

# **CMBS Issuance and Collateral Analysis Review**

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## **Abstract**

This project reviews the structure of Commercial Mortgage-Backed Securities at issuance as well as their underlying collateral analysis and deal level analysis. Through the comparison of CMBS 1.0 and CMBS 2.0 (CMBS 1.0 is the Commercial Mortgage Backed Securities issued pre-crisis and CMBS 2.0 is the CMBS that was issued after the 2008 Global Financial Crisis), we investigate how the underwriting standards evolved as a response to the crisis of 2008.

This paper looks at several different categories with convergent informational outcomes. This paper identifies how underwriting standards becomes stricter, for example the cutoff LTV for CMBS 2.0 is lower and cutoff DSCR for CMBS 2.0 is higher. The new CMBS issuance starts to take off after 2008, though slowly.

Moreover, this paper provides estimates of expected loss by vintage through the use of its own collateral model. Bloomberg identifies the deals we modeled as falling into one of the following categories: Conduit, Portfolio, SASB (single asset/single borrower), or Small Balance deals. In total, we modeled 617 American CMBS deals, which originated at various years between 2000 and 2011. Approximately 4,000 bonds were included in our model. The underlying property and loan information that we used in our model came exclusively from the Bloomberg database. We modeled the change in property values by the time-dependent Moody's CPPI index.

We also considered stressed property values. The discount factor on the value of a particular stressed property is influenced by relative location of the target property to stressed properties. We subtracted the current balance of the underlying loan by the current estimated value of the property in our model to get the expected loss for each loan. Then we summed each of the individual losses to get the expected total loss for each deal. This algorithm influenced our decision to investigate the change in value of the collateral underwriting the loans.

## **Acknowledgements**

We would like to express our deepest gratitude to Professor Andrey Pavlov and Steve Adang, CFA for their valuable feedback and guidance throughout the development and completion of this project. We would also like to acknowledge and thank them for their generous support during the entirety of our work in the Master's of Financial Risk Management program.

# 1. Introduction

The Commercial Mortgage-Backed Securities (CMBS) market became an important source of financing for commercial real estate beginning in the early 1990s. After the Subprime Crisis of 2008, rating agencies were blamed for underestimating the volatility of the subprime asset class when acceptable levels of risk associated with leverage. Since the Global Financial Crisis of 2008, investors have become increasingly aware of the risk associated with structured financial products such as CMBS and residential mortgage-backed securities amongst other types of asset-backed securities. Investors have wanted to ensure that the volatility of their investment asset class, identified as the correlation between default loans and the expectation of loss associated with structured financial products, were well realized and adjusted by the rating agency and the industry. The issuance of CMBS after 2008 decreased dramatically due to the decreased demand from frightened investors and to the increased stringency in the industry's underwriting standards. From 2010 onward, the appetite for securitized assets began to return and CMBS issuance once again began to rise. Compared to the earlier CMBS 1.0 deal, the deals of CMBS 2.0 are generally more conservative in nature. This conservative propensity is exemplified in lower LTVs, higher DSCRs, lower concentrations, smaller sizes, and lower non-standard properties.

The factors that we included in our collateral analysis were number of issues deal

size, number of loans, size of loans, concentration metrics, LTVs, DSCRs, the percentage of *Interest Only* loans (both partial and full), the super senior and super duper percentages, and the expected loss as implied by our updated collateral valuation work.

## **2. Development of CMBS Market**

The American Government National Mortgage Association (Ginnie Mae) insured the first mortgage pass-through security of an approved lender in 1968 (Fabozzi & Modigliani, 1992). In 1981, the first Mortgage-Backed Security (MBS) was issued by the Federal National Mortgage Association (Fannie Mae). A mortgage-backed security (MBS) is an asset-backed security that represents a claim on the cash flows from mortgage loans through a process known as securitization. Whereas a residential mortgage-backed security (RMBS) is secured by a single-family or a two-to-four family parcel of real estate, a commercial mortgage-backed security (CMBS) is secured by commercial and multifamily properties, such as apartment buildings, retail or office properties, hotels, schools, industrial properties, or other commercial sites. CMBS pools are usually different from RMBS pools in several distinct ways. First, the number of loans that a CMBS pool contains is relatively small. Second, data on rental income history and on individual loan terms for the underlying property for securitization is readily available. It is feasible for an informed investor to analyze each individual loan and to analyze the performance of the underlying properties in a CMBS pool. A similar analysis would be far more

difficult to conduct in a residential pool because of the difficulty in any prediction of rental income. Third, a CMBS usually has less prepayment risk than a residential MBS, due to the structure of commercial mortgages. Commercial mortgages often contain lockout provisions after which they can be subject to defeasance, yield maintenance, and prepayment penalties, all of which protect their bondholders. Finally, the pool composition and credit quality in CMBS pools has a great deal of heterogeneity, which is inherently absent in RMBS pools.

Securitization of commercial mortgages began in the early 1990s as a means for the Resolution Trust Corporation (RTC) to dispose of assets of the failed Savings and Loan institutions. Securitization of these types of mortgages has grown significantly over the past 20 years (Graph 1). Based on data from the Federal Reserve, over one quarter of outstanding commercial mortgages are presently securitized. A large portion of this growth came about as insurance companies gradually changed the composition of their portfolios from whole commercial mortgage loans to a mix of commercial mortgages and CMBS. Commercial banks continue to dominate nearly half of all commercial mortgages and nearly all the commercial construction loans.

CMBS is seen to be an attractive alternative for commercial real estate investors who are planning to increase their leverage wish to avoid funding by portfolio lenders. There is evidence that leverage buyouts of REITs was a huge part of the growth in CMBS in 2006 as well as in the first half of 2007. It is likely that the



availability of abundant and cheap debt through the CMBS markets, combined with the improving fundamentals associated with a growing economy, enabled leveraged investors to pay more for the purchases of commercial properties. These overpayments were not relegated to CMBS alone. Demand from the RMBS market fueled the increase in residential housing values and demand from investors in Leveraged Loans fueled public equity markets.

### **3. Paper Description**

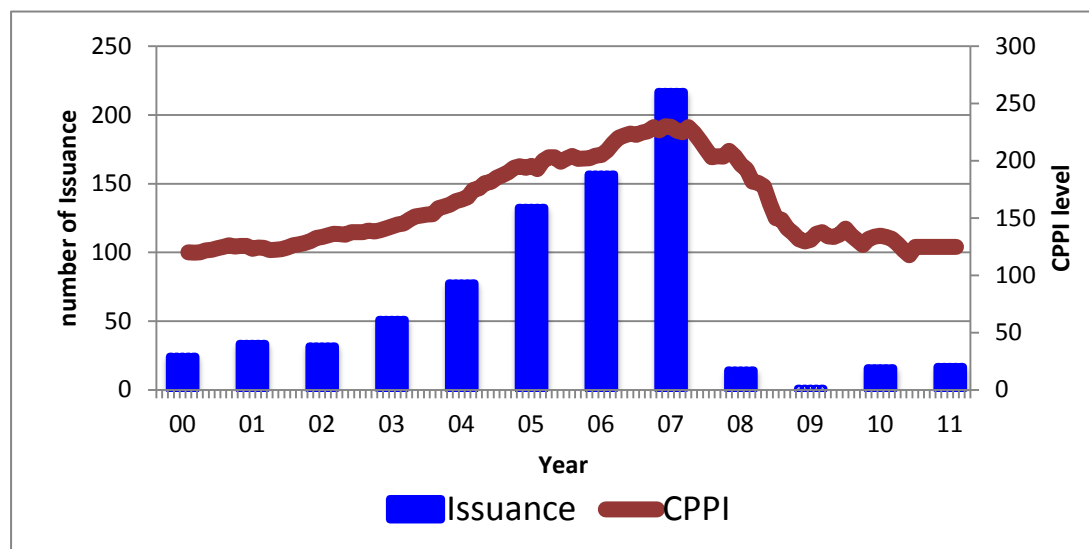
The work for this paper was completed in two parts. The first part was an analysis of origination trends (Graph 1-Graph 10). It showed higher LTVs, lower DSCR ratios, larger overall deal sizes, heavier concentrations, lower AAA credit support, and an increased presence of interest only loans. These factors describe an aggressive underwriting standard and were the main signals indicating that the deals had become riskier.

The second part of our work (Graph 11) is the extrapolation of the collateral model we designed (described under the graph 11). In our model, CMBS bonds are expected to experience fewer losses as a result of an increasingly conservative underwriting standard as well as from improved property market.

### **4. Research Methodology and Data description**

As before, the majority of the data we used in our model for CMBS underlying property and loan information came from Bloomberg. The 617 deals that we analyzed were exclusively from US deals and included data from a decade of approximately issued 4000 bonds. The deal types were among Conduit, single asset/single borrower (SASB), Portfolio, and Small balance.

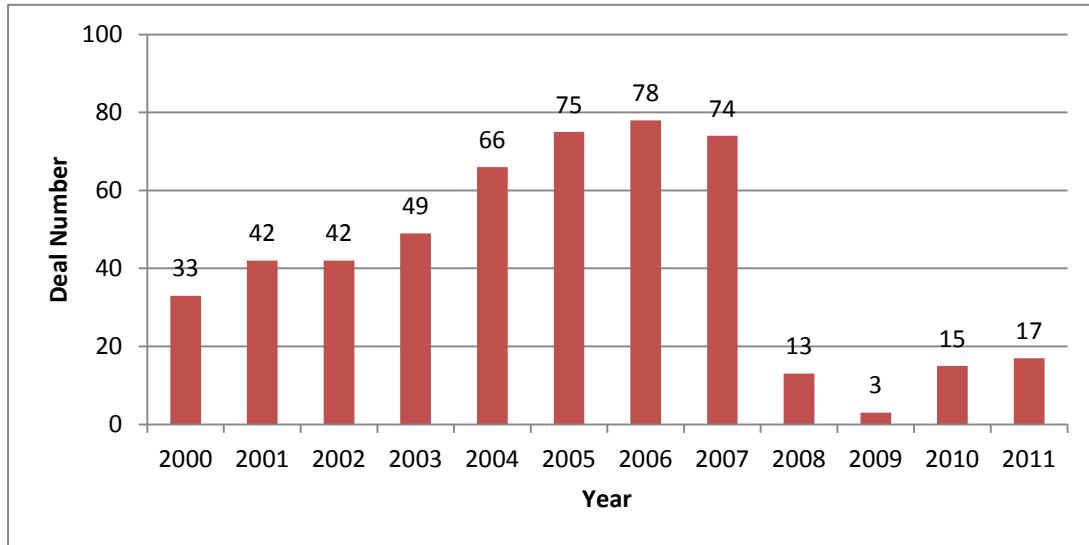
**Graph 1. Total Issuance in billions by vintage, the compounded annual growth rate from 2000-2007 is 33.1%, and the overlay of the performance of the CPPI index, which is the basis for forecasting future losses**



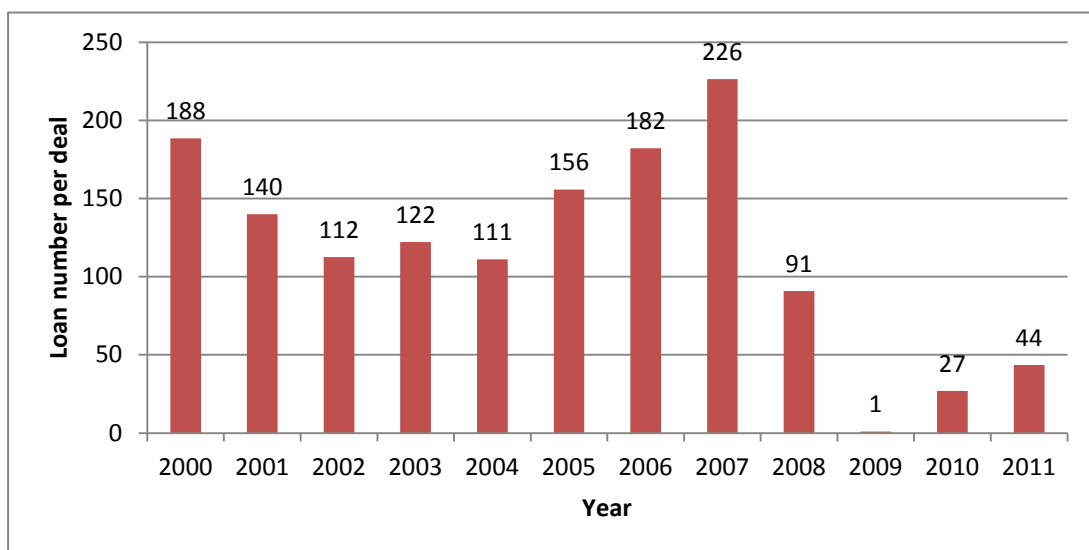
(Sources: Bloomberg)

US CMBS issuance hit a high in 2007 at a volume of USD 220 billion. This high represented a tenfold increase in volumes over the year 2000. The financial crisis resulted in a severe cooling of the securitization market: in 2008, CMBS issuance was

down to approximately one-tenth (USD 17 billion) of the 2007 reading. It was not until 2009 that the market showed signs of even a slight recovery. In 2011, USD 20 billion worth of CMBS have been issued in the US. We can see the Issuance increase align itself with the CPPI increase.



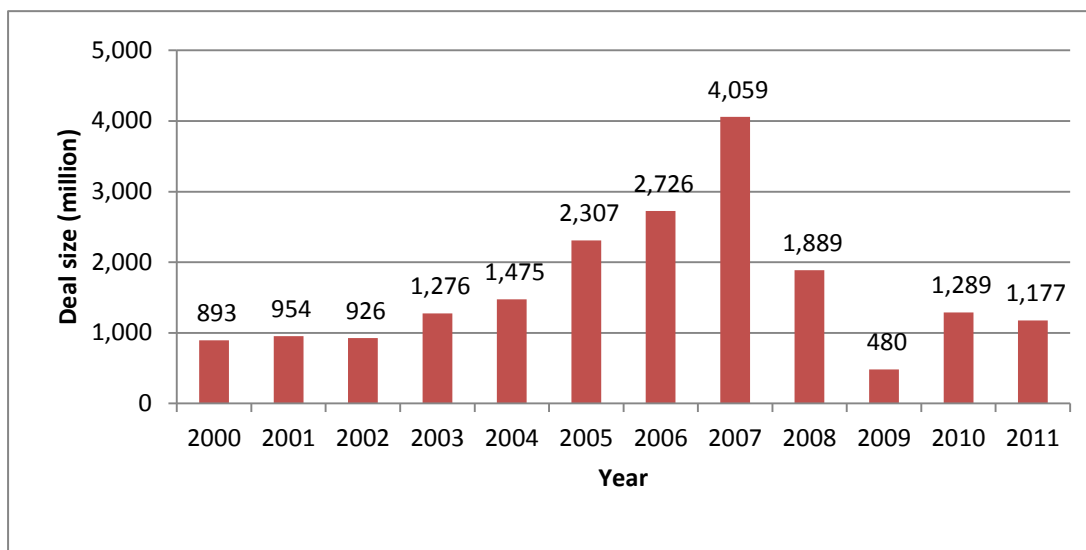
**Graph 2. CMBS Deal Count by vintage.** (Sources: Bloomberg)



**Graph 3a. Average Deal Loan Count by vintage. Underlying loan of the 2009 vintage**

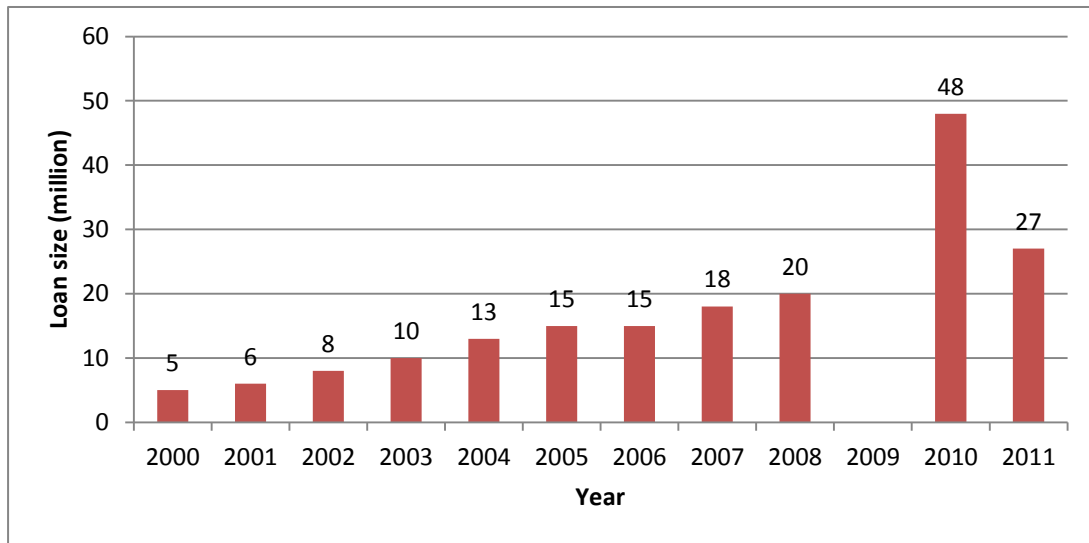
**deals is just a large single loan.** (Sources: Bloomberg)

In 2007 deals, the average loan count per deal was 260. This average highlights the possible intention of increased diversification among the deals that were issued that year. The deals issued in 2010 and 2011 were typical of conduit and fusion deals and were much less diversified (smaller in number but with more loans within each deal), despite the fact that they had fewer average loan numbers per deal. The 2009 vintage deals were entirely backed by multiple commercial properties and were collateralized using one single loan.

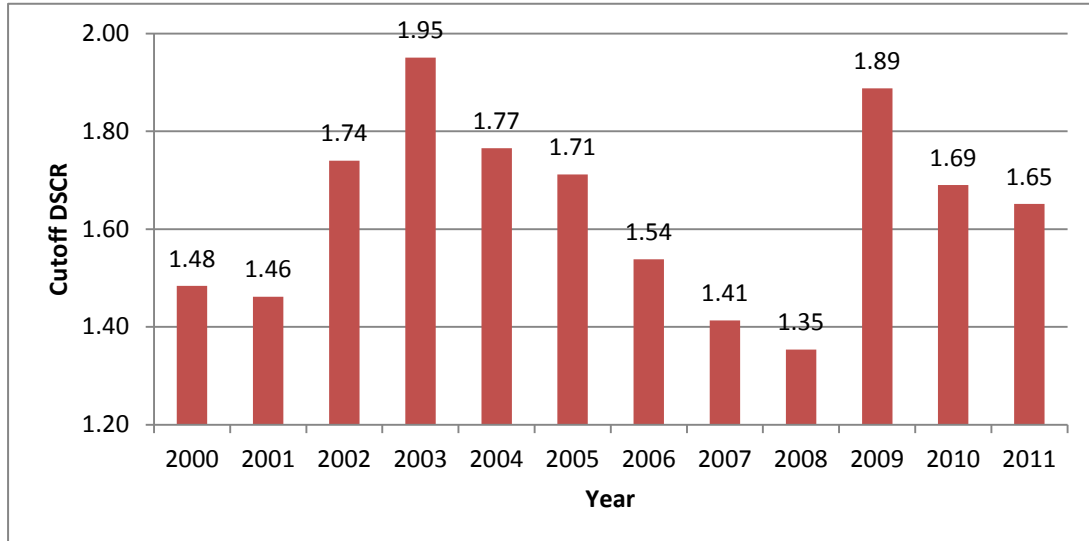


**Graph 3b. Average deal size by vintage** (Sources: Bloomberg).

Average deal size was 1.29 billions in 2010 (close to 2003 vintage) and 1.18 billion in 2011. When the peaks of 2007 vintage were reached, the average deal size was 4,06 billion.

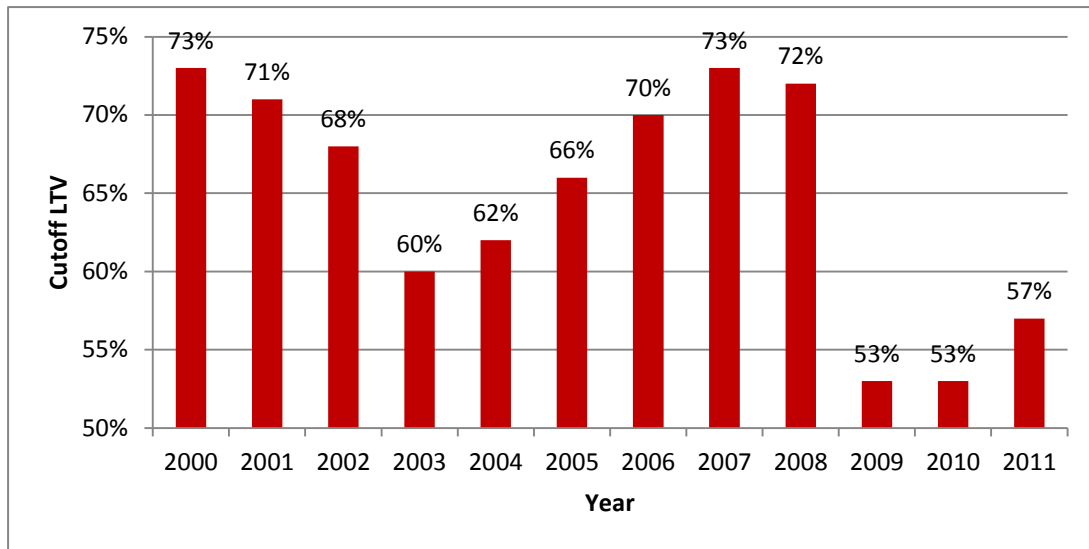


**Graph 3c. Average loan size by vintage. In 2009, all the deals were single loan deals, and the average loan size is 480 millions. (Sources: Bloomberg).**



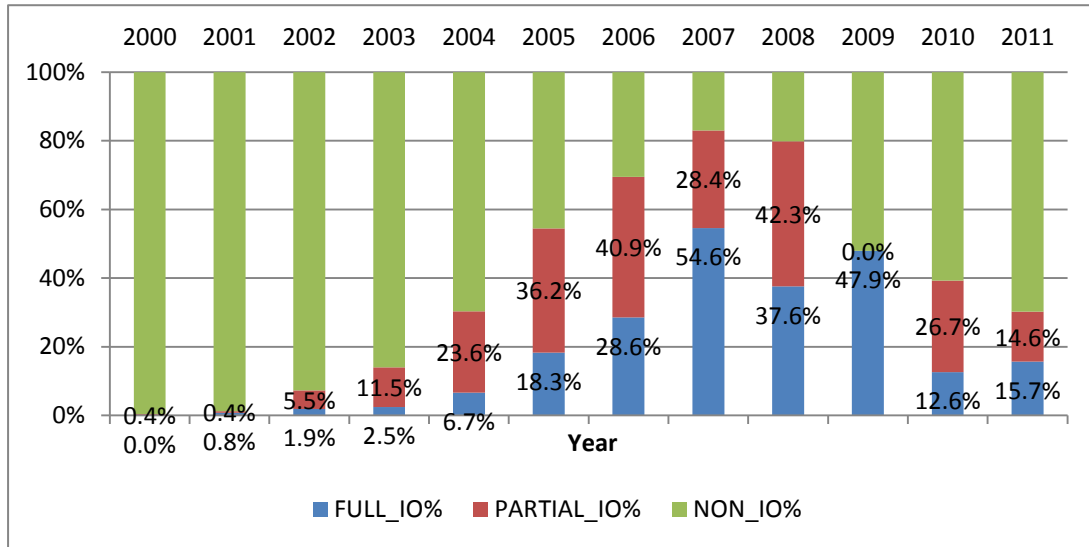
**Graph 4. Cutoff DSCR by vintage (Sources: Bloomberg)**

From 2009 to 2011, the average cutoff for DSCRs fell from 1.89 to 1.65. The leverage and debt coverage ratios inched toward their pre-crisis levels.



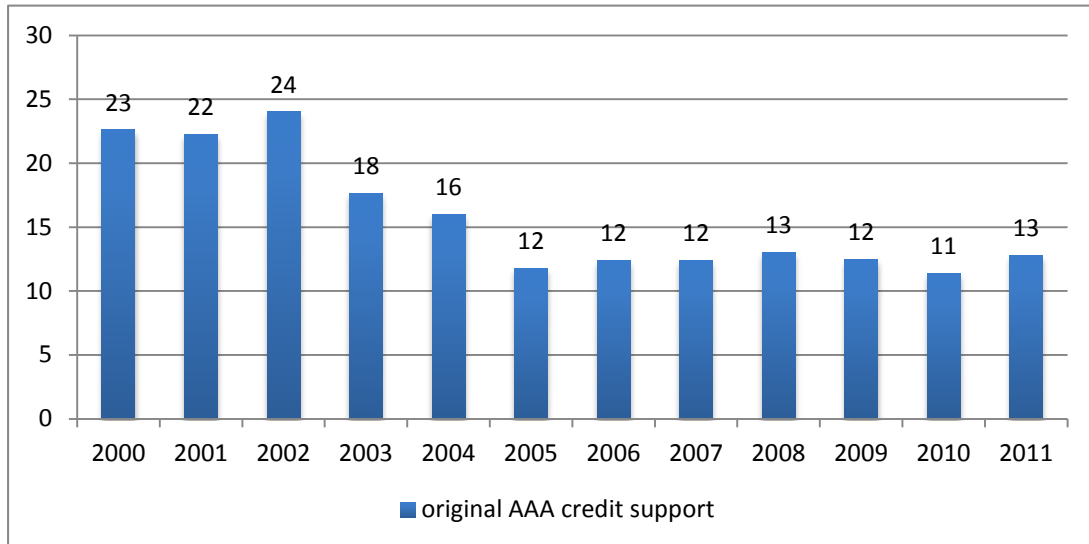
**Graph 5. Cutoff by Vintage** (Sources: Bloomberg)

The LTVs were later found to have peaked in 2007 as a result of the financial crisis. After a brief slide post 9/11, the stock market rallied, but again began to slide in March 2002. By July and September of 2002, the market reached lows, which had not been seen since 1997 or 1998. Well-publicized corporate fraud scandals such as Enron coupled with the 9/11 World Trade Centre attacks to act as contributors to the loss of investor confidence in the stock market at that time. This loss of confidence also affected and spilled over into the real estate market. From 2009 to 2011 issuance, the cut off LTV ratios increased by approximate 5 percent.



**Graph 6. Partial IO and Full IO percentage by vintage (Sources: Bloomberg)**

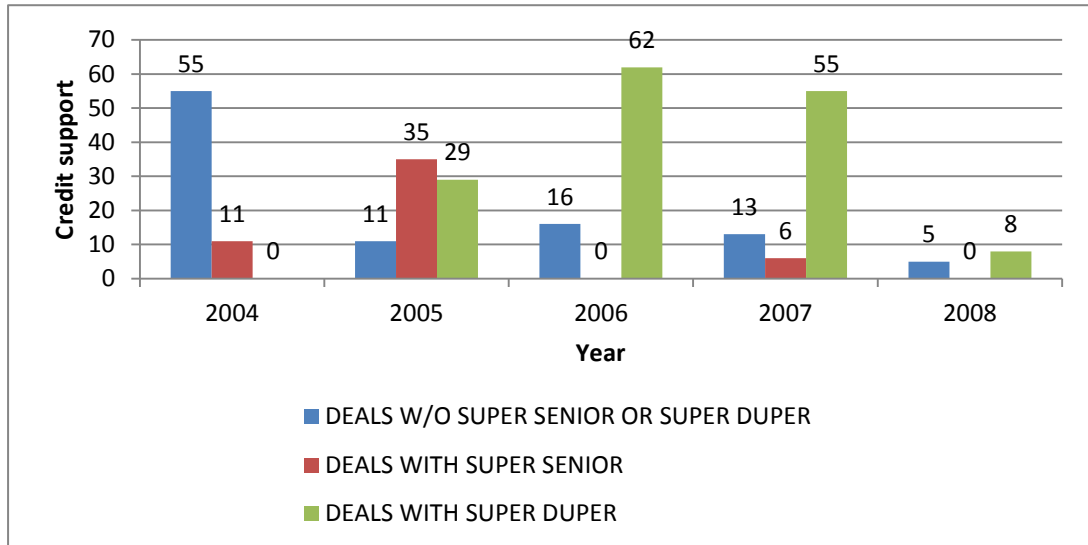
When a CMBS transaction matures, the loans securitizing it must refinance, according to how much of the loans have already been amortized. In accordance with the given structure (interest-only loans, partial interest-only loans, and amortizing loans), the act of loan refinancing gives rise to a more or less pronounced refinancing risk for the bank/lender as well as a more or less pronounced “maturity risk” for the bondholder. The share of interest-only or partial interest-only loans securitized in CMBS has strongly increased in the past. In 2007, it totaled 80% (2003,15%), in 2011 it decreased to a level of 30%.



**Graph 7. Original AAA credit support by vintage** (Sources: Bloomberg).

One of the most significant trends in the CMBS market over time has been the pronounced decline in subordination levels, which is the part of the pool that must default before the investors of a given tranche loses any of their principal.

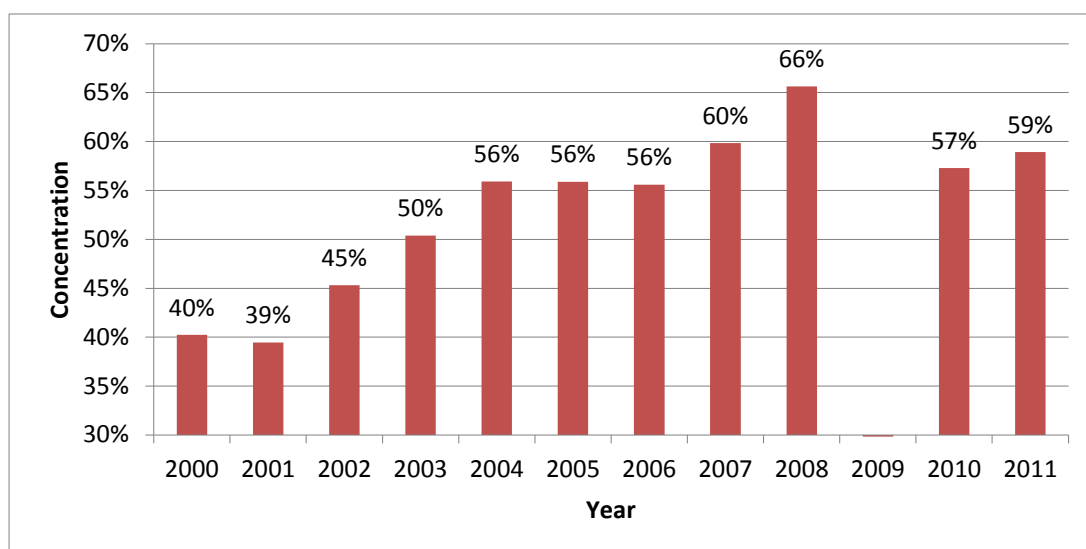




**Graph 8. Deals with super senior or super duper by vintage.** (Sources: Bloomberg).

As evidenced by the declining levels of AAA subordination through 2004 (Graph 7), the Rating Agencies appear to have determined CMBS to be a less risky asset class over time. This determination by the rating agencies, combined with the increase in deal volumes (graph 3b) shown in the previous graph, meant that larger absolute numbers of AAA bonds needed to be sold at relatively low spreads. In order to meet the need to place this larger number of low yielding bonds, dealers created a structural twist in order to appeal to fixed income crossover investors that lacked the resources, means and expertise to underwrite commercial real estate which was becoming necessary at the natural AAA rate of subordination determined by the Rating Agencies. By artificially increasing the AAA subordination rate through the creation of tiered AAA securities according credit priorities, a Super AAA class was created that could be deceptively but justifiably deemed to be an ultra safe credit product. Such a product would naturally be priced appealingly when compared to truly high quality corporate bonds. The first iteration of this financial engineering

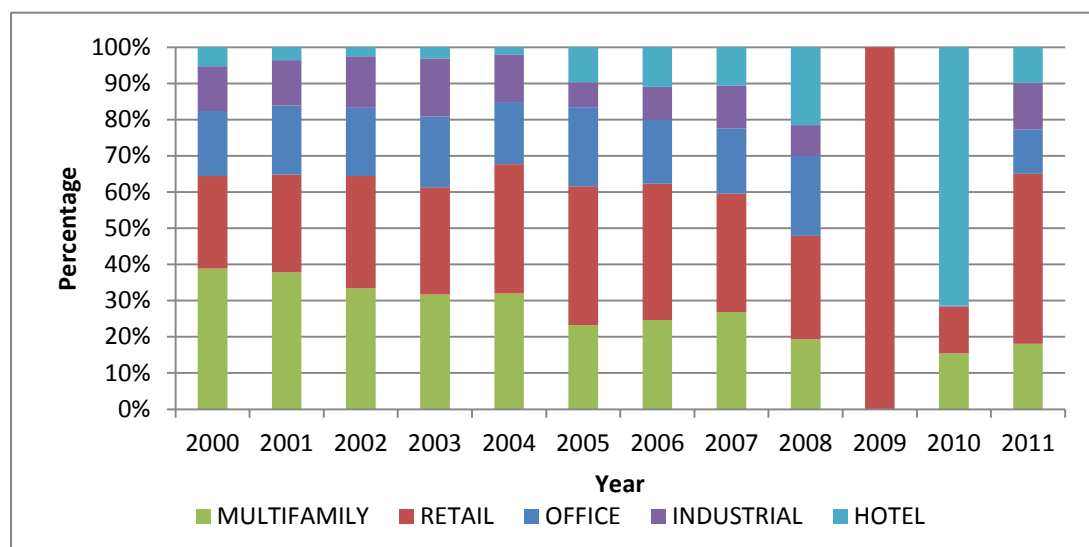
exercise occurred in late 2004. Two AAA classes were introduced: a Super Senior class with 20% subordination and a lower priority junior AAA class (commonly referred to as an AJ tranche). Many potential crossover investors felt that additional protection was necessary, and thus, 2005 saw the introduction of an additional layer of AAA credit. With the stack now consisting of a Super Duper Senior with 30% subordination, a senior Mezzanine class with 20% subordination (commonly referred to as an AM tranche), and the lowest priority junior AAA (AJ) class. Throughout most of 2005, the market experimented with Super Senior and Super Duper classes until finally arriving at Super Duper as the consensus structure. From 2006 onwards to 2008, the market consisted exclusively of Super Dupers.



**Graph 9. Concentration by vintage** (Sources: Bloomberg)

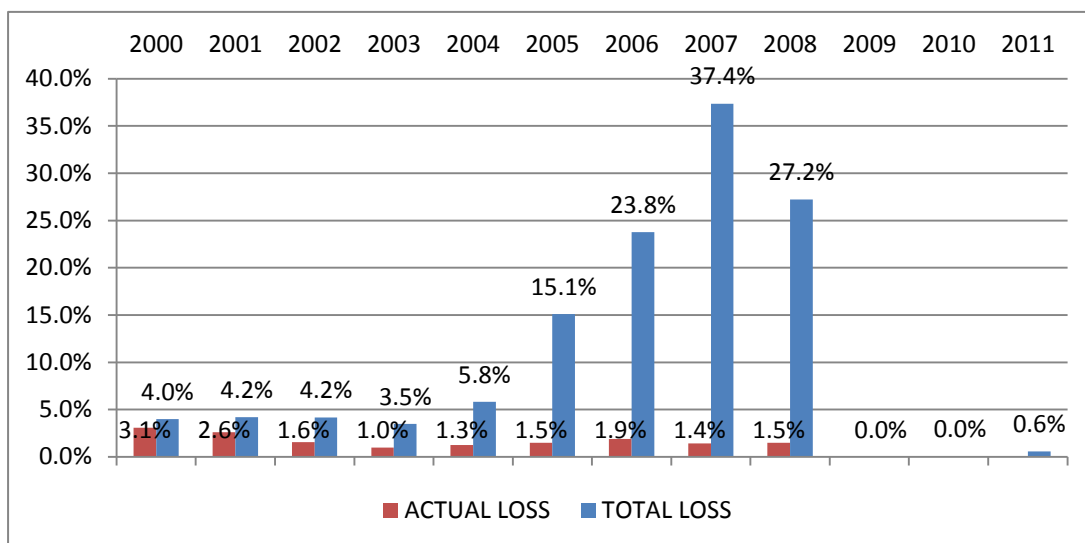
The concentration of deals, which is defined as the balance of top 10 loans within each deal divided by the total balance of the deal, averaged about 58% in the

2010-2011 vintages. This concentration highlights increased diversification among recent conduit/fusion deals. Similarly to the deals issued from 2007-2008, when the average loan count within a deal ranged from 91-226, the typical conduit and fusion deals were much less diversified and ranging around from 60% to 66%. In 2009, the concentration was 100%. This can be explained due to the fact that the 2009 vintage deals were all backed by multiple commercial properties and collateralized with a single loan.



**Graph 10. Property Type distribution by vintage** (Sources: Bloomberg)

With a combined contribution of approximately 80%, the CMBS universe is dominated with collateral from the retail, multifamily (including manufactured housing), and office sectors. In the 2009 deals, the underlying property was a single retail property type. In the 2010 vintage, the hotel sector made up almost 70% of the CMBS universe.



**Graph 11. Expected Loss by vintage** (Sources: Bloomberg)

We designed a collateral model to estimate the expected loss by vintage. In our model, we only modeled those deals defined by Bloomberg as Conduit, Portfolio, SASB, and Small Balance deals. In total, we modeled 617 US CMBS deals originating from data collected between 2000 and 2011. Over 60,000 underlying properties were included in the data fed to our model. The underlying property and loan information came exclusively from the Bloomberg database. We modeled the property value change by time-dependent Moody's CPPI index. We also took the stressed property value into consideration. The discount factor for a particular stressed property was determined by how many stressed properties were relatively near the target property and how far away are they were from the target property. Moreover, we included the adjustment of delinquency loans and near-term maturing loans with high LTVs and lower DSCRs for property values. The refinanced loan factor

was also included in the framework. We assumed a haircut of the property value at the origination if the loan was in the purpose of refinancing.

We then subtracted the current balance of the underlying loan by the current estimated value of the property in our model to get the expected loss for each loan. Finally, we added all of the losses together and came up with the expected loss amount for each deal. Our results gave us the idea that we should investigate the change of value of the collateral under the loans in future research.

The expected loss is defined as the loss-given default of the each property divided by the remaining balance of the deal. The default probability is assumed by the loan performance data as well as by the price appreciation of the underlying properties. The limitation of our calculated default probability is that, as the earlier vintages have already experienced substantial pay downs, any remaining expected loss is based on an artificially low denominator. Our modified calculation of expected loss is defined as the loss-given default of the each property divided by the cutoff balance of the deal. And the actual loss in the graph is the realized losses to date. So a reconciliation of actual and expected loss has been adjusted in the comparison of the total loss percentage between different vintages.. The total loss (actual and expected loss in total) in 2007 is about 37% of the cutoff balance. Due to the improved property market after the financial crisis, as opposed to the conservative underwriting as the sole input to expected losses implied by the framework, current market values have no additional predictive power.

## 5. Conclusion

As time progressed, CMBS deals became riskier as evidenced by more aggressive underwriting in the form of higher LTVs, lower DSCR ratios, larger overall deal sizes and heavier concentrations, lower AAA credit support, and by the increased presence of interest only loans. At the same time, property values increased at an elevated rate, perhaps at least partially attributed to the availability and attractive pricing of CMBS debt instruments. Additional significant demand from non-traditional CMBS investors was spurred by the introduction of Super and Super Duper AAA bonds and further fueled issuance in the years leading up to the Global Financial Crisis. When the capital markets and securitization markets in particular abruptly shut down, property values were negatively impacted as the means to finance them all but disappeared. The resulting global economic slowdown caused erosion in property fundamentals, which further pressured capital values. As a result, CMBS bonds are currently expected to experience substantial losses going forward into the future and this is particularly so for the peak of the market vintages. The predicted losses as a result of the work performed at the direction of our mentors yields some interesting results as the super duper AAA classes from the peak vintages (on an

average basis at least) are likely to realize some form of loss. An interesting follow up would be an analysis of deal levels which would highlight deals that were better (worse) on average relative to other vintage cohort. We believe that investors would be well served by such an analysis.

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