Given that in the short term, insurance capacity is limited, the prices will go to the roof. If some home owners could not afford these prices, their mortgages will automatically default, triggering foreclosures and a real estate crisis. This is one of the reasons why the insurance market is regulated.

Figure 9: Outstanding Value of Credit Default Swaps (in Billions of Dollars)



Source: International Swaps and Derivatives Association (ISDA) Market Survey.

Table 5: Distribution of Credit Derivative Contracts: Top 25 Commercial Banks and Trust Companies in Derivatives. JUNE 30, 2008

RANK	BANK NAME	TOTAL ASSETS	TOTAL DERIVATIVES	TOTAL CREDIT DERVATIVES	TOTAL CREDIT DERIVATIVES BOUGHT	TOTAL CREDIT DERIVATIVES SOLD	BOUGHT CREDIT DEFAULT SWAPS	BOUGHT TOTAL RETURN SWAPS	SOLD CREDIT DEFAULT SWAPS	SOLD TOTAL RETURN SWAPS
1	JPMORGAN CHASE BANK NA	1,378,468	83,436,951	7,850,264	4,028,873	3,821,391	3,994,756	15,004	3,817,140	2,771
2	BANK OF AMERICA NA	1,327,429	36,961,254	2,710,538	1,342,595	1,367,943	1,326,855	12,276	1,344,015	22,353
3	CITIBANK NATIONAL ASSN	1,228,445	33,922,675	3,209,678	1,672,423	1,537,255	1,636,972	35,240	1,527,573	8,439
4	WACHOVIA BANK NATIONAL ASSN	670,639	4,061,830	385,616	198,917	186,699	188,712	10,205	178,621	8,078
5	HSBC BANK USA NATIONAL ASSN	177,466	2,822,877	1,240,227	600,803	639,424	584,320	16,333	623,283	16,141
6	WELLS FARGO BANK NA	503,327	1,513,682	2,238	1,411	827	1,411	0	817	0
7	BANK OF NEW YORK	130,062	1,047,852	1,677	1,675	2	1,514	161	2	0
8	STATE STREET BANK&TRUST CO	138,859	836,971	238	238	0	238	0	0	0
9	SUNTRUST BANK	171,501	265,718	3,104	1,806	1,298	831	975	313	975
10	PNC BANK NATIONAL ASSN	128,348	205,342	5,352	3,655	1,697	3,655	0	1,697	0
11	NORTHERN TRUST CO	65,200	183,923	254	254	0	254	0	0	0
12	MELLON BANK NATIONAL ASSN	39,476	183,003	0	0	0	0	0	0	0
13	KEYBANK NATIONAL ASSN	98,048	127,983	8,714	4,684	4,030	4,684	0	3,645	385
14	NATIONAL CITY BANK	151,165	108,341	2,408	1,360	1,048	1,360	0	1,048	0
15	U S BANK NATIONAL ASSN	242,308	85,278	2,170	627	1,543	56	0	0	0
16	REGIONS BANK	139,354	79,872	283	35	248	35	0	248	0
17	BRANCH BANKING&TRUST CO	132,884	63,472	52	52	0	0	52	0	0
18	MERRILL LYNCH BANK USA	58,042	50,421	9,146	9,146	0	9,146	0	0	0
19	RBS CITIZENS NATIONAL ASSN	132,051	57,391	234	214	20	2	0	20	0
20	FIFTH THIRD BANK	67,272	55,663	313	72	241	0	0	0	0
21	UNION BANK OF CALIFORNIA NA	60,228	35,486	0	0	0	0	0	0	0
22	LASALLE BANK NATIONAL ASSN	68,379	32,781	1,820	412	1,409	0	0	0	0
23	UBS BANK USA	27,316	34,160	0	0	0	0	0	0	0
24	DEUTSCHE BANK TR CO AMERICAS	46,071	28,690	5,197	5,197	0	100	5,097	0	0
25	LEHMAN BROTHERS COML BK	6,418	28,086	0	0	0	0	0	0	0

Source: Office of the Comptroller of the Currency

The same would be true if a large CDS player, like AIG, defaulted. As Table 5 shows, large commercial banks have massive exposure to CDS. Most of their positions are hedged; hence the net exposure is much smaller. Nevertheless, if they a major player defaults, all the other ones will find themselves un-hedged, triggering a run to buy insurance, with consequences not dissimilar from the case described above. In spite of its potential systemic effects, the market for CDS is completely unregulated. The same is true for the mortgage-backed security market. In 2007 there were almost 6 trillion mortgage-backed securities outstanding (Gorton 2008). Most of these securities were issued under the 144A rule, with limited disclosure. This lack of transparency in the issuing process made it difficult to determine who owned what. Furthermore, the complexity of these repackaged mortgages is such that small differences in the assumed rate of default can cause the value of some tranches to fluctuate from 50 cents on the dollar to zero. Lacking information on the nature and hence the value of banks' assets, the market grew reluctant to lend to them, for fear of losing out in case of default. One often-used measure of this reluctance is the spread between Libor and the overnight indexed swap (OIS) rate of the same maturity. Before the beginning of the crisis the multi-year average of this spread was 11 basis points. On August 10 2007 it was over 50 basis points and it was over 90

basis points by mid-September. While fluctuating it has mostly remained above that level ever since (Gorton 2008).

3.8. Bad Regulation of Over the Counter Market

Active encouragement by the SEC and federal bank regulators of the rapid growth of over-the-counter (OTC) derivatives and securities by all types of financial institutions, leading to a breakdown in safety and soundness at banks and securities dealers.

The combination of OTC derivatives, risk-based capital requirements authorized by Congress in 1991 and favorable accounting rules blessed by the SEC and the FASB, enabled Wall Street to create a de facto assembly line for purchasing, packaging and selling unregistered securities, such as subprime collateralized debt obligations (CDOs), to a wide variety of institutional investors.

Seen from the perspective of regulatory inaction, the true lesson of the subprime crisis has less to do with the use of subprime mortgages as collateral in the SIVs and much more with how these inferior assets were packaged and sold outside the bounds of established regulatory controls. Not only did regulators allow the creation of new, unregistered assets classes which have caused investors grievous losses, but the use of structured finance by banks for reasons of funding introduced a new element of volatility and instability into the model of many U.S. banking institutions.

3.9. Fair Value Accounting

“Fair value” accounting has been used over the past two decades and was promoted by large segments of the accounting and economics profession, as well as by leaders of the financial services community. It was implemented by an arm of the SEC known as FASB or the Financial Accounting Standards Board.

Unlike fairly simple GSE obligations or even interest-rate swaps (which are entirely standardized and thus quite liquid), CDOs and other types of OTC derivatives blossomed into hideously

complex and opaque permutations, configurations that a smart trial lawyer might successfully argue were deliberately deceptive.

The positive public policy goal of providing a more flexible way of describing the value of different types of assets is forcing banks and some investors to write down CDOs and other types of derivative assets entirely, even though the assets have not yet reached levels of default. Two factors — the near-zero liquidity in structured assets and the severe legal strictures of Sarbanes-Oxley — have forced banks to take total losses on assets that were once a source of enormous profitability but lacked organized and defined markets to ensure liquidity.

Part of the reason that companies for centuries used "book value" (e.g., historical cost accounting) to describe the value of assets is that book value accurately reports the cost of the investment. Once an investment is made, the only way truly to determine, on an arm's length basis, the value of an asset is to sell it to a third party. Unfortunately, since there currently is no market for CDOs and other structured assets, banks have no choice, under the fair value accounting rules, but to take a near total loss — even though the economic value of the assets in terms of cash-flow may be closer to par!

4. DIRECT AND INDIRECT IMPACT

Direct Impact

Financial firms around the globe have written down their holdings of subprime related securities by US$501 billion as of August 2008. The crisis began to affect the financial sector in February 2007, when HSBC, the world's largest (2008) bank, wrote down its holdings of subprime-related MBS by $10.5 billion, the first major subprime related loss to be reported (BBC News 2008a). During 2007, at least 100 mortgage companies either shut down, suspended operations or were sold (Onaran 2008a). Top management has not escaped unscathed, as the CEOs of Merrill Lynch and Citigroup resigned within a week of each other (CNNMoney.com 2007).As the crisis deepened, more and more financial firms either merged, or announced that they were negotiating seeking merger partners (McSherry 2008).

The panic in financial markets encouraged investors to take their money out of risky assets and put it into commodities as "stores of value" (BBC News 2008b). Financial speculation in commodity futures following the collapse of the financial derivatives markets has contributed to the world food price crisis and oil price increases due to a "commodities super-cycle (English Xinhua 2008; Sunday Herald 2009). Financial speculators seeking quick returns have removed trillions of dollars from equities and mortgage bonds, some of which has been invested into food and raw materials (Macwhirter 2008).

Three major stock indices in the United States (Dow Jones Industrial Average, NASDAQ, and the S&P 500) entered a bear market at the beginning in mid-2008. On 15 September 2008, the indices dropped by their sharpest amounts since the 2001 after terrorist attacks. That day, the most noteworthy trigger was the declared bankruptcy of investment bank Lehman Brothers. Additionally, Merrill Lynch was joined with Bank of America in a forced merger worth $50 billion. Finally, concerns over insurer American International Group's ability to stay capitalized caused that stock to drop over 60% that day. Poor economic data on manufacturing contributed to the day's panic, but were eclipsed by the severe developments of the financial crisis. All of these events culminated into a stock selloff that was experienced worldwide. Overall, the Dow Jones Industrial plunged 504 points (4.4%) while the S&P 500 fell 59 points (4.7%). Asian and European markets rendered similarly sharp drops.

The much anticipated passage of the $700 billion bailout plan was struck down by the House of Representatives in a 228–205 vote on September 29. In the context of recent history, the result was catastrophic for stocks. Despite congressional passage of historic bailout legislation, Stocks market continued to tumble to record lows ending one of the worst weeks in the Stock Market since September 11, 2001.

The crisis has also affected the financial condition of USA governmental units. The Federal government's efforts to support the global financial system have resulted in significant new financial commitments, totaling $7 trillion by November, 2008. These commitments can be characterized as investments, loans, and loan guarantees, rather than direct expenditures. In many cases, the government purchased financial assets such as commercial paper, mortgage-backed securities, or other types of asset-backed paper, to enhance liquidity in frozen markets (Goldman 2008). As the crisis has progressed, the Fed has expanded the collateral against which it is willing to lend to include higher-risk assets (Vekshin and Kopecki 2008). The extent to which the Federal government is at risk because of these investments and guarantees remains to be seen (Desmond 2008). The upshot has been a US$1 trillion increase in the national debt of the USA during 2008, compared to an average increase of US$550 billion during the previous five years. The total debt reached $10 trillion in September 2008 according to Treasurydirect (2008). In addition, state and local government property tax collections are expected to decline because of an estimated $1.2 trillion reduction in housing prices, and a slowing of the overall American economy (Shandling 2008).

Indirect impact

Declining house prices have reduced household wealth and the collateral for home equity loans, which is placing downward pressure on consumption (Luhby 2008). Members of USA minority groups received a disproportionate number of subprime mortgages, and so have experienced a disproportionate level of the resulting foreclosures. Minorities have also born the brunt of the dramatic reduction in subprime lending (Fernandez 2007). House-related crimes such as arson have increased (Birger 2008b). There have been significant job losses in the financial sector, with over 65,400 jobs lost in the USA as of September 2008 (Dickler 2008).

Many renters became innocent victims, by being evicted from their residences without notice, because their landlords' property has been foreclosed (Hopkins 2008). The tightening of credit has caused a major decline in the sale of motor vehicles. Between October 2007 and October 2008, Ford sales were down 33.8%, General Motors sales were down 15.6%, and Toyota sales had declined 32.3% (Strott 2008).

5. ACTION TAKEN AND RECOMMENDATIONS

5.1. Recommendations

A proposed systemic fix to the current mess that also could help restore free market discipline to America's increasingly managed financial markets. The following are the recommendations:

5.1.1. Suspend fair value accounting treatment for illiquid financial assets

A large portion of the crisis of confidence now affecting global markets comes from non-cash losses reported as a result of the adoption of "fair value" accounting rules in the US. Under current accounting rules, the fair value of an asset is the amount at which it could be bought or sold in a current transaction between willing parties. A quoted market price in an active market is the best evidence of fair value and should be used as the basis for the measurement. If a quoted market price is not available, "preparers should make an estimate of fair value using the best information available". Most of the losses reported by global banks are based on such estimates.

Unfortunately, the proponents of fair value accounting ignored the invocations of classical theorists who stated that liquid markets are a necessary condition for using market prices, either as a surrogate for measuring risk or for valuation. Given that most securities and loans do not have liquid, actively traded markets, it seems fair to ask: why did the US adopt the fair value accounting standard in the first instance?. While it may be reasonable to apply fair-value rules to actively traded securities, for the vast majority of assets that are illiquid, historical cost remains the only reasonable and consistent way to report the value of financial assets

John Ryding, chief economist of RDQ Economist proposed to suspend mark-to-market accounting, which compels banks to value assets on their balance sheet at the price they could fetch in the open market. It would give banks significant breathing room to deal with these legacy (nee toxic) assets (Task 2009)

Spaventa (2008) suggested not to value illiquid assets at market prices under crisis conditions. He recommended the creation of a publicly sponsored entity that could issue guaranteed bonds to banks in exchange for illiquid assets, drawing on the US Treasury Secretary Nicholas Brady's solution to the Latin American sovereign debt crisis in 1989. This new entity, preferably multilateral, would value assets based on discounted cash flows and default probabilities rather than crisis-condition market prices. As a firm floor is set to valuation and illiquid assets otherwise running to waste are replaced by eminently liquid Brady-style bonds, funding difficulties and, at the same time, the market liquidity problems besetting the banks' balance sheets would be removed.

According to the IOSCO (2008), it is important for many firms to develop modelling capabilities to provide data for trading purposes when markets failed. The need for modelling also became more apparent to investors in SPVs. In other words, an accurately modelled price can replace a market price when necessary.

5.1.2. Standardization of terms and structure of all private label securitizations

According to Dr. Kroszner (2008, 2008a), private label securitizations should be fundamentally changed. These changes include:

- Provision of easily accessible, comprehensive, and standardized loan-level data describing all of the loans in each mortgage backed security;
- Simplification of MBS cash-flow structures and increased homogeneity of loan types with each securitization;
- Standardization of securitization contracts; and
- Reduction in the number and increase in size of MBS tranches, to increase liquidity and decrease uncertainty with respect to what might happen under unusual circumstances.

With this promotion of standardization and simplification, investors will be able to conduct independent credit analyses in addition to that provided by the traditional credit rating agencies. This should gradually, over time, rebuild investors' confidence in the private label MBS structure and non-agency loans.

Cecchetti (2007) suggested that Governments could help clarify the relative riskiness of assets by fostering the standardization of securities and encouraging trading on organized exchanges.

5.1.3. Public disclosure of secondary market prices for all securitization

It is important to note that secondary trading in credit risk transfer instruments mostly takes place off the organised exchanges, and that transactions executed on over-the-counter (OTC) markets are not usually identified as such. Accordingly, with the exception of a few segments and indices, prices and quantities are not necessarily divulged to the broader market

Some initiatives have been taken to provide additional information on asset prices, in an effort to address the issue of OTC-market opacity. For example, Markit, a financial information services company, provides some information through ABX HE, a synthetic index of US home equity asset backed securities (ABS). The drawback of these initiatives is that they represent a small portion of the market and cannot be more objective or reliable than the providers themselves. The importance of securing better information for market participants, notably so that they can properly value their assets, should not be underestimated.

5.1.4. Improve the securitization market

Buiter (2007); De la Dehesa (2007) proposed solutions to improve the securitization market. Firstly, insist on simpler financial structures and products, instead of financial engineering masterpieces that cannot be priced even by their designers, let alone by buyers and sellers in the secondary markets.

Secondly, *banks should have to retain their equity or first loss risk. A*ll banking supervisors should oblige all banks, which originate and sell loans and mortgages, to retain their equity or first loss risk block, as it happens today in some European countries, in order to make them share part of the risk when they sell them to intermediaries or final investors and, therefore, to be much more careful when monitoring their credit risks and when choosing the mortgages to be pooled for sale.

5.1.5. Recommendations in the Credit Agency Report

To avoid inaccurate credit ratings which caused confidence crises, Buiter (2007); De la Dehesa (2007) proposed some of the following suggestions.

- The ratings agencies should try to regain credibility by showing that they are truly independent and that their rating process is fully transparent and reliable, mainly for these complex structured products
- Eliminate the quasi-regulatory role of the rating agencies in Basel II
- Require rating agencies to sell nothing but ratings, to reduce conflict of interest.
- End the payment of individual rating agencies by the individual issuers of securities they rate.

5.1.6. Regulatory Reform

The US banking authorities should regulate all US agents and brokers which are originating these mortgage loans in order to avoid their perverse incentives when dealing with their potential borrowers and to try to standardize their property registration and collateral execution systems across states.

Effective enforcement of any lending standards means that those who package and sell those loans into the secondary market must also have some responsibility. Setting clear guidelines, which securitisers must follow to guard against being vehicles for unsound loans, can be done in a way that enhances the attractiveness of the secondary market to investors and serves as a safe harbour against liability.

Cecchetti (2007a) wrote that asset managers and under-writers should disclose both the detailed characteristics of what they are selling and their costs and fees. This will allow investor to know what they buy and understand our bankers' incentives.

5.1.7. Curb the Credit Boom and Speculation

Historically, the effectiveness of macroeconomic polices in reducing credit growth has varied (Enoch and Ötker-Robe 2007). While monetary tightening can reduce both the demand and supply of bank loans, its effectiveness is often limited by capital account openness. This is especially the case in small open economies and in countries with more advanced financial sectors, where banks have easy access to foreign credit, including from parent institutions. Monetary tightening may also lead to significant substitution between domestic and foreign-denominated credit, especially in countries with (perceived) rigid exchange-rate regimes. Fiscal tightening may also help reduce the expansionary pressures associated with credit booms, though this is often not politically feasible.

Prudential and supervision policies may be very effective in reducing the risks associated with a boom. Such policies include prudential measures to ensure that banks and supervisors are equipped to deal with enhanced credit risk (such as higher capital and provisioning requirements, more intensive surveillance of potential problem banks and appropriate disclosure requirements of banks' risk management policies). Prudential measures may also target specific sources of risks (such as limits on sectoral loan concentration, tighter eligibility and collateral requirements for certain categories of loans, limits on foreign-exchange exposure and maturity mismatch regulations). Other measures may aim at reducing existing distortions and limiting the incentives for excessive borrowing and lending (such as the elimination of implicit guarantees or fiscal incentives for particular types of loans, and public risk awareness campaigns).

According to Persaud (2008), the alternative is to try to avoid booms and crashes through regulatory and fiscal mechanisms which counter the incentives that induce traders and investors to place highly leveraged bets on what the markets currently believe is a 'sure thing'. This sounds fraught with regulatory risks, and policy-makers are not as ambitious as they once were. Regulatory ambition should be set now, while the fear of the current crisis is fresh and not when the crisis is over and the seat belts are working again.

5.1.8. Other Possible Solutions

(Murphy 2008) proposed other solutions to the crisis by nationalizing the depository institutions of the failed corporate holding companies, and simply let the holding companies and all other failed institutions go bankrupt and default on their credit default swaps. The nationalized banks could then go back to making loans as they did in the old days, having real human beings make credit-granting decisions. The cost of this policy to taxpayers might be rather small, especially since most of the losses on the defaulting credit default swaps would either be offsetting or be incurred by investors like hedge funds.

The real estate and mortgage crisis itself could possibly be resolved by allowing defaulting mortgagors to refinance with shared appreciation mortgages (SAMs) that would lower their payments in return for the lending institution receiving a share in the future appreciation on the home (Murphy 2007). The SAMs could possibly be standardized to both reduce legal costs and also potentially create a secondary market for them in the form of SAM pools in which investors seeking diversification into residential real estate might be interested. By replacing foreclosure solutions with SAMs, less homes would be put on the market for sale, thereby reducing the downward pressure on real estate prices. The cycle of falling real estate prices leading to more mortgage defaults and foreclosures, which cause further drops in real estate prices that prompt more foreclosures, might therefore not only be stopped but even reversed.

5.1.9. The future of monetary policy and central banking

Buiter and Sibert (2007, 2007a) advocate the expanded use of liquidity policies rather than monetary easing. They think that central banks should act as the market-maker of last resort. The FED should have effectively created a market by expanding the set of eligible collateral, charging an appropriate 'haircut' or penalty interest rate, and expanding the set of eligible borrowers at the discount window to include any financial entity that was willing to accept appropriate prudential supervision and regulation.

5.2. Action Taken

Various actions have been taken since the crisis became apparent in August by various agencies, regulators as well as political officials. The US Federal Reserve partnership with central banks around the world, has taken several steps to address the crisis. The FED Chairman Ben Bernanke (2008) stated in early 2008: "Broadly, the Federal Reserve's response has followed two tracks: efforts to support market liquidity and functioning and the pursuit of our macroeconomic objectives through monetary policy." The Fed has undertaken, along with other central banks, open market operations to ensure member banks remain liquid. These are effectively short-term loans to member banks collateralized by government securities. Central banks have also lowered the interest rates (called the discount rate in the USA) they charge member banks for short-term loans (Bernanke 2007). Besides that FED has finalized, in July 2008, new rules for mortgage lenders (Bernanke 2008a).

Regulators and legislators have contemplated taking action with respect to lending practices, bankruptcy protection, tax policies, affordable housing, credit counseling, education, and the licensing and qualifications of lenders (Schumer and Maloney 2007). Regulations or guidelines can influence the transparency and reporting required of lenders and the types of loans they choose to issue. Responding to concerns that lending was not properly regulated, the House and Senate are both considering bills to further regulate lending practices. Non-depository banks (e.g., investment banks and mortgage companies) are not subject to the same capital requirements as depository banks. Many investment banks had limited capital to offset declines in their holdings of MBSs, or to support their side of credit default insurance contracts. Nobel prize winner Joseph Stiglitz has recommended that the USA adopt regulations restricting leverage, and preventing companies from becoming "too big to fail." (Stiglitz 2008)

The Housing and Economic Recovery Act of 2008 included six separate major acts intended to restore confidence in the American mortgage industry (Summary of Act 2008). The Act requires that lenders disclose more information about the products they offer and the deals they close;

As of May 2008, major financial institutions had obtained over $260 billion in new capital, taking the form of bonds or preferred stock sold to private investors in exchange for cash (Krause 2008). This new capital has helped banks maintain required capital ratios (an

important measure of financial health), which have declined significantly due to losses on subprime loans or CDO investments. Raising additional capital has been advocated by the leadership of the U.S. Federal Reserve and the Treasury Department (Matthews and Lanman 2008). Well-capitalized banks are in a better position to lend at favorable interest rates, and to offset the falling liquidity and rising uncertainty in credit markets. Banks have obtained some of their new capital from the sovereign wealth funds of developing countries, which may have political implications (Economist 2008).

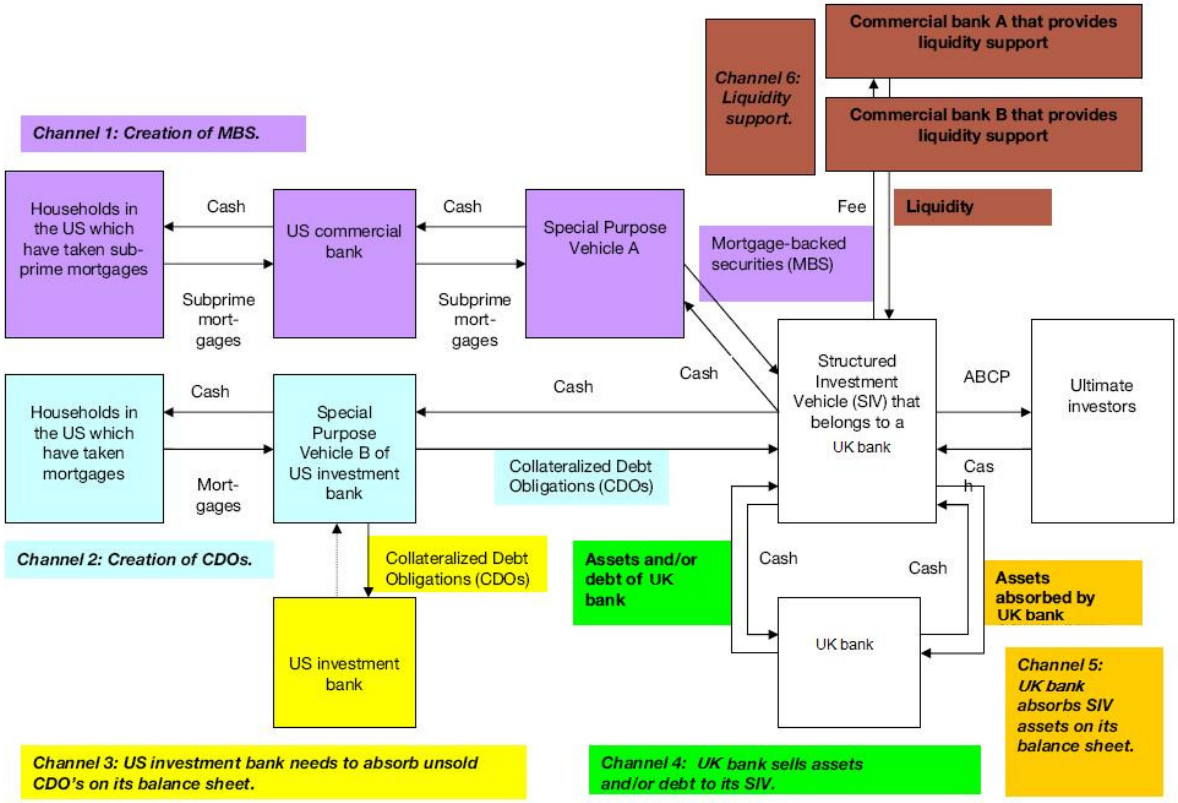
6. CONCLUSIONS

The financial turmoil of 2007-2008 has revealed substantial transparency and information shortcomings due to the increasing opaqueness and complexity of the global financial system. In this conclusion, we present an overview of the fundamental characteristics of the main instruments of structured finance and their role in the financial turmoil. We also conclude this paper with a short discussion of the recommendations of the proposed causes such as inability of homeowners to make their mortgage payments, speculation, risky mortgage products, financial products that distributed, affordable housing via the use of creative financing techniques, unregulated over-the-counter (OTC) derivatives and fair value accounting. The basic goal is to minimize the likelihood of the crisis from happening again.

It has been shown that in particular various securitizations or asset-backed securities such as mortgage backed securities (MBS), asset-backed commercial paper (ABCP) and collateralized debt obligations (CDOs), played a crucial role in the development and propagation of the financial turmoil. It also has been shown credit default swaps (CDS), played a much more indirect role and has been of particular use in monitoring the spreading of the financial turmoil.

Figure 10 presents the main channels through which structured finance instruments played a role in the financial turmoil. The figure represents the essential interaction between the use of structured finance, the banking sector and the development of the financial turmoil. The specific instruments are chosen as examples and are representative of the underlying mechanisms.

Figure 10: The channels involving structured finance in the financial turmoil



Channel 1 involves the creation of subprime mortgage-backed securities by a US commercial bank, which are bought by ABCP conduits, for example a SIV belonging
to a UK bank which affected by the turmoil in this way. When due to the subprime crisis the value of these assets declined substantially, the collateral values of the SIV eroded, resulting in major refinancing difficulties. It works similarly for Channel 2 and 3. Merrill Lynch has been one of the (investment) banks hit in particular through Channel 3 (The New Yorker 2008). Some banks that have been hit via the channel 5 are HSBC, Citigroup and West LB. Finally, Channel 6 is also related to the first four channels and consists of the process that the liquidity facilitating banks actually needed to provide liquidity support to the ABCP conduits.

It is highly important to understand some of the mechanisms underlying the problems with structured finance during most of 2007 and 2008. Essentially, the financial turmoil highlighted strong doubts on the ratings methodologies for structured finance products in general and their robustness in particular. These doubts further increased by substantial ratings' downgrades both in number and severity in the course of 2007 and 2008 which resulted in major valuation losses of the structured finance instruments involved. All in all,

the turmoil revealed intrinsic problems with the valuation of structured finance products and various incentive problems involving the rating agencies (Mason and Rosner 2007a, b; BIS 2008d).

The solution to the proposed causes mentioned above is to have a properly regulated system; to progressively transform the very nature of the corporations and banks in terms of both ownership and functioning; and to create a global network of social funds, financed in the way envisaged by Meidner, and a global system of financial regulation. The 'shadow' banking system must be brought under control and new principles observed by all those who offer derivatives for sale (Blackburn 2008).

We must return to a more sensible model, with enhanced oversight of financial institutions. We need to recreate a housing finance model that promotes stability rather than speculation. Monetary policy must be turned away from using rate hikes to pre-empt inflation and toward a proper role: stabilising interest rates, direct credit controls to prevent runaway speculation, and supervision (Wray 2007).

One way to tackle the financial rip currents would be to apply higher capital requirements to more complex derivative securities. This approach would involve going back to something resembling Basel I, in which accountants placed different kinds of securities into different risk buckets, with banks then adjusting capital requirements accordingly. Another strategy would be for central banks to announce that they were prepared to accept relatively simple, transparent instruments when providing collateral, but not complex ones. This reform would in turn reduce the attractiveness of holding relatively complex securities. The problem is that this policy might ultimately come into conflict with the authorities' responsibility for financial stability, limiting their capacity to act as liquidity provider of last resort to the markets most in need.

The ongoing credit crunch represents the first crisis of the age of mass securitisation. One conclusion sometimes drawn is that the costs of securitisation, in the form of risks to financial stability, exceed the benefits. The implication is that we should return to the simpler days of "good-old-fashioned banking" in which commercial banks originate loans to households and firms and hold them on their balance sheets, rather than slicing them, dicing them and selling them off. To rebuild market confidence in structured assets by going back to "first principles"

on issues such as market transparency, standardization of contracts, and accounting treatment. By reducing complexity on the trade of structured assets through simple deal structures and providing investors with the information they need to analyze collateral, for example by requiring SEC registration and public pricing of assets, much of the current liquidity problem is ameliorated (Whalen 2008)

By analyzing the root causes of the financial crisis, it is possible to estimate the costs of resolving that crisis utilizing current policies of bailing out investors who made poor investment decisions. Although the cost of the bailout may be staggering, cheaper solutions appear to exist. In any event, it would seem imperative that the financial managers of the future be better educated in the art of credit analysis (Murphy 2008)

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