

Financial Innovation and the Financial Crisis of 2007-2008*

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September 2011

* The Spanish Ministry of Education and Culture provided partial support of this research through project SEJ2007-67448/ECON and ECO2010-17158. Ellyn Terry provided helpful research assistance. Any errors are my responsibility. The views expressed here are mine and not necessarily those of the Federal Reserve Bank of Atlanta or the Federal Reserve System.

The Financial Crisis of 2007-2008 was associated with three related substantial financial innovations. Banks substantially increased their securitization of loans, changing from “originating to hold loans” to “originating to distribute loans” to others. Instead of issuing plain-vanilla securities based on the loans’ cash flows, some of the securities created were tranching securities with the tranches having different rights to cash flows and credit ratings.¹ In addition, credit default swaps became important derivative securities for transferring credit risk. While these securities can transfer credit risk that exists for other reasons such as an underlying loan, credit default swaps also can be used to lay off or assume credit risk that has not arisen in the course of other business.

Many blamed the financial crisis partly on these securities (National Commission on the Causes of the Financial and Economic Crisis in the United States 2011; Permanent Subcommittee on Investigations, U.S. Senate, 2011). While attractive in some respects, it is important to understand what is being claimed. The strongest claim would be that the financial crisis would not have occurred if these securities had not existed. Before examining this particular claim, it is necessary to decide the counterfactual. What would a world without a financial crisis have looked like?

Unlike many other concepts in Economics and Finance such as hyperinflation, a recession or even a bear stock market, there does not appear to be a generally accepted definition of a financial crisis. Many definitions of financial crises are not empirically verifiable because there are no clear criteria for determining whether or not a crisis exists. Others are broad, such as sharp decreases in asset prices, and would include many relatively common decreases in stock prices. Others are quite narrow, including only runs on banking systems. For the purposes of this paper, it is reasonable to assert that the events in 2007 and 2008 were a financial crisis and the “crisis” was associated with substantial decreases in securities’ values and disruption of financial and other economic activity.

From this point of view, the Financial Crisis of 2007-2008 in the United States was caused by one set of developments and spread by another.

Subprime mortgages and related financial innovations have received much of the blame for the Financial Crisis of 2007-2008. Financial innovation, while generally a good thing, does deserve some of that blame. On the other hand, the responsibility of either subprime mortgages or financial innovations as causes of the financial crisis itself is dubious. Unfortunately, there is enough blame to go around.

The developments in the financial crisis in the United States are not hard to summarize. Subprime mortgages certainly were the catalyst for the crisis in the United States (Wallison 2011, Acharya et al. 2011). Securities based on subprime mortgages played a central role in spreading difficulties during the Financial Crisis of 2007-2008. The shortcomings of models for pricing these securities became apparent when real estate prices started to fall and mortgages became delinquent. Difficulties valuing these securities led to widespread problems trading them and created difficulties conducting business as usual (Brunnermeier 2009; Dwyer and Tkac 2009; Dwyer and Tkac 2010). Financial difficulties in funding markets and decreases in the value of housing in the United States led to both transitory and longer lasting decreases in the values of securities (Dungey, Dwyer and Flavin 2011).

¹ The creation of these securities and the meaning of tranching is explained in the paper.

What role did financial innovation play in those developments? Tranching securities based on subprime mortgages were widely spread around parts of the world and those securities were difficult to value when there was a substantial likelihood of payments not being made. Credit default swaps were an important way in which these securities traded. The importance of the pricing by credit default swaps itself is unlikely to have contributed much to the financial crisis, although that conclusion might be changed by research into the issue.

To some extent before the financial crisis and more so since the crisis, securitization of loans is thought to be fraught with peril. Indeed, the Dodd-Frank bill in the United States enshrined this view into law by requiring that creators of such securities retain an interest in the securities.

Cause of the Financial Crisis

The period leading up to the crisis was indeed one of dramatic growth in asset backed securities and structured financial products. Figure 1 shows the level of creation of Collateralized Debt Obligations (CDOs) from the first quarter of 2005 through the third quarter of 2009, the last date available to me. CDOs are structured securities based on other assets. Structured products can be based on loans, in which case they are Collateralized Loan Obligations (CLOs), they can be based on Asset-Backed Securities (ABSs) or they can be based on other assets generating cash flows. Three things stand out in Figure 1. First, CDOs and CLOs increased dramatically up to the middle of 2007. Second, this increase reflected an increase in CDOs of ABSs. The assets backing these securities include subprime mortgages. Third, CDOs and CLOs decreased to relatively small amounts by the end of 2008.

The temporal connection between the financial crisis and CDOs and CLOs is obvious, although a graph such as this does not even create a presumption about the direction of causation. It establishes that such securities grew before the crisis and fell afterwards.

The conclusion that these securities caused the crisis runs into many contradictory facts. Not the least of these is the widespread nature of problems during the crisis. Banks in Iceland were an early casualty of the financial crisis. These banks' financial difficulties were due to loans on Icelandic stock and had nothing to do with subprime mortgages in the United States or in Iceland (Special Investigation Commission 2010, Chapter 21; Flannery 2009). Similarly, Ireland's financial difficulties were due to domestic credit expansion associated with increasing housing prices in Ireland. These loans were financed by borrowing abroad but were not even especially low-credit-quality Irish loans, let alone were they loans on U.S. properties (Honohan 2010; Connor, Flavin and O'Kelly 2011). These are small countries and therefore might be small, isolated observations but they are not. The U.K. bank Northern Rock was an early casualty of the crisis in September 2007, and Northern Rock's difficulties were associated with concerns about the bank's ability to securitize mortgages it had made in the United Kingdom (Milne and Wood 2009). Northern Rock's problems were not related to holding or transacting in U.S. subprime mortgages or claims to them such as CDOs. Spain's difficulties after the financial crisis have little or no connection with U.S. subprime mortgages and are associated with increases in Spanish housing prices and a subsequent crash in those prices (Carbó Valverde 2009).

The primary cause of the financial crisis in the U.S. was a substantial push by the U.S. federal government to increase homeownership by lower-income families. This included a variety of actions, among the most notable being goals for holdings of subprime mortgages by Fannie Mae and Freddie Mac, two government-sponsored enterprises (Wallison 2011, Pinto 2011). These enterprises failed when these loans started to become delinquent and these enterprises are likely to be by far the most expensive part of the crisis for U.S. taxpayers. Additionally, the federal government permitted senior tranches of housing mortgages to be pledged in repurchase transactions with the collateral being recoverable on the same basis as Treasury securities (Gorton and Metrick 2010; Acharya and Öncü 2011). This increased the liquidity of such securities but created difficulties for banks such as Bear Sterns, Lehman Brothers and Citi when house prices fell, loans started to become delinquent and the underlying securities became difficult to value.

It is possible that the Federal Reserve, by keeping the federal funds rate low for the extended period from 2002 to 2004, added fuel by encouraging subprime borrowers (Taylor 2009). If correct, this adds an additional way in which factors other than financial innovation played a role in the crisis.

The effects of securitization itself are controversial. There even is uncertainty about the basic effects for these securities. Chiesa (2008) shows that securitization of loans can generate optimal risk transfer. On the other hand, one rationale for securitizing loans is an informational advantage about underlying loans' risk enjoyed by informed sellers (DeMarzo 2005).

Mian and Sufi (2009) provide evidence that an increase in securitization of mortgages and an increased supply of subprime mortgages resulted in less stringent lending criteria and contributed to subprime mortgages' growth. While the growth of subprime mortgages is positively correlated with increasing securitization, this correlation can be explained two different ways. The correlation is consistent with securitization itself increasing the supply of subprime mortgages because of a wider distribution of the mortgages than before. It also is consistent with an increased demand for securitized subprime mortgages by Fannie Mae and Freddie Mac which increased the number of subprime mortgages.

Private actions did contribute to the financial difficulties. For example, in a clear example of regulatory arbitrage, commercial banks created subsidiaries which bought long-term assets and financed them by issuing asset-backed commercial paper. The subsidiaries paid lower interest rates on their commercial paper because the assets were removed from banks' balance sheets but clever contract terms lowered the interest rate on the commercial paper because the credit risk was not transferred (Acharya, Schnabl and Suarez 2011).

A common cause for difficulties across countries requires a more general explanation. The prior two decades with few and relatively small recessions is a possible common cause: the so-called Great Moderation in the United States in the 1990s and 2000s, the Celtic Tiger characterization of Ireland's extraordinary growth, and so on. If this explanation is correct, it also must explain the lack of a financial

crisis in many countries, including Australia and Canada. Differences in these countries' financial regulation and other differences might explain why these countries did not experience crises.²

The losses on CDOs were spread widely, including outside the United States. Two state-owned banks in Germany suffered losses due to holding CDOs and four small towns in Norway suffered similar losses (Dwyer and Tkac 2009). Many financial institutions suffered losses due to CDOs. Indeed, those losses were a major way in which CDOs contributed to the financial crisis.

The Structure of Collateralized Debt Obligations

CDOs can be created from Residential Mortgage Backed Securities (RMBSs) and those CDOs are the ones pertinent for understanding the role of CDOs in the financial crisis.

Mortgages are securitized by pooling many mortgages together to form an RMBS, shares of which are sold to investors wishing to include real estate in their portfolio. While the actual financial and legal arrangements can be complicated, the most pertinent feature of RBMSs is the flow of households' payments on mortgages through to investors who own the securities.

Some securities are tranced, and that wrinkle is important for understanding the crisis. For typical bonds, say AT&T corporate bonds, all holders of the bonds suffer the same proportionate loss if AT&T fails to pay; all holders of the bonds have the same risk. This is not so for many RMBSs. Some holders of RMBS bear more risk than others and some bear less. This is accomplished by "tranching" the RMBS security and constructing what is called a "waterfall" of payments.

Figure 2 shows the waterfall of payments on an RMBS. There are three tranches in the figure, a AAA tranche, a BBB- tranche and an equity tranche. Actual RMBSs have more tranches but three are enough to illustrate how tranching works. The waterfall works with mortgage payments flowing in at the top. The mortgage payments first go to the highest-rated tranche, the AAA tranche in the figure. As in any bond, the bonds' terms include promised payments to the bonds' holders. The promised payments generally go to the holders of the AAA tranche first. If all of the promised payments to holders of the AAA tranche are made and there are remaining funds, remaining payments represented by the flow of water go to the next tranche, which is the BBB- tranche. If all of the promised payments to holders of the BBB- tranche are made and there still are remaining funds, those funds go to the equity tranche. Equity holders are often called "residual claimants" and that characterization holds here. The equity tranche gets whatever is left over.

Another way of seeing the effect of tranching is in terms of losses. Losses go from the bottom up, obviating a waterfall analogy. The equity tranche also is said to be the first-loss position. The equity tranche suffers initial losses if any mortgagee defaults. The higher rated tranches suffer no losses until enough defaults occur so that the equity tranche receives nothing. If the losses are large enough that the equity tranche receives no payments, the BBB- tranche then suffers losses. If the losses are large enough that the BBB- tranche receives no payments, the AAA tranche then suffers losses.

² Fry (2009) summarizes developments in Australia and concludes that a financial crisis was avoided because of a resource boom and relatively strict regulation of banks in Australia.

Actual RBMS have more tranches than this example and there are complications concerning reserves and triggers for payments. Nevertheless, the general principle that higher rated tranches experience less risk of loss still holds. Actual tranches generally cover the entire range from AAA to equity tranches with each intermediate grade included (AAA, AA, A, BBB, BBB-, equity) and often more than one AAA tranche.

The CDOs at the center of the financial crisis are created from tranches of RMBSs. Figure 3 illustrates how this is done. The figure is similar to Figure 2 except that the underlying portfolio is not a portfolio of subprime mortgages. The underlying portfolio of these CDOs is a portfolio of BBB tranches of various RMBSs.³ The allocation of risk is similar, with the waterfall of payments being similar. The AAA tranche often was roughly 85 percent of the value of these CDOs (Griffin and Tang 2011). The lower rated tranches account for the remaining 15 percent and represent the degree of subordination in the CDO. The higher the subordination, the less risk of loss by the AAA tranche.

Figure 4 shows the overall path of cash flows from the underlying subprime mortgages to the tranches of the CDO. This path is quite complicated. People pay on their mortgages and payments are made based on the waterfall of payments in the RMBS. Some of the tranches are used to create CDOs and the payments to these tranches of the RMBSs start the waterfall of payments to the tranches of the CDO. As long as everyone is paying on the mortgages, the complex nature of this path is not problematic or necessarily evident.

The structure in Figure 4 is simplified relative to the actual structure in subprime-mortgage-backed CDOs. (Lucas, Goodman and Fabozzi 2006; Goodman et al. 2008; Tavaloki 2008) CDOs often built up reserve funds to pay higher rated tranches in the event of default. They also contained triggers for payments to tranches (Goodman et al., 2008, Chapters 4 and 5).

In addition, they sometimes had what seems at first glance like an odd structure for principal payments, but understanding this structure helps to understand the background of the financial difficulties. In the United States, mortgage borrowers typically can prepay their mortgage. Prepayment can occur because the mortgagee sells the house or because the mortgagee takes out a new mortgage and pays off the old one. Not surprisingly, borrowers are more likely to pay off a mortgage and obtain a new one when the new mortgage interest rate is lower than the interest rate on the existing mortgage. Consequently, prepayments occur more frequently when interest rates are lower than the mortgage interest rate. Absent prepayments, RMBS would trade at a premium price when mortgage interest rates are lower because payments are being made at a higher interest rate. Upon prepayment, though, the capitalized value of the interest payments at a higher rate is lost. As a result, prepayment usually is regarded as a substantial risk of mortgage-backed securities. Even so, CDOs of subprime mortgages sometimes included a provision that principal prepayments in the first three years were made to the AAA holders.

This structure for early principal payments reflected the fact that subprime borrowers were more likely to refinance if they were lower risk, and the AAA holders received these relatively low risk principal payments which reduced their exposure to the remaining pool of riskier borrowers. (Goodman et al.

³ These CDOs of tranching RMBS are similar to CDOs-Squared although the tranches of RMBS are not CDOs themselves. Whetten (2005) analyzes the risk of CDOs-Squared.

2008, Chapter 5). The remaining borrowers were riskier because they did not improve their credit rating by making regular payments on their mortgage while more credit-worthy borrowers obtained prime loans two or three years after obtaining a subprime mortgage. When house price fell, even credit-worthy borrowers were unable to refinance their loans.

Given all the complications of CDOs' financial structure, how much are the tranches of CDOs worth when some payments are delinquent or in default? This is not so easy to determine.⁴

An immediate answer might be to look at market prices to determine the value of the CDO. Unfortunately, the value of any particular CDO depends on the specific mortgages underlying that CDO. As a result, CDOs are idiosyncratic securities. Trying to value securities from one CDO deal by looking at another deal would be like trying to value AT&T bonds by looking at Sprint bonds. It is possible to get some indication of the value of a CDO by looking at the prices of similar deals, but it will not get one all the way to the value of a particular CDO.

Moreover, CDOs do not have not standardized contracts. Each CDO has its own contractual terms and these terms can differ materially. These differences make it even harder to compare CDOs.

As a result of their idiosyncrasy, CDOs are traded over the counter, not on an organized exchange. There is no CDO analog to the New York Stock Exchange with readily available prices, and hence there is no "market price" that reveals all.

For the overall financial system, the problem with CDOs is the complexity of valuing them once some borrowers begin to default. Two problems arise. First, buying CDOs when delinquencies and defaults are common requires time-consuming and expensive research into the underlying mortgages to determine what payments are likely and a reasonable price to offer for them. Second, because the values are problematic even for the owners of CDOs, the value of CDOs held by another institution can be practically impossible to determine. This, in turn, makes it difficult for institutions to assess whether their trading partners have suffered losses and how much those losses are.

ABX

Markit -- a financial services firm -- did create indices of the values of CDOs based on subprime mortgages. Figure 5 shows the evolution of the Markit indices, called ABX.HE or ABX for short.

The indices track the values of CDOs formed from the last half of 2005 to the first half of 2007. There are four vintages of the index: one that started trading on January 19, 2006; one that started trading on July 19, 2006; another that started trading on January 19, 2007; and a last one that started trading on July 19, 2007. No new indices have been created since due to the low volume of deals, evident in Figure 1. The index beginning in January 2006 is based on CDOs created in the last half of 2005 using mortgages originated at about that time. The subsequent vintages of the ABX similarly represent mortgages made before the inception of each index.

⁴ Smithson (2009) provides a nice summary of the valuation issues.

Each vintage is subdivided into five tranches, varying from AAA to BBB-, where the ratings are the lower of those issued by Moody's and S&P.⁵ The index values are derived from underlying credit default swaps with the insurance coupon fixed for the life of trading. The coupon is set so the index trades at par -- 100 -- at inception unless such a coupon exceeds 500 basis points, in which case the coupon is set at 500 basis points. Table 1 shows the coupons on the tranches of the ABX indices. The lowest rated July 2007 ABX indices traded below par on inception in July 2007 and had coupons of 500 basis points.

Each vintage of the index is based on twenty mortgage backed CDO deals created within the previous six months. For example, the ABX.HE 06-1 index is constructed from deals created in the second half of 2005. The largest originators are included.⁶

Strict requirements must be met by a deal to qualify for inclusion in the index. The value of each deal must be at least \$500 million. Each tranche must have an average life between four and six years and the AAA tranche must have a weighted average life of more than five years. No security originator can have more than four deals included.

The ABX is said to "trade on price" because the indices trade on the basis of the index value. The contract is a credit default swap (CDS), not a security purchase or sale. The protection buyer on a CDS on the ABX pays the fixed insurance premium to the protection seller. Because the periodic insurance payment is fixed, cash changes hand on inception of the CDS contract to reflect any deviation of the value of the insurance from the par value. If the index value is below 100 at inception of a CDS contract on the ABX, the protection seller pays 100 minus the current index value to the protection buyer. If the index value is over 100, which sometimes was true in 2006 and early 2007, the protection buyer pays the current index value minus 100 to the protection seller.⁷ The protection buyer then makes periodic payments to the protection seller for insurance. In the event of default on the CDO, the protection seller pays the protection buyer.

This index provides an indicator of the value of CDOs in general, although it still does not provide the value of any specific CDO.

Figure 5 shows that the values of CDOs fell substantially during the financial crisis. There are similarities in the price falls across the vintages. The lowest rated tranches fall more, which is consistent with the waterfall of payments into these tranches and the cash flows in periods of default on the underlying mortgage payments. The lowest rated tranches, the BBB and BBB- tranches are virtually worthless by the end of 2008.

⁵ A particular tranche included in the index for a particular rating, say AA, is included in the AA tranche of the ABX index for the life of the deal even if the rating of the actual tranche changes from AA.

⁶ Licensed dealers in the ABX.HE indices included ABN AMRO, Bank of America, Barclays Capital, Bear Stearns, BNP Paribas, Calyon, Citigroup, Credit Suisse, Deutsche Bank, Goldman Sachs, JPMorgan, Lehman Brothers, Merrill Lynch, Morgan Stanley, RBS Greenwich, UBS and Wachovia.

⁷ This initial payment creates credit risk for the party making an initial payment, and this could be quite substantial when the index value is close to zero.

While the fixed premia were rising for the CDS on the ABX indices, it is clear the later tranches fall more. This can be interpreted as reflecting variation in the quality of the underlying loans and collateral over time. Demyanyk and Van Hemert's (2011) analysis of subprime loans indicates a gradual and persistent deterioration of loan quality from 2001 to 2007. In addition though, falling home values combined with the inability to refinance due to falling home values increased the riskiness of the underlying cash flows.⁸

The AAA tranches of the vintages fall by amounts that are hard to square with a low-risk security. The AAA tranche of the 2006 vintage falls close to 40 percent, from 100 to about 60 by early 2009. The AAA tranche of the 2007 falls quite a bit more, from 100 to about 25 by early 2009, a 75 percent decline in value. No doubt an unexpected fall in housing prices is much of the explanation. Griffin and Tang (2011) provide evidence, though, that the risk of the highest rated tranches was underrepresented at creation of the CDOs.

Mian and Sufi (2009) provide some evidence that an increased supply of subprime mortgages resulted in less stringent lending criteria and contributed to their subsequent growth. While correlated with an increase in securitization, this is consistent with securitization increasing the supply or with an increase in demand for high-risk securitized loans by Fannie Mae and Freddie Mac which generated the increase in the number of loans made to high risk borrowers.

The Role of CDOs in the Financial Crisis

The spread of this crisis from a relatively small sector of the financial system across markets and international borders resulted in widespread financial distress. This does not reflect a large value of subprime mortgages relative to other assets. Dwyer and Tkac (2009) estimate that subprime mortgages are no more than one percent of global bond values, stock values and bank deposits.

Banks in various countries suffered substantial losses followed by serious retrenchment and restructuring. The turbulence and ensuing lack of confidence spread to other asset markets and the real economy. Brunnermeier (2009), Dwyer and Tkac (2009) and others document the evolution and spread of the crisis and the role of CDOs in it.

The misperception and misevaluation of risk in these structured financial products is central to many explanations of the financial crisis. This misperception of risk may have arisen partly due to the failure of some market participants to differentiate between the risk of AAA-rated tranches of CDOs and AAA-rated corporate bonds (Brennan, Hein and Poon, 2009). A rating is not a sufficient statistic for risk and,

⁸ Refinancing generally is possible only if the house's value is more than the new mortgage's value. While mortgages for 100 percent of a house's value were possible before 2007, it often is possible to borrow no more than 80 percent of the house's value. Given the size of the decreases in housing prices in the United States, many homeowners owe more than their houses are worth.

If the house's value falls, it is possible that the homeowner owes more than the house is worth. In this situation, if the mortgage is non-recourse – which means the house is the only asset collateralizing the loan – it can be financially optimal for a borrower to default. Despite impressions to the contrary, home mortgages are recourse loans in most states in the United States (Ghent and Kudlyak 2009). Mortgages are non-recourse loans in some states such as Arizona, and it can be difficult to obtain enforceable judgments against borrowers who have defaulted in some other states.

even if not intended by anyone, the equilibrium amount of risk not perceived by buyers of structured products can be more than buyers perceive (Dwyer 2009).

In addition to possible mispricing, the valuation of CDO tranches is particularly problematic in the event of widespread defaults (Smithson, 2009), a feature not apparent before defaults increased in 2007. Valuation models have four key inputs: default rates, prepayment risk, recovery rates and default correlations. Problems estimating all of these factors became important once housing prices started to fall. Default correlations are based on historical data and were underestimated based on a period of increasing house prices and economic expansion. As the probability of observing large-scale defaults increases and default correlations increases, the prices of senior CDO tranches fall with the prices of riskier tranches. The risk priced in CDO tranches was underestimated, at least ex post. Coval, Jurek and Stafford (2009) analyze the risk inherent in the securitization process and in particular how risk migrates to higher-rated tranches in the event of increasing importance of a large common shock such as falling house prices.

The ABX data have been the subject of several statistical studies already. Fender and Scheicher (2009) use two vintages to track the crisis and conclude that increased liquidity risk and decreasing risk appetite were important factors in the price decreases of the higher-rated tranches. Longstaff (2010) uses the ABX indices to test for contagion from the subprime-asset backed market to other parts of the financial system. He finds strong evidence of contagion and liquidity risk with revisions to risk premia identified as the most likely transmission channel. Longstaff also finds that ABX returns lead stock market returns and bond yield changes by up to three weeks, suggesting that significant information was reflected in these prices before being reflected in other markets. Gorton (2009) finds that declines in the ABX indices and the repo market were highly correlated due to some combination of counterparty risk and lack of liquidity.

Dungey, Dwyer and Flavin (2011) present evidence that the value of the ABX is significantly lower due to the financial crisis, over and above any continuing effects of decreased real estate values. We estimate a common factor in the ABX indices in Figure 5 from a statistical analysis. We use the London Interbank Borrowing Rate (LIBOR) less the Overnight Index Swap rate (OIS) as a measure of the financial crisis, reflecting concerns about counterparty risk and liquidity during the financial crisis. We estimate that the value of the ABX was 20 percent lower at the end of 2009 than it would have been without the temporarily elevated values of LIBOR less OIS during the financial crisis.

More speculatively, there are other important ways in which the ABX may have contributed to the financial crisis. The ABX index was used as a basis for so-called "arbitrage" in which traders made bets on the mortgage market. To the extent that traders were increasing the risk of their own positions by doing so, these contracts may have contributed to the gains and losses due to the underlying fall in housing prices, the uncertainty about others' losses and the financial difficulties. In and of themselves, such gains and losses are lump-sum transfers after the gains and losses occur, but such contracts contributed to some agents' losses which may well have increased the underlying uncertainty about others' solvency. Then again, this effect may have been unimportant. I am not aware of any studies of this issue to date.

Failures, Securitization and Risk Transfer

At least one firm – AIG – took sizeable positions on subprime mortgage CDOs by writing CDS contracts on them and failed at least partly because of those contracts (Kos 2010). AIG received funds from the Federal Reserve on September 16, 2008, the day after Lehman filed for bankruptcy. Many of AIG's counterparties for CDS contracts were banks in Europe which bought the insurance in CDS contracts because it reduced their capital requirements. If AIG had gone bankrupt using standard legal arrangements, some banks in Europe would have had to raise substantial additional capital. AIG also insured CDOs, which generated substantial losses and set the stage for the liquidity crisis that led the Federal Reserve to provide funds to AIG.

Besides securitization of mortgage loans, originators of loans have been securitizing loans on many other assets such as credit cards. The increasing use of securitization by banks has been and continues to be controversial. The common criticism of these arrangements is that the arrangements for credit risk transfer will reflect asymmetric information between the originators and sellers of the loans and the buyers of them (DeMarzo 2005; Chiesa 2008).

Ironically, some securitization was created partly to create the appearance but not the reality of credit risk transfer. Banks created off-balance-sheet entities – conduits – which acquired medium-term and long-term securities and financed the purchases by issuing asset-backed commercial paper. These arrangements were supposed to transfer the credit risk to the conduit and then to the holder of the commercial paper, but clever contract terms undid any apparent credit risk transfer (Acharya, Schnabl and Suarez 2011).⁹

Conclusion

Did financial innovations play a role in the Financial Crisis of 2007-2008? No doubt. By the time of the financial crisis, some financial innovations were sufficiently widespread that the financial difficulties were bound to touch them and have additional effects because of them.

A yet more pertinent question is whether “the financial crisis was caused by certain financial innovations”, where this means “the financial crisis would not have occurred without certain financial innovations”. A careful answer to this question would require a precise definition of a financial crisis, which would make it possible to examine whether the financial crisis so defined would have been possible without the innovations. Some developments are unlikely to have been affected by the financial innovations. The Great Moderation and the U.S. government's push to increase lending to higher risk mortgage borrowers are very unlikely to have been affected much by financial innovation. It is plausible that the combination of these two developments by themselves would have resulted in an increase in higher risk mortgages and rising housing prices. It is worth recalling that, in the context of the United States crisis, the takeover of Fannie Mae and Freddie Mac on September 7, 2008 was the

⁹ Some conduits held only assets originated by their sponsoring institution, some held only assets originated by others and some held both (Acharya, Schnabl and Suarez 2011, p. 7).

beginning of the climax of the crisis.¹⁰ Whether the denouement of higher housing prices and riskier mortgage lending would have been a spectacular financial crisis or a gradual unraveling of unsustainable arrangements is not obvious.

The issue is similar in many respects to Friedman and Schwartz's (1963) examination of the Great Contraction from 1929 to 1933 and their conclusion that disastrous monetary policy contributed substantially to the economy's collapse. While their research did not settle every related issue, their detailed analysis of developments in the context of an economic theory advanced the discussion to a much more serious level than previous analyses. Such research on the Financial Crisis of 2007-2008 is likely to be necessary before discussion of the cause of that crisis advances to a similar level. In the meantime, anyone's answer about the role of financial innovation in this crisis probably reflects their prior beliefs before the crisis as much as or more than it reflects any evidence from the crisis.

¹⁰ Dwyer and Tkac (2009, Appendix) provide a detailed summary of developments from January 2007 to March 2009.

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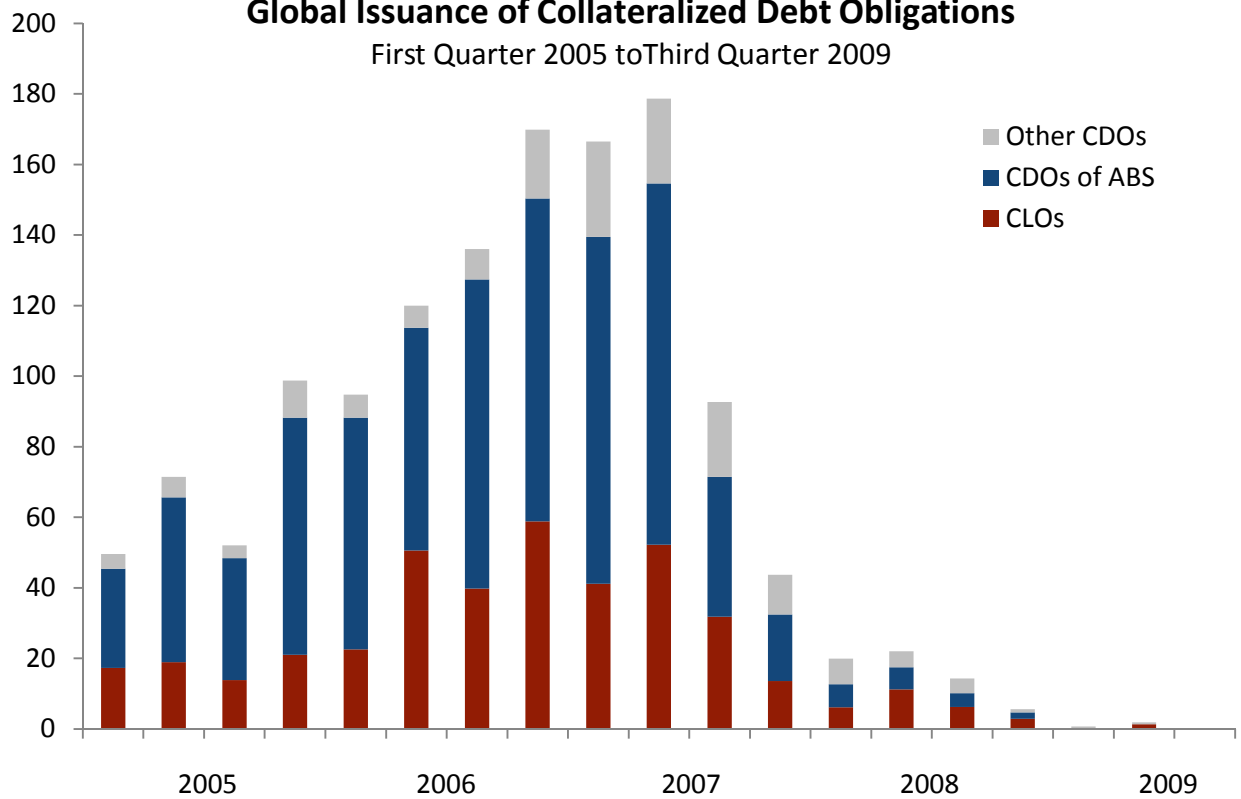
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Table 1
Coupons on the ABX

Vintage	Rating	Coupon (Basis points)
January 2006	AAA	18
	AA	32
	A	54
	BBB	154
	BBB-	267
July 2006	AAA	11
	AA	17
	A	44
	BBB	133
	BBB-	242
January 2007	AAA	9
	AA	15
	A	64
	BBB	224
	BBB-	389
July 2007	AAA	76
	AA	192
	A	369
	BBB	500
	BBB-	500

Source: Markit Group Limited and Haver Analytics.

Figure 1
Global Issuance of Collateralized Debt Obligations
 First Quarter 2005 to Third Quarter 2009



Source: SIFMA.

Figure 2

Creation of a Tranched Residential Mortgage Backed Security from
A Portfolio of Subprime Mortgages

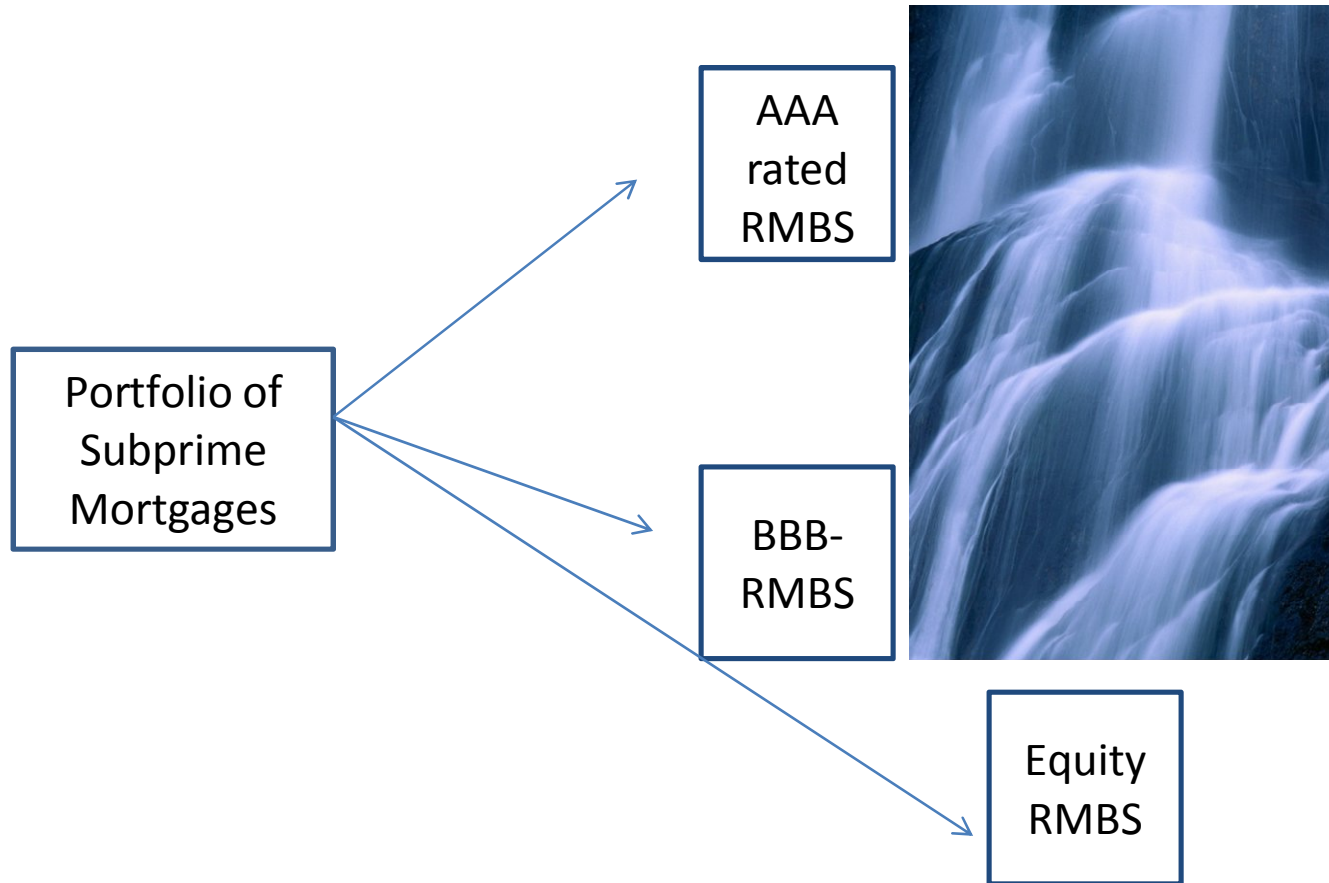


Figure 3
Creation of a Tranched CDO from
Tranches of a Residential Mortgage Backed Security

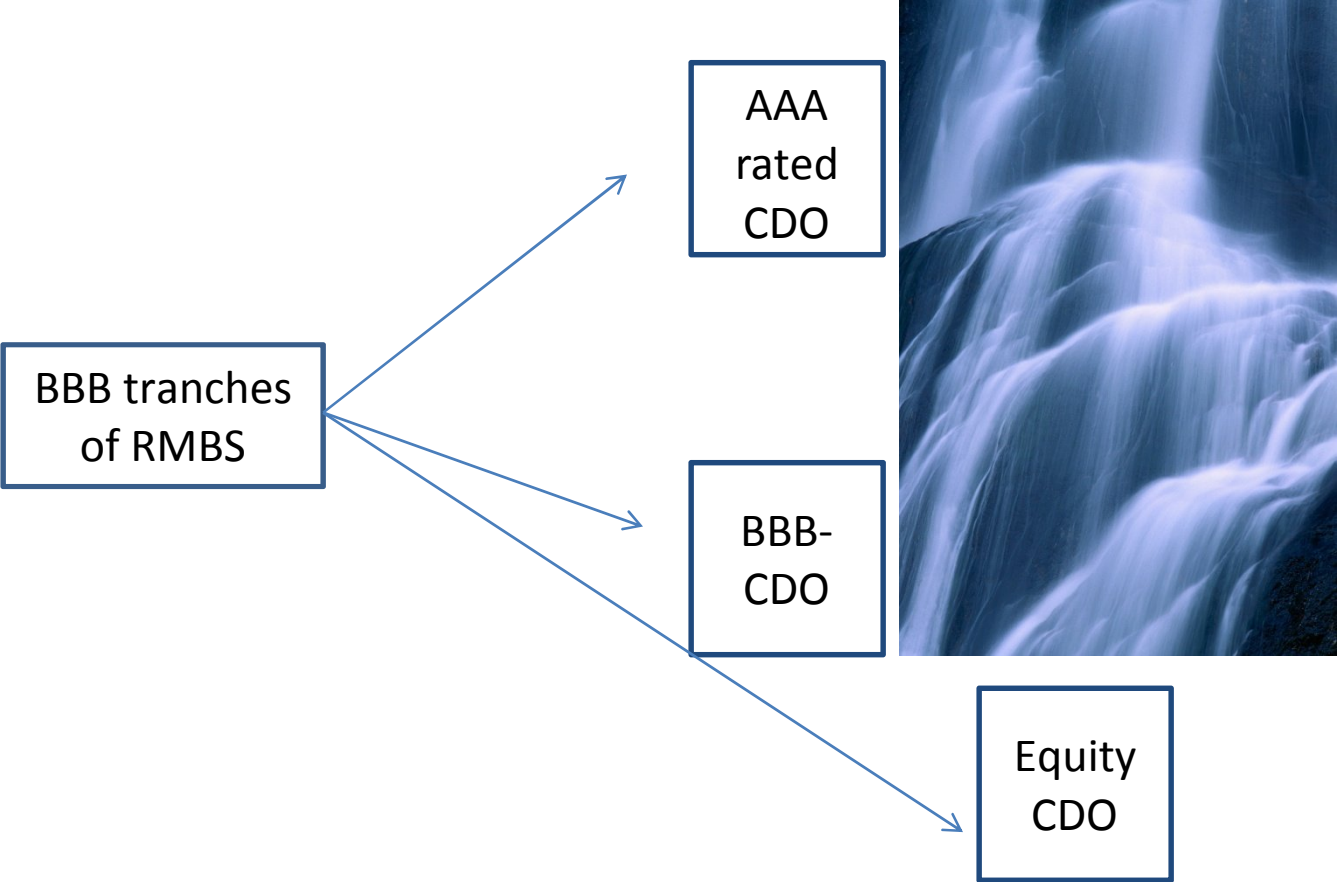


Figure 4

Subprime Mortgages to Tranches of CDO

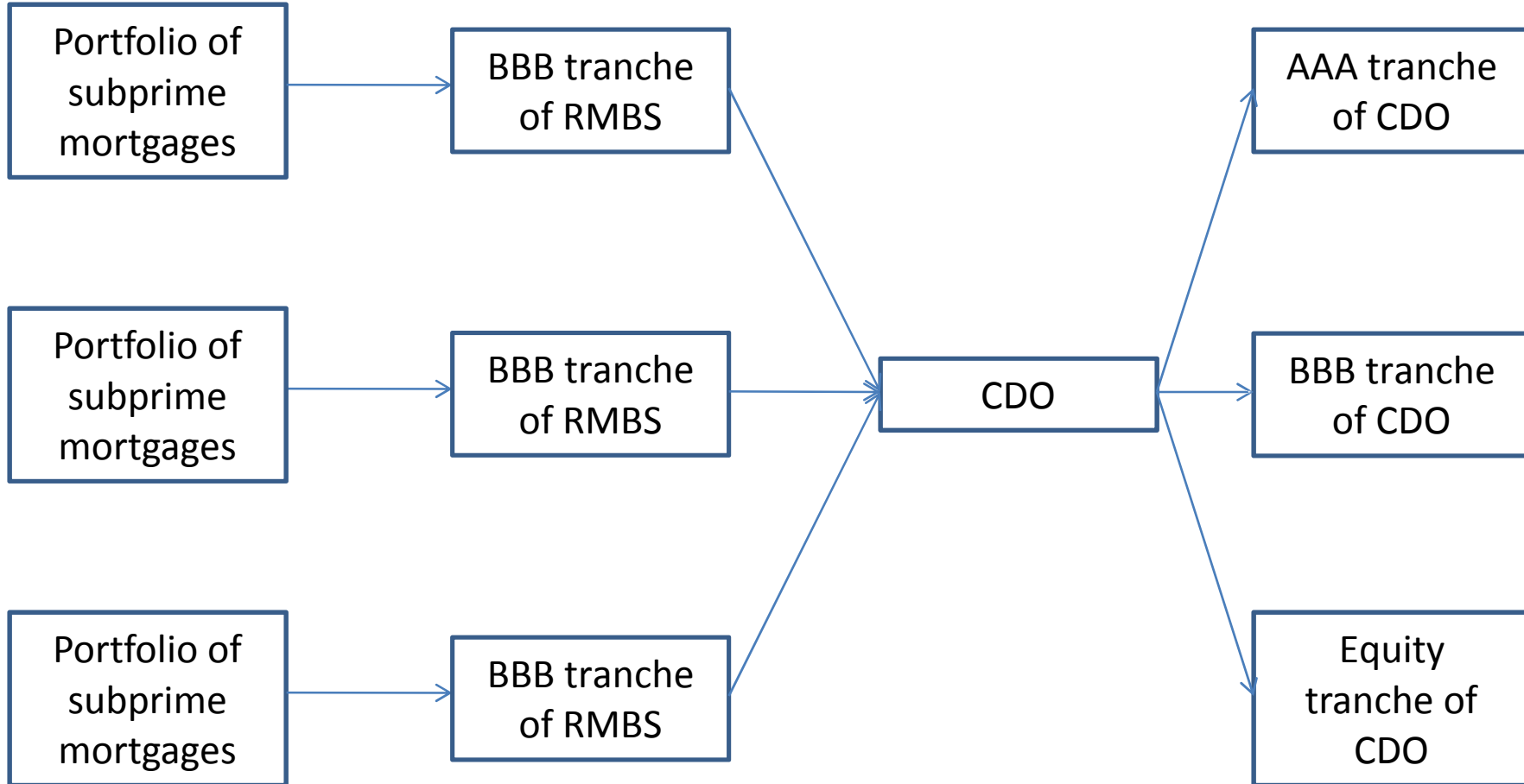
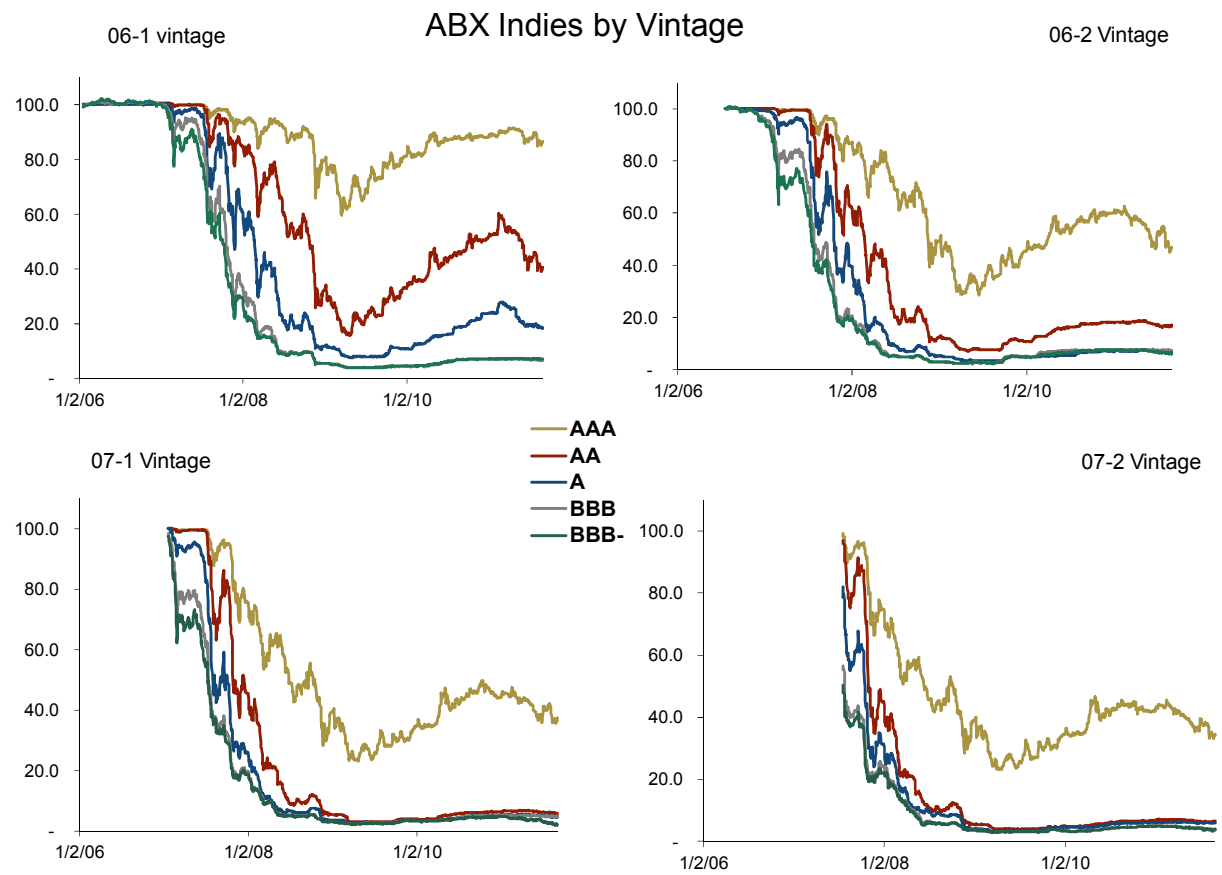


Figure 5
ABX Indices
January 19, 2006 to August 31, 2011



Sources: Markit Group Limited/Haver Analytics