

Lemons and CDOs

Why Did So Many Lenders Issue Poorly Performing CDOs?

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Abstract

Collateralized Debt Obligations (CDO) played a key role in the growth of Asset-Backed Security (ABS) issuance between 2004 and 2007 by providing a mechanism for lower-rated ABS to be used as collateral for the creation of AAA securities. Using a database published by Pershing Square Capital Management covering all of the assets underlying 528 CDOs and CDO-Squareds issued from 2005 through 2007 and using rating history and other information from the ABSNet database, we compare the characteristics and performance of ABS observed in a CDO with other ABS not observed in a CDO. We find that CDO assets tend to be lower rated securities from the lowest quality asset classes and vintages, and with a higher spread at issuance. CDO assets performed much worse than comparable securities that were not included in a CDO. When we control for the initial rating, CDO assets have a downgrade severity that is at least twice as bad as comparable ABS not included in a CDO. Synthetic CDOs assets perform worse than cash CDO assets, but assets included in both cash and synthetic CDOs perform worst of all (with a downgrade severity about two and one-half times worse than the average downgrade severity). Even when we include controls for a wide variety of observable characteristics, including initial yield, CDO assets still underperform comparable ABS by between 50 and 100 percent. These results suggest that CDO originators successfully sold securities and insurance against the worst performing ABS assets, but also that buyers of CDOs would have had a hard time analyzing these securities based on observable characteristics alone.

1. Introduction

“They structured like mad and travelled the world, and worked their tails to make some lemonade from some big old lemons.”

- Former head of Goldman Sachs’ mortgage department in an internal email released during the U.S. Senate Permanent Subcommittee on Investigations hearings of April 27, 2010.

Headlines regarding large investor losses on collateralized debt obligations (CDOs) were highlighted by SEC charges against Goldman Sachs “...for defrauding investors by misstating and omitting key facts...” about a CDO transaction, Abacus 2007 AC-1.¹ The litigation served to highlight the exceptionally poor performance of a group of assets whose issuance ballooned with the growth of private asset-backed securities (ABS) between 2004 and 2007 (see Figure 1). According to the Securities Industry and Financial Markets Association (SIFMA), issuance of US dollar denominated CDOs more than doubled in 2006 reaching over \$421 billion before collapsing in the second half of 2007.² Cordell et. al. (2012) document eventual issuance of 727 CDO securities worth \$641 billion during the run-up to the crisis. Strikingly, the authors argue that eventual losses from CDOs will equal \$420 billion, about two-thirds of total issuance. The existence of a large market to sell low quality subprime securities into CDOs has sometimes been blamed for the deterioration of subprime lending standards at the height of the housing bubble.

Commentators have suggested a variety of reasons for the rapid growth of the CDO market. A common view of CDOs is that they were designed to take advantage of overly simplistic ratings models (the so-called “ratings arbitrage” view), creating highly rated bonds

¹ SEC Press release 2010-59, April 16, 2010. On July 15, Goldman Sachs agreed to pay a fine of \$550 million and reform its business practices to settle the SEC charges (SEC Press release 2010-123, July 15, 2010).

² Aggregate issuance data based on SIFMA reports available at: <http://www.sifma.org>.

from relatively poor quality underlying collateral. Demand for these relatively low quality but AAA-rated CDOs with high yields appears to have come from regulated financial institutions, oftentimes in Europe, where explicit or implicit capital requirements were based on the underlying rating of the security. By this view, willing buyers and sellers understood the collateral and risks, but were arbitraging capital rules. Others have argued that the strong demand for AAA bonds was due to a scarcity of high quality assets that could serve as collateral in growing global capital markets (“lack of collateral” view). With growing demand and a limited supply of high quality assets, CDO quality inevitably deteriorated. Finally, critics have often suggested that CDOs were designed by well-informed sellers to take advantage of less informed buyers, often with the complicity of intermediaries who misled investors as to the underlying quality of the CDOs (“uninformed buyers” view).

We shed light on the reasons for the growth and subsequent crash of the CDO market by examining the performance of ABS that serve as underlying collateral or reference securities for CDOs. We use a sample of 528 cash, hybrid, and synthetic CDOs posted online by Pershing Square Capital Management and insured by Ambac or MBIA from 2005 to 2007 and match the underlying securities from the CDOs into a database of more than 84,000 ABS from ABSNet containing rating history, initial yield, collateral type, sponsor, and a variety of other important variables.

Consistent with the common perception, our data show that CDOs were made up of relatively poor quality securities based on readily observable attributes. Relative to the overall universe of ABS, CDOs contained assets from the worst performing asset classes and vintages. The poor quality of the assets inside CDOs is not just exhibited by ex-post measures of quality; securities placed inside CDOs also had a higher spread at issuance. Yet, despite their apparently low quality, bonds placed inside CDOs were also more likely to be rated by all three rating agencies than comparable bonds not placed inside CDOs.

Next, we compare the performance of ABS inside a CDO with similar securities that were not put into a CDO when controlling for ratings alone, as well as other available ex-ante measures of asset quality. The empirical results show that ABS included in CDOs performed extraordinarily poorly relative to seemingly comparable securities that were not included in a CDO. When we control for the initial credit rating alone, CDO assets have a downgrade severity that is at least twice as bad as comparable ABS not included in a CDO. These results are

consistent with the ratings arbitrage hypothesis, as is the fact that securities in more highly structured deals (CDO squared) perform even worse than those in straight CDOs. Nonetheless, buyers of CDOs would have had a hard time analyzing these securities based on observable characteristics alone. Even when we include controls for initial bond yield and other attributes that were associated with poor ex-post bond performance, CDO assets still had a 50 and 90 percent worse downgrade severity. The evidence shows that CDO originators successfully sold securities and insurance against what turned out to be the worst performing ABS assets.

We also examine the performance of cash versus synthetic CDOs to better understand the motives of participants in the CDO market. Synthetic CDOs are made up of some portion of reference securities rather than cash bonds, meaning that payments between buyers and sellers are triggered by the performance of reference securities rather than actual bond cash flows. A key distinction of synthetic CDOs is that their issuance is not constrained by the need to locate and purchase a reference bond. As well, the size of the synthetic CDO market is not limited by the size of the underlying ABS market; some ABS were sold long and short at well above 100 percent of the outstanding value of the particular bonds.

The ability to create synthetic securities was sometimes argued as a way to overcome the lack of high quality collateral in the face of strong global demand for such collateral. Yet the opposite appears to have been the case. Controlling for ex-ante ratings, assets that served as collateral for synthetic CDOs had a downgrade severity that was worse than assets in cash CDOs alone. Reference securities that show up in multiple synthetic CDOs perform worse than ABS that appears in only one CDO. The association of synthetic security issuance with poor performance is reinforced by the fact that synthetic CDOs issuance hit its peak just at the time that the housing bubble started to burst, and after the peak issuance of cash CDOs.

Finally, we show that ABS that appear in both cash and synthetic CDOs have a 50 percent worse downgrade severity than ABS in either cash or synthetic CDOs on their own. Particularly striking, though, is that assets in both cash and synthetic CDOs received an average of 2.5 out of a possible three ratings, compared to an average of 2.1 ratings for the typical ABS outside a CDO, underscoring the inability or unwillingness of rating agencies to discipline adverse selection of the worst assets into CDOs. These results might also be consistent with the hypothesis that equity buyers in cash CDOs might have tried to offload the risk from the worst performing underlying ABS by shorting the cash positions in subsequent synthetic CDOs,

especially since reference securities appearing in both cash and synthetic CDOs show up first in the cash CDO about 75 percent of the time.³ Nonetheless, our data do not support this hypothesis; when a bond appears in a cash CDO and is then followed by a synthetic CDO, it actually performs slightly better than bonds appearing in cash CDOs alone.

The data also allow us to examine the role of the sponsor in subsequent performance of the CDOs. Many critics have argued that the proliferation of smaller, less reputable and poorly regulated issuers was a factor in the crisis. Counter to findings in Faltin-Traeger, Johnson, and Mayer (2010a) that high quality ABS sponsors issue better performing securities, our results show that more highly regulated sponsors chose especially poor quality securities for their CDOs, securities that performed even worse than the average security inside a CDO (a very low standard). ABS included in CDOs issued by both foreign and domestic banks suffered especially severe downgrades, a finding that persists even when we control for a large number of observable bond attributes. ABS in CDOs issued by major investment banks performed better-than-average based on rating alone, although those results becomes insignificant when we control for bond yield and other observable characteristics. Finally, we examine 14 of the ABACUS deals issued by Goldman Sachs and cited by the SEC for exceptional poor performance. Conditional on rating and initial security yield, bonds included in the ABACUS deals suffer less severe downgrade severity than ABS inside the average CDO deal (although the underlying still perform considerably worse than equivalent ABS not included in a CDO). However, once we control for the various observable characteristics, the underlying ABS in ABACUS deals perform worse than average.

The next section summarizes the relevant literature on ratings and structured finance. Section 3 discusses the data, while Section 4 presents the basic empirical results. Section 5 presents a brief conclusion and policy discussion.

³ A more nefarious interpretation suggested by some news reports, such as ProPublica, was that some issuers would purchase the bottom rated portion of a CDO to convince buyers that the underlying CDO collateral was of sufficiently good quality, only to subsequently hedge the risks from the first CDO by taking a short position in a subsequent synthetic CDO.

2. Previous Literature

Many commentators argue that the ABS market suffers from information asymmetries due to the opacity that securitization creates. While investors may not have fully appreciated the asymmetries present in structured finance markets, their existence in other markets has been thoroughly examined. A long and established literature explores the potential effects of adverse selection on market allocation including Akerlof (1970) and Rothschild and Stiglitz (1976), the implications for debt markets including Jaffee and Russell (1976) and Stiglitz and Weiss (1981), and the implications for equity markets including Myers and Majluf (1984).

Empirical research confirms the importance of information asymmetries, but also shows that such asymmetries need not necessarily lead to market failures or financial crises in the case of the CDO market. When they recognize there is adverse selection in a market, buyers typically respond by paying a lower price for an asset. For example, Genesove (1993) shows that buyers at auction pay less from used car dealers than for cars that come from new car dealers, where some sellers will trade-in a used car every three years to buy a new car whether or not anything is wrong with their existing car. In the ABS market, Downing, Jaffee, and Wallace (2009) show that buyers of Freddie Mac SPVs recognized that the seller (Freddie Mac) was more informed about prepayment and demanded a “lemons” premium of 13 to 45 percent of the overall prepayment spread. Importantly, Benmelech et. al. (2011) show that appropriate mechanisms to align incentives successfully mitigated adverse selection in the securitization of corporate loans.

In the subprime mortgage market, information asymmetries and adverse selection often resulted in inefficient transactions taking place. Several authors have examined the likelihood that some lenders originated mortgages with greater risk due to their ability to sell the loans in the securitized market. Keys, et. al. (2010), Mian and Sufi (2009), and Berndt and Gupta (2008) show that originators made riskier loans when they were able to securitize these loans. Jiang, Nelson, and Vytlačil (2010) provide evidence of specific agency conflicts associated with the mortgage origination process.

In the case of rated securities, the market has relied on third-parties (rating agencies) to certify the quality of underlying collateral. Theoretical and empirical research points to numerous pitfalls in a third party ratings system, such as ratings shopping (see Becker and Milbourn, 2011, for example). Faltin-Traeger (2010) presents empirical evidence that sponsors chose to obtain ratings from rating agencies that tended to rate its deals more favorably or with

lower levels of subordination, implying that the “issuer pays” model may have given sponsors too much influence over the rating process. Skreta and Veldkamp (2009) point out that increased asset complexity exacerbates the scope for ratings shopping even if rating agencies issue purely unbiased ratings. As well, Bolton, Freixas, and Shapiro (2012) suggest that ratings become less informative at the peak of a market when there are more naïve investors in the market. Aschcraft, Goldsmith-Pinkham, and Vickery (2009) find that projected mortgage delinquency rates on subprime and Alt-A ABS from a loan-level econometric model are strongly correlated with ex-post default, suggesting ratings did not fully reflect information on mortgage risk available at deal origination.

A growing empirical literature specifically documents the poor performance of CDO ratings. The most comprehensive paper on the subject, Cordell, et. al (2012), documents the existence of 727 CDOs totaling \$641 billion of issuance. The paper demonstrates many important facts that might have led to the failure of the market and large losses, including the repeated use of certain low-rated subprime ABS as reference securities in numerous CDOs, the fact that most junior tranches of CDOs were not sold, but eventually re-subordinated into CDO-squared, and that yield was the primary determinant of placement of ABS into CDOs. Griffin and Tang (2012) point to the importance of rating failures, especially the use of discretion, as many CDOs issuances received a far higher proportion of AAA ratings than would have been justified based on published ratings guidelines. Benmelech and Dlugosz (2009) find that CDO tranches rated by only one agency, especially S&P, were more likely to be downgraded and, conditional on being downgraded, to suffer more severe downgrades. Coval, Jurek, and Stafford (2009a) point out that ratings of CDOs were highly unreliable due to models that were highly sensitive to even small errors in economic projections or losses and that underestimated the correlation of risks across various debt securities.

Authors come to different conclusions about the extent that CDOs investors understood the risks they carried. Coval, Jurek, and Stafford (2009b) argue that many structured finance instruments could be characterized as economic catastrophe bonds, but that they offered far less compensation than alternatives with comparable payoff profiles. The authors suggest that buyers focused on expected payoffs as measured by ratings, while ignoring the state of the economy in which defaults occur. However, Collin-Dufresne, Goldstein, and Yang (2010) price long-dated S&P 500 options and tranche spreads on the five-year CDX index, calibrating the model using

the entire term structure of CDX spreads. The authors point out that their model matches the time series of tranche spreads, offering a resolution to the seeming puzzle reported by Coval, Jurek, and Stafford (2009b).

Most authors find that market prices did not sufficiently differentiate between the risks posed by different securities. Adelino (2009) and Faltin-Traeger, Johnson and, Mayer (2010b) demonstrate the spreads paid by securities buyers often help predict subsequent downgrades, controlling for ratings, and that less complicated structures obtained slight pricing premiums. However, the predictive power of spreads was far from perfect. Adelino shows that spreads do not predict the likelihood of downgrade for AAA securities, which represented the bulk of MBS securities issued in the crisis. Faltin-Traeger, Johnson, and Mayer show that securities issued by the highest rated sponsors, if anything, required a spread premium, despite the fact that these high quality sponsors issued ABS that had the smallest likelihood of downgrade. Cordell, et. al (2012) point out that most dealers were unlikely to have known the extent of the risk inside CDOs since they eventually held that risk on balance sheet through the purchase of super senior tranches of CDOs.

3. CDO Structure and Ratings

This paper attempts to disentangle a number of alternative hypotheses about the failure of the market for CDOs. Given that CDOs are primarily composed of other rated securities, there may be greater potential for information and ratings failures for CDOs than for other asset-backed securities where the underlying collateral are easier to understand assets.

3.1. Cash flow versus Synthetic CDOs

In their simplest form, “cash flow” (or non-synthetic) CDOs allow a sponsor to combine the cash flows from a pool underlying ABS into a single security. In most cases, this process produces a CDO with much higher credit ratings than the underlying collateral, especially if the sponsor is able to argue that the pool of underlying assets come from a diversified pool of assets and geographies. According to the Pershing Square dataset used in this paper and described below, about 30% of the face value of the securities underlying CDOs active in the second half of 2007 were rated AAA by S&P, but over 80% of the face value of those CDOs’ obligations

were rated AAA (see Figure 1), although this analysis does not take into account the value of bond insurance and other forms of credit support that were sometimes embedded in the CDOs. Some have referred to the process of pooling low-rated ABS to collateralize the issuance of CDO liabilities that are predominantly rated AAA as “ratings arbitrage” because the process allegedly takes advantage of “arbitrage opportunities” in the credit rating agencies’ models.

A second function of CDOs was to allow the creation of custom securities that permitted large and presumably sophisticated investors to express opposing views about the expected performance of a particular pool of ABS. So-called “synthetic” CDOs did not involve the purchase of an actual pool of underlying assets but instead were created to allow investors to receive cash flows based on the performance of a pool of ABS specified by the deal documents (“reference securities”), but not actually owned by the CDO trust. The CDO trust might purchase credit default swaps (CDS) on the reference securities. The pool of CDS was designed to mimic the cash flows that actual ownership of the securities referenced by the CDS would provide. Since the CDO manager was not constrained by the need to purchase the underlying ABS, synthetic CDOs could be arranged relatively quickly and sponsors could choose from a large variety of reference assets.⁴ In some cases, issuers created “hybrid” CDOs that contained a mix of actual ABS and credit default swaps referencing ABS.

Motives for participation in synthetic CDOs varied widely. Some investors used CDOs to hedge an existing investment position (“purchase protection”) or to receive regular investment income. Others appear to have been speculating on the demise or success of the housing and/or mortgage markets through the performance of reference securities. Whatever the motives, issuance of synthetic CDOs grew rapidly at the tail end of the housing and credit boom. Although pure synthetic CDOs represented less than one-third of overall CDO issuance, the aggregate face value of synthetic CDOs rose substantially in 2007, while the issuance of cash flow CDOs fell (see Figure 1), possibly suggesting the demand by some investors to speculate on

⁴ Synthetic CDOs also have more flexible structures than cash CDOs. Funded synthetic CDOs closely mimic cash CDOs in that a buyer pays cash to purchase CDO tranches and receives regular payments based on the performance of the underlying collateral. More common were unfunded synthetic CDOs in which an investor receives regular spread payments (“premiums”) in return for cash payments in the event of a default.

the future performance of the housing market at a time when the housing bubble had started to collapse.⁵

3.2. Sponsor Incentives

The incentives for placing different types of securities in a CDO depend, in part, on whether a deal is cash flow or synthetic.⁶ In cash flow CDOs, sponsors have relatively clear incentives to choose poorly performing underlying. Rating agencies were clear in stating that they evaluated the expected performance of a previously rated security based only on the rating of the security. Consider an issuer who must decide which of two AA-rated subprime mortgage-backed securities to include in a CDO. One security sells at par, while the other (riskier) security sells at 95 percent of par. Since the rating agency treats both securities as equivalent in terms of the impact on the CDO rating, the issuer might choose to include the cheaper (riskier) security. Of course, if investors fully understood the process and the rating had no independent impact on valuation, such ratings arbitrage would not create financial value. However, regulators provided preferential capital treatment for highly rated securities so CDOs provided an opportunity for purchasers to acquire these riskier (and higher yielding) securities while still apparently meeting strict risk-based capital requirements.

Since CDOs involved a second layer of structuring beyond the original ABS, the potential for ratings arbitrage was greater than what would have otherwise been possible by pooling riskier-than-average mortgages into subprime MBS. In addition, “CDO-squareds” involved using CDO securities as collateral for the creation of a higher-level CDO and provided still another layer of securitization, multiplying once again the potential degree of ratings arbitrage.

⁵ Data provided by S&P’s RatingsXpress database of structured finance ratings. Some now high-profile investors such as John Paulson appear to have used CDOs to place large bets on the demise of subprime securities in 2007.

⁶ In some CDOs, the sponsor of the CDO might be a different party than the collateral manager, who was responsible for choosing securities to put into a CDO. Nonetheless, the sponsor of a CDO can influence the quality of the underlying ABS pool through its choice of collateral manager and through communication to that collateral manager. As well, purchasers of different CDO tranches also had to approve the types of securities placed in the CDO, so these purchasers might have also been in favor of taking advantage of as much ratings arbitrage as possible.

In the case of a synthetic CDO, however, the sponsor has much greater scope to design a security to meet specific needs of the buyers and sellers. In principle, a sponsor could choose almost any underlying reference security meeting specified criteria since it is unnecessary to locate a sufficient supply of ABS to available purchase to create a synthetic CDO. Of course, greater scope for choosing securities benefits relatively informed parties on one side or the other of a transaction if these parties are able to manipulate reference securities their favor, especially given the complexity of CDOs and thus the difficulty of analyzing underlying collateral. All else equal, the long side of a CDO (the party who receives the regular yield) would prefer relatively safe reference ABS, while the short side would prefer the inclusion of risky securities with large expected losses.

In the SEC's complaint against Goldman Sachs, the government alleges that the party on the short side of the transaction, Paulson and Co., was able to skew the reference asset pool towards assets that were disproportionately likely to take losses and that Paulson's position in the transaction was not adequately disclosed to investors on the long side of the transaction.⁷ Paulson's participation in a large number of CDO transactions has led some to speculate that such behavior was the norm rather than the exception.

Similarly, a recent book on the financial crisis, Smith (2010), suggests that "[t]he really smart guys were the ones who ... used the bottom tranches to fund a short subprime bet," and that another hedge fund, Magnetar, "... went into the business of creating subprime CDOs on an unheard-of scale." According to the book's sources, Magnetar was involved in the sale of approximately \$30 billion in CDO securities, and it ended up driving between 35% and 60% of subprime issuance in 2006.⁸ Allegedly, most of the CDOs associated with Magnetar have turned out to be nearly worthless.⁹

⁷ SEC Press release 2010-59, April 16, 2010.

⁸ See pp. 259-262 and Appendix II of Smith (2010) for a more detailed discussion of the "Magnetar trade."

⁹ See "The Magnetar Trade: How One Hedge Fund Helped Keep the Bubble Going," by Jesse Eisinger and Jake Bernstein, ProPublica - April 9, 2010. The full article reports that "An independent analysis commissioned by ProPublica shows that these deals defaulted faster and at a higher rate compared to other similar CDOs. According to the analysis, 96 percent of the Magnetar deals were in default by the end of 2008, compared with 68 percent for comparable CDOs." Magnetar disputes these findings in a letter posted in Propublica.

3.3. CDO Complexity and Opacity

Even if parties on one side or the other had incentives to choose low-quality collateral assets, it is not immediately clear why asymmetric information should be an issue since the composition of the ABS pool was available to all investors. The securities in the pool were clearly listed in deal documents and an interested investor could have performed an independent evaluation of the underlying ABS. An ABS is not the same as a used car, where the seller has driven the car for years and knows its quality much better than a buyer who takes a short test drive.

Instead the issue may be better characterized as costly information acquisition and adequate disclosure. As a consequence of the size and complexity of the collateral pool, buyers would have faced a difficult task in pricing each of the many underlying assets. Most CDO deals in the dataset used in this paper had at least one hundred underlying securities, each of which was tied to thousands of mortgages or other types of debt (see Figure 2). Because of this complexity, CDO ratings depend critically on a variety of modeling assumptions about the overall performance and the correlation in performance of underlying assets and the extremely complicated division of cash flows between more than a dozen securities that make up a typical cash CDO. Synthetic CDOs often had fewer tranches, but equally complex rules.

Evaluating CDO performance is further complicated when considering other institutional features. Liabilities from one CDO can be repackaged within a second CDO (referred to as a “CDO-squared”). The performance of one CDO tranche may therefore depend upon not only the cash flows from the ABS in that CDO but also the ABS underlying any CDO tranches that the CDO of interest owns as collateral. Each CDO in the dataset used in this paper invests in an average of 119 securities and about 5% of those are themselves CDO liabilities. Going only one “level” down in a set of 120 securities, an investor must evaluate the 114 ABS directly underlying the CDO and 6 additional sets of 114 securities underlying the 6 CDO tranches in the pool for a total of nearly 800 ABS. As well, many CDO deals were backed by actively managed pools of assets, creating significant flexibility with respect to the choice of securities in the collateral pool but also making them much more difficult to evaluate.¹⁰

¹⁰ According to a report by Fitch Ratings (2006) describing the popularity of one type of actively managed CDO, “Market Value CDOs are enjoying a revival with issuance more than doubling in 2006 from the year before. MV

The difficulties involved in accurately estimating the value of CDO liabilities led former Fed Chairman Greenspan to warn investors that "...the credit risk profile of CDO tranches poses challenges to even the most sophisticated market participants [and investors should not] rely solely on rating-agency assessments of credit risk." However, many investors nonetheless did not have access to the considerable resources needed to perform their own due diligence and continued to rely on credit ratings. According to Mason and Rosner (2007):

"The ability to repackage financial securities and call them something else, with no fundamental change to their risk characteristics, in order to achieve an improved bond rating is the fundamental source of ratings arbitrage...embedding ratings into regulation through ERISA and Basel II only worsens the incentives to use opacity to the issuers' benefit (and the investors' loss)."

4. Data

Under normal circumstances, the collateral underlying CDOs is not available to academic researchers as most CDOs were issued as private securities under SEC rules that required only limited disclosure (so-called 144A offerings). In return, sponsors agreed to limit the types of investors who could purchase CDOs to the most sophisticated investors. In contravention of these rules, on January 30th, 2008 Pershing Square Capital Management posted a database online covering all of the assets underlying CDOs and CDO-Squareds insured by Ambac or MBIA from 2005-2007 in what Pershing Square claimed was an attempt to bring attention to the large liabilities of bond insurers Ambac and MBIA.¹¹ We use this database to examine the performance of assets inside these CDOs.

The information reported by Pershing Square was collected from trustee reports dated between 2006Q3 and 2008M1, although virtually all of the deals in the dataset (99%) are described by a trustee report dated in 2007 or January 2008. We therefore restrict our definition of "CDO assets" to securities observed in a CDO trustee report dated in this period. The resulting

CDOs appeal to managers because they offer greater trading flexibility and can invest in a wide range of assets, including high yield bonds and bank loans and [structured finance] securities."

¹¹ Pershing Square was reputed to hold an appreciable short position in the stock of Ambac and MBIA at that time.

dataset covers 528 deals and approximately 30,000 unique underlying securities identified by CUSIP.

Documentation accompanying the Pershing Square dataset indicates that it covers all cash CDO deals closed between 2005 and 2007, but possibly omits some synthetic deals. In order to examine how many deals may be missing, we merge the CDO liabilities reported by Pershing Square with S&P's RatingsXPress dataset, which covers all of S&P's public structured finance ratings. For comparability, we drop deals that would be unlikely to contain only ABS, including CLOs, TruPS, and CDOs backed by corporate debt. Of the remaining CDO deals in the S&P dataset, 76% are also in the Pershing Square dataset. Using downgrade severity regressions similar those described below for underlying ABS, we find no statistically significant difference in the downgrade performance of CDO tranches for S&P rated deals that were in the Pershing Square database and those S&P rated CDO tranches that did not merge.

To provide additional information about the assets within the CDOs, we use data on ratings history, coupon, and sponsors of ABS from Lewtan Technologies' ABSNet securitization database. The database provides the complete history of rating actions by Standard and Poor's (S&P), Moody's Investors Service (Moody's), and Fitch Ratings (Fitch) and identifies the issuer for 150,000 securities issued between 1995 and 2008. We restrict the sample to those ABS securities issued after 2001 where we observe the underlying collateral type, coupon history, sponsor and servicer, resulting in a sample of 86,294 securities.

To measure performance, we calculate the number of fine rating notches each security was downgraded. For a security rated AAA, a downgrade of one fine notch would result in a rating of AA+; two fine notches would be AA; three fine notches would be AA-. Each ratings category has three fine notches between AA and CCC. We treat as censored any ratings reported to be at or below CCC-, as downgrades below this level are not consistently reported. This "downgrade severity" measure takes a value of zero if a security's rating remained unchanged or improved.¹² We use S&P ratings because S&P rated the largest fraction of securities in the sample. Results are comparable regardless of which rating agency's ratings are used.

For our baseline analysis, we focus on downgrades during the two-year period at the heart of the crisis between July 1, 2007 and July 1, 2009, although we consider other time

¹² Very few securities were upgraded during our sample period beginning in July, 2007.

periods to control for possible measurement error in when we observe ABS underlying each CDO or the timing of downgrades of underlying ABS. One specific concern is that turnover in the collateral pool might undermine the clarity of our results because we only observe a snapshot of the collateral pool at the time of the trustee report. In some cases, the CDO manager may choose to subsequently change the composition of the pool. However, for a subset of the CDO deals in our sample, we have access to servicer reports that show monthly changes in each collateral pool. In these pools, turnover appears to be low – a few percent per month. We also address this issue in other specification tests by limiting our analysis to data taken from trustee reports dated July, 2007 through January, 2008 and measuring performance beginning in February, 2008. As well, we consider various endpoints for our analysis, including July, 2008, July, 2009, and June, 2010.

For each security, we proxy for the date of issuance using the date each security is first rated. Table 1 shows the mean downgrade severity by vintage and the distribution of securities in the ABSNet database by whether they are observed in a CDO. Securities observed in CDOs tend to be of more recent vintages, which also have higher downgrade severities. For example, the 2006:h2 vintage represents about 9 percent of all outstanding securities issued since 2001, but between 16 and 22 percent of all ABS used in CDOs. That vintage had an average downgrade severity of more than 9 fine notches; so a security rated AAA at issuance would on average be rated BBB- by the middle of 2009. Despite being a relatively late vintage and thus not available to be placed into CDOs for a very long period of time, the 2006h2 vintage was especially likely to be placed in synthetic CDOs (22 percent of all ABS in synthetic CDOs) and even more likely to be used as a reference asset more than once in synthetic CDOs (24 percent) as shown in the column on the bottom right hand side of the table.

Table 2 lists the same relative distribution of securities in and out of CDOs, but by collateral type instead of vintage. There are 22 types of collateral backing securities in our database, of which the smallest 13 types have been consolidated into a category labeled “Other.” Once again, the worst performing collateral type—home equity—is much more highly represented within securities included in CDOs than those never consolidated into CDOs.

Next we consider the rating agency that rated the CDOs compared to those that rated the underlying securities in Table 3. Not surprisingly, the ABS included in CDOs were much more likely to have been rated by the particular agency that also rated the CDO. This is because most

agencies treated their own rated ABS in an advantageous fashion when rating a CDO relative to collateral rated by competing agencies. Even more striking is the extent to which the CDOs themselves were likely to be rated by at least two agencies, and often by all three agencies. S&P and Moody's were involved in rating the bulk of the CDOs in the database. Clearly buyers of CDOs might have been nervous about ratings shopping and required rating by multiple issuers, a requirement that in the ABS market has been shown to have provided more reliable ratings performance. However, obtaining multiple ratings did not provide stronger protection for buyers of CDOs. Table 4 shows that the CDOs rated by all three rating agencies were, if anything, more likely to be downgraded relative to CDOs that were rated by only two agencies. As well, the previously documented problems with CDOs rated by S&P are apparent in this table.

One potentially valuable control variable is the yield on the ABS security. Many analysts claimed that issuers of CDOs searched for high yielding securities conditional on rating, with the high initial yield serving as a proxy for ABS securities that were especially low quality. Alternatively, higher yielding securities were relatively cheap compared to the par value of their collateral and thus especially attractive for inclusion in a CDO if rating agencies did not differentiate between ABS of a given rating. Such a yield might have also served as a signal to potential purchasers of CDOs or rating agencies about the quality of underlying collateral. While we would like to observe the current yield (or price) of the security at the time it was included in the CDO, such data is typically not available as most of the ABS were traded quite infrequently and the prices of the secondary trades of ABS are not publically recorded. Instead, we use data on the coupon at the time of issuance and convert that coupon yield into a spread at issuance assuming the security was issued at par. To validate the assumption that most securities trade at par upon issuance, we examine price data from Bloomberg, which is available for a portion of our sample. The median issuance price in the 37% of the sample that merged was par and 95 percent of the sample had an issuance price greater than 99.8% of the par value. We therefore use the coupon spread to proxy for the yield spread at issuance.¹³

¹³ For each fixed-rate security, ABSNet provides an expected maturity. We create the spread by subtracting the yield on the coincident Treasury with the closest maturity to the security's expected maturity. For floating-rate securities, the benchmark interest rate is provided (most often 1-month LIBOR). This rate is subtracted from the initial coupon to create the spread for floaters.

Table 5 reports summary statistics for a number of other important variables for our analysis, including the mean coupon spread in percentage points and the floating-rate fraction for securities observed and not observed in a CDO. It also shows the number of ratings and mean rating for each subsample of securities. CDO assets tend to have more ratings and lower ratings. The mean rating is created by assigning a numerical value to each fine rating notch beginning by assigning 1 to AAA, 2 to AA+, 3 to AA, etc. Therefore a higher mean rating numerical value corresponds to a worse mean rating. CDO assets also tend to have slightly longer expected maturities. This may reflect the skew in distribution towards home equity MBS relative to credit card and auto loan ABS, which tended to have shorter maturities. Finally, for AAA securities, we calculate subordination below the AAA tranche as in Ashcraft, Goldsmith-Pinkham, and Vickery (2009), defined as $1 - [\text{face value of AAA securities}]/[\text{aggregate face value of underlying loans at origination}]$. This subordination value is calculated using the underlying loan balance at origination so it may not be identical to subordination at the beginning of 2007H2 depending upon loan balance changes that have occurred after origination. However, this variable should still be informative about the subordination level at 2007H2, even if it may be somewhat stale.

Next we examine the distribution of ABS ratings for securities within CDOs in Table 6 based on their initial rating on July 1, 2007. Securities observed in a CDO tended to have ratings below AAA, which is consistent with the idea that issuers were using CDOs to improve the ratings of otherwise lower quality collateral. Once again, synthetic CDOs appear to be using relatively lower quality collateral, measured by initial rating, relative to cash CDOs.

Table 7 serves to preview our regression results by examining the subsequent downgrade severity of ABS inside and outside CDOs based on the initial rating of the ABS. Securities observed in CDOs have strikingly higher downgrade severities regardless of their initial rating. We consider three time periods: securities downgrades about one year after our initial observation (July 1, 2008 versus July 1, 2007), two years afterwards (July 1, 2009), and three years afterwards (June 1, 2010). For the first two years of the sample, ABSs suffered more than twice the downgrade severity when they were included in a CDO. And ABS included in synthetic CDOs or in both non-synthetic (cash) and synthetic CDOs appeared to perform even worse than ABS included only in cash CDOs. The difference in downgrade severity between the columns appears to moderate after three years, but that might be due to censoring as securities

can only hit a lower bound of CCC- in our database. We control for such censoring, as well as differences in underlying collateral and other observable attributes in the regressions that follow.

Finally, Table 8 considers CDO squared securities, by examining the performance of CDOs that were included as underlying collateral in other CDOs. Greater levels of complexity appear to offer the opportunity for even more cherry picking of securities by expected downgrade severity. The worst downgrades are suffered by AAA and AA CDOs included in other CDOs, with a mean downgrade severity of almost 10 fine notches, the equivalent of going from the highest possible rating to junk status, in less than two years.

5. Security Performance

5.1. Security Characteristics and Downgrade Severity

We take all securities issued between 2002 and 2007H2 and compare the downgrade severities of those observed in a CDO with the rest of the sample of ABS not included in a CDO. To do this, we run a Tobit regression of downgrade severity on fixed effects indicating whether each security was observed in at least one non-synthetic CDO, at least one synthetic CDO, or a combination of both synthetic and non-synthetic deals.

The results, shown in Table 9, demonstrate the exceedingly poor performance of collateral inside a CDO. When we include only includes dummy variables for the initial rating (as of July 1, 2007), column (1) shows that securities observed in a CDO are downgraded at least 3 more fine-rating notches more than those not included in a CDO, an effect that is twice as large as the mean downgrade rate of 3.0 fine ratings over the same two year time period for ABS not used as collateral. Securities inside synthetic CDOs performed even worse, with a downgrade severity of about 4.1 fine notches. Securities inside both synthetic and cash CDOs performed worst of all, with a downgrade severity of 4.6 fine notches, about two and half times worse than average. These effects are little changed in column (2) when we include fixed effects for the rating agency that rated each security, including controls for ABS that were rated by multiple agencies.

The regression reported in column 3 adds variables for initial yield characteristics of the underlying ABS, include a fixed-effect identifying if a security's coupon is floating-rate, the

mean spread calculated by vintage half-year separately for fixed and floating securities, and the coupon spread difference from the mean. A higher coupon spread difference from the mean is predictive of worse performance, indicating that the market was capturing some of the performance risk in these securities. As well, floating-rate securities tended to perform worse than fixed-rate securities, consistent with other research evaluating ABS performance between 2000 and 2008 (Faltin-Traeger, Johnson, and Mayer, 2010a).¹⁴

In column (4) we include a number of additional controls from the base specification of Faltin-Traeger, Johnson, and Mayer (2010a). The inclusion of these detailed security characteristics, many of which may pick up effects that might not have been fully anticipated at the time the CDOs were issued, reduces the estimated coefficients on the inclusion in a CDO by about one-half, although the effects remain economically and statistically significant. New variables include fixed effects for each security's collateral type and half-year of initial rating, the S&P issuer credit rating of the sponsor at the time of issuance of the security, whether the sponsor issued ABS in more than four collateral type categories in the three years prior to issuance of the security, and whether the sponsor also services the security's collateral or the servicer is unidentified. The coefficients on these controls are shown in Appendix Table 1. The results are consistent with those from Faltin-Traeger, Johnson, and Mayer (2010a). Securities issued by sponsors with an investment-grade credit rating and more lines of structured finance business perform better than average.¹⁵ As well, deals in which the sponsor also performs servicing have lower downgrade severities. These regressions also include fixed effects indicating if each security was upgraded or downgraded in a prior period. Consistent with other work on the serial correlation of rating transitions, we find that securities downgraded before 2007H2 also have significantly higher subsequent downgrade severities. As well, securities rated AAA with higher levels of subordination perform better ex post.

Finally, in column (5) the floating-rate fixed effect and difference from mean spread are included along with all other ABS characteristics. As before, the coefficients on the CDO fixed effects remain largely unchanged by the inclusion of the individual security spread. The

¹⁴ See Faltin-Traeger, Johnson, and Mayer (2010a) and Standard & Poor's Press Release. "Lower Property Valuations Drove 2009 Floating-Rate CMBS Downgrades." February 18, 2010.

¹⁵ The omitted sponsor category corresponds to any sponsor with a rating below BBB.

coefficient on the difference from the mean spread is still positive, however it is significantly smaller, indicating that the other controls are capturing some of the information imbedded in spreads. The mean spread variable is not included because vintage half-year fixed effects are included in this specification.

5.2. Sub-sample Specifications

We now re-run the regressions presented in the previous section, showing that the results are robust to examining securities divided by initial rating or to limiting the sample to recently issued securities.

In Table 10, we run separate regressions for securities pooled by initial rating to account for possible non-linearities in the downgrade process. Panel A reports the results from the specification that includes a complete set of controls (column 5 of Table 9). For all ABS with initial ratings of investment grade (BBB) or higher, the coefficients on the CDO fixed effects are positive and in most cases they are significant. The results provide further support for our conclusions that cash CDOs appear to perform better than synthetic CDOs. However, for securities rated BB and below (representing 7 percent or less of the sample), the CDO fixed effects are small and not statistically different from zero. Panel B provides a similar set of regressions corresponding to the specification from column (1) of Table 10, which is the specification that only includes controls for the initial rating of the ABS security. Once again, the coefficients on the CDO fixed effects are positive and significant in each case, including for securities rated BB and below.

In order to examine the extent to which stale spread and subordination information is affecting the results, we report the results of running the same specifications as in Table 9, but restricting the sample to securities originated in 2007H1 only. Results are shown in Table 11. The coefficients on the inclusion in a CDO are much smaller, although still highly statistically significant. Also striking is the fact that when we restrict to recently issued securities, the inclusion of additional controls beyond rating does not diminish the extent of adverse selection; if anything, the coefficients on CDO variables rises when we include additional controls. These results suggest that including more recently rated securities might moderate the extent of adverse selection, possibly suggesting that ratings arbitrage is best accomplished for securities that are in

the market longer and where ratings information might be more stale. As well, for recently issued securities, initial ratings appear to be a much better proxy for the variety of other performance controls.

Next we restrict the sample to the performance of CDOs in Table 12 to examine the performance of already structured collateral in subsequent securitizations. These regressions compare the performance of CDO liabilities that are observed as underlying in CDO-squareds with the remaining CDO liabilities in the ABSNet sample. The results indicate that CDOs that are re-securitized tend to perform even worse than other repackaged ABS, with a downgrade severity of 3.3 fine notches for cash CDOs and an incredible 7.8 fine notches for CDOs in both cash and synthetic CDOs. Once again we also find that there is strong serial correlation in rating transitions for CDO liabilities and that higher subordination levels help protect investors. Thus the more highly structured CDO-squareds had even greater potential for ratings arbitrage and thus for leaving investors with even worse performing bonds.

5.3. Number and Type of CDOs

In order to examine whether securities observed in more CDOs perform worse, we run the same specification as in Table 9, but include fixed effects indicating whether a security was observed in 2 CDOs and more than 2 CDOs along with the usual set of control variables. Results shown in Table 13 indicate that securities observed in two or more CDOs perform significantly worse than securities observed in only one synthetic or non-synthetic deal. These results are consistent with the hypothesis that CDOs were chosen, in part, for their relative likelihood of performing poorly (and/or being relatively cheap). Bonds that appeared more frequently had the worst performance.

One hypothesis for the especially poor performance of securities in both cash and synthetic CDOs is that buyers of CDOs with ABS might have used synthetic CDOs to hedge the performance of the worst ABS. Consistent with that hypothesis, securities are issued first in the cash CDOs about 75 percent of the time prior to their inclusion in a synthetic CDO. Nonetheless, the data do not suggest appreciable support for this hypothesis. For securities in both a synthetic and non-synthetic CDO, we examine which type of CDO had the earliest closing date. Again, we run the same specification as in Table 9 but include a fixed effect that equals one for those

securities in both a synthetic and non-synthetic CDO where the non-synthetic deal closed first. Results in Table 16 illustrate that in the simpler specifications, these securities perform relatively better, however when all the available controls are included, their performance is similar to other CDOs included in both cash and synthetic CDOs.

5.4. Performance of Various Sponsors

Finally, we examine the role of various sponsors in the performance of CDOs. We divide CDOs into four categories: those sponsored by a domestic bank, those sponsored by a foreign bank, those sponsored by an investment bank (as of July, 2007), and all other sponsors. The list of sponsors is given in Appendix Table 2. The results suggest an important role of sponsor in CDO performance, but that the CDOs sponsored by the most highly regulated sponsors (both domestic and foreign banks) performed the worst. Ironically, investment banks that have generated much attention for having contributed to the crisis appear to have sponsored CDOs whose collateral performed, if anything, slightly better than the collateral in the average CDO. Appendix Table 3 shows the performance of the Abacus deals that the SEC referenced in its complaint against Goldman Sachs. The Abacus deals seemed to suffer even slightly fewer downgrades relative to deals sponsored by other investment banks.

6. Conclusion

Collateralized Debt Obligations (CDO) played a key role in the growth of Asset-Backed Security (ABS) issuance between 2004 and 2007 by providing a mechanism for lower-rated ABS to be used as collateral for the creation of AAA securities. Using a database published by Pershing Square Capital Management covering all of the assets underlying 528 CDOs and CDO-Squareds insured by Ambac or MBIA from 2005 to 2007 and using rating history and other information from the ABSNet database, we compare the characteristics and performance of ABS observed in a CDO with other ABS not observed in a CDO. We find that CDO assets tend to be lower rated securities from the lowest quality asset classes and vintages, and with a higher spread at issuance, although also more likely to be rated by all three rating agencies.

CDO assets performed much worse than comparable securities that were not included in a CDO. When we control for the initial rating, CDO assets have a downgrade severity that is at least twice as bad as comparable ABS not included in a CDO. Synthetic CDOs assets perform worse than cash CDO asset, but assets included in both cash and synthetic CDOs perform worst of all (with a downgrade severity about two and one-half times worse than the average downgrade severity). Even when we include controls for a wide variety of observable characteristics, including initial bond yield, CDO assets still underperform comparable ABS by between 50 and 100 percent. These results suggest that CDO originators successfully sold securities and insurance against the worst performing ABS assets, but also that buyers of CDOs would have had a hard time analyzing these securities based on observable characteristics alone.

These results suggest an appreciable failure of the regulatory process that relies on heavily on credit ratings to discipline the investment behavior of regulated entities through giving preferential capital treatment for low-rated securities. Issuers were able to game the system and obtain high ratings on low quality assets that performed extremely poorly in the crisis. This fact is underscored by the failures of AIG, several investment banks, and many regulated banks, especially in Europe, and who clearly sought out high yielding securities with the seeming safety of top ratings.

Our findings also suggest that reforming the ratings process will not be easy. Bolton, Freixas, and Shapiro (2012) have suggest requiring issues be rated by more than one rating agency. While this rule would have eliminated problems with single-rated ABS that performed poorly relative to ABS with multiple ratings, the assets underlying the CDOs in our sample were more likely to receive two or three ratings relative to ABS outside CDOs, yet still performed considerably worse. A second possible reform that some have raised is to require rated ABS to have a separate ratings category (presumably with higher required capital) relative to corporate rated securities. Nonetheless, this might not be sufficient to have prevented the problems in CDOs. CDO quality was much worse than comparably rated ABS. Our results suggest that the more highly structured the product (e.g., CDOs versus ABS or CDO squared versus “plain” CDOs), the less informative ratings were in predicting performance. The experience of CDOs suggests we have a long way to go to finding a process of using third-party credit rating agencies to discipline regulated entities from taking on excess risk.

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Table 1: S&P Performance and Distribution of Underlying Securities by Vintage

This table shows the mean number of fine rating notches that a security was downgraded by S&P from end of 2007H1 to end of 2009H1. It also shows the number and distribution of securities not observed in a CDO, securities observed as collateral in non-synthetic deals and securities observed as reference assets in synthetic deals.

Halfyear of initial rating	Mean downgrade severity	Not in a CDO		Collateral in a non-synth CDO		Reference asset in a synth CDO		Both collateral and a reference asset	
		N	Dist.	N	Dist.	N	Dist.	N	Dist.
2002h1	0.5	3,154	5%	60	0%	9	0%	2	0%
2002h2	0.6	4,016	6%	106	1%	9	0%	0	0%
2003h1	0.5	5,989	9%	225	2%	31	1%	10	0%
2003h2	0.7	6,418	10%	339	2%	73	4%	45	1%
2004h1	1.0	5,979	9%	563	4%	162	8%	178	4%
2004h2	1.7	6,001	9%	1,600	11%	163	8%	469	9%
2005h1	2.1	5,764	9%	2,262	16%	155	7%	825	16%
2005h2	4.4	7,681	12%	2,985	21%	274	13%	1,101	22%
2006h1	7.9	6,080	9%	2,530	17%	314	15%	1,166	23%
2006h2	9.1	5,876	9%	2,280	16%	457	22%	876	17%
2007h1	9.1	7,746	12%	1,514	10%	423	20%	384	8%
Total		64,704	100%	14,464	100%	2,070	100%	5,056	100%

Halfyear of initial rating	Collateral in 2 non-synth CDO		Collateral in >2 non-synth CDO		Reference asset in 2 synth CDO		Reference asset in >2 synth CDO	
	N	Dist.	N	Dist.	N	Dist.	N	Dist.
2002h1	8	0%	1	0%	0	0%	0	0%
2002h2	15	0%	2	0%	0	0%	0	0%
2003h1	31	1%	6	0%	0	0%	0	0%
2003h2	43	1%	15	1%	9	3%	1	1%
2004h1	70	2%	29	1%	31	10%	13	7%
2004h2	322	10%	205	8%	33	10%	6	3%
2005h1	507	16%	611	23%	17	5%	10	5%
2005h2	688	22%	639	24%	28	9%	18	9%
2006h1	623	20%	571	21%	53	17%	38	20%
2006h2	494	16%	344	13%	66	21%	46	24%
2007h1	346	11%	255	10%	78	25%	61	32%
Total	3,147	100%	2,678	100%	315	100%	193	100%

Table 2: Collateral Type Distribution of Underlying Securities

This table shows the mean number of notches each security is downgraded by S&P from end of 2007H1 to end of 2009H1 by collateral type. It also shows the number of securities and distribution for securities not observed in a CDO, securities observed as collateral in non-synthetic deals and securities observed as reference assets in synthetic deals.

Collateral type	Mean downgrade severity	Not in a CDO		Collateral in a non-synth CDO		Reference asset in a synth CDO		Both collateral and a reference asset	
		N	Dist.	N	Dist.	N	Dist.	N	Dist.
Auto loans	0.3	1,335	2%	11	0%	5	0%	2	0%
CDOs	4.8	1,699	3%	434	3%	105	5%	285	6%
CMBS	0.3	2,406	4%	164	1%	106	5%	78	2%
Credit cards	0.2	734	1%	26	0%	17	1%	8	0%
Home equity	5.0	33,363	52%	10,224	71%	1,390	67%	4,171	82%
RMBS	3.7	23,847	37%	3,572	25%	428	21%	489	10%
Student loans	0.0	1,108	2%	24	0%	15	1%	21	0%
Other	0.0	212	0%	9	0%	4	0%	2	0%
Total		64,704	100%	14,464	100%	2,070	100%	5,056	100%

Collateral type	Collateral in 2 non-synth CDO		Collateral in >2 non-synth CDO		Reference asset in 2 synth CDO		Reference asset in >2 synth CDO	
	N	Dist.	N	Dist.	N	Dist.	N	Dist.
Auto loans	1	0%	0	0%	0	0%	0	0%
CDOs	99	3%	121	5%	15	5%	6	3%
CMBS	35	1%	18	1%	18	6%	14	7%
Credit cards	6	0%	2	0%	3	1%	0	0%
Home equity	2,478	79%	2,211	83%	219	70%	161	83%
RMBS	5	0%	1	0%	0	0%	0	0%
Student loans	517	16%	318	12%	58	18%	12	6%
Other	6	0%	7	0%	2	1%	0	0%
Total	3,147	100%	2,678	100%	315	100%	193	100%

Table 3: Number of Securities Rated by Each Combination of CRAs Underlying CDOs Rated by Each Combination of CRAs

Each cell reports the number of underlying securities that were rated by a particular combination of rating agencies (by row) and observed as collateral in a CDO rated by each combination of rating agencies (by column). Ratings are taken from the end of 2007H1. The letters S, M, and F correspond to S&P, Moody's, and Fitch respectively. A security will only occupy one row but may be represented in more than one column if it was included in multiple CDO deals rated by different combinations of rating agencies.

Underlying rated by	Observations in a CDO rated by							Not in a CDO
	F	M	S	MF	SF	SM	SMF	
F	49	0	0	0	271	61	38	6,786
M	0	0	0	0	16	130	46	1,763
S	18	0	0	1	847	533	293	8,903
MF	0	0	1	7	31	532	175	6,753
SF	3	0	2	9	249	701	304	14,447
SM	2	0	47	111	666	10,749	3,350	28,315
SMF	2	0	51	135	482	6,306	2505	13,013
Total	74	0	101	263	2,562	19,012	6,711	79,980

Table 4: Fraction Downgraded by Each Combination of CRAs Underlying CDOs Rated by Each Combination of CRAs

Each cell reports the percent of underlying securities that were downgraded by any rating agency from end of 2007H1 to end of 2009H1. Each cell corresponds to securities rated by a particular combination of rating agencies (by row) and observed as collateral in a CDO rated by each combination of rating agencies (by column). Ratings are taken from the end of 2007H1. The letters S, M, and F correspond to S&P, Moody's, and Fitch respectively. A security will only occupy one row but may be represented in more than one column if it was included in multiple CDO deals rated by different combinations of rating agencies.

Underlying rated by	Observations in a CDO rated by							Not in a CDO
	Fitch	Moody's	S&P	M and F	S and F	S and M	SMF	
Fitch	98%				87%	90%	87%	48%
Moody's					25%	70%	67%	35%
S&P	78%			0%	55%	66%	65%	39%
Moody's and Fitch			100%	14%	65%	67%	48%	31%
S&P and Fitch	100%		50%	11%	78%	82%	67%	28%
S&P and Moody's	100%		91%	72%	86%	92%	92%	57%
All three agencies (SMF)	50%		96%	65%	78%	84%	87%	37%

Table 5: Summary Statistics for ABSNet Securities by Observation in a CDO

This table shows summary statistics by subsample. In order to calculate mean ratings, a numerical value was assigned to each rating, assigning 1 to AAA, 2 to AA+, 3 to AA, etc. Therefore, a higher mean rating numerical value corresponds to a worse mean rating

	Not in a CDO	Collateral in a non-synth CDO	Reference asset in a synth CDO	Both collateral and a reference asset
Number of securities	80,007	15,517	2,173	5,134
Mean number of ratings	2.1	2.3	2.3	2.5
Mean Fitch rating	2.9	4.7	6.5	7.0
Mean Moody's rating	2.5	4.8	6.9	7.3
Mean S&P rating	3.0	4.9	6.6	6.9
Mean expected maturity (years)	29.7	31.1	31.1	31.2
Mean coupon spread	0.58	0.90	1.20	1.30
Floating-rate fraction	56%	80%	87%	96%
Mean subord. of AAA securities	13%	17%	18%	20%
Mean S&P downgrade severity				
- as of Jul 1 2008	0.7	3.0	4.5	4.9
- as of Jul 1 2009	3.0	7.2	8.2	9.0
- as of Jun 1 2010	6.4	12.0	11.3	12.1

Table 6: Distribution of Securities by S&P Rating at the Start of the Performance Observation Period

This table shows the number and distribution of securities in the ABSNet dataset by coarse rating where rating is observed at the end of 2007H1.

Rating at end of 2007H1	Not in a CDO		Collateral in a non-synth CDO		Reference asset in a synth CDO		Both collateral and a reference asset	
	N	Dist.	N	Dist.	N	Dist.	N	Dist.
AAA	46,148	71%	2843	20%	295	14%	202	4%
AA	4,673	7%	4752	33%	290	14%	939	19%
A	4,333	7%	3,764	26%	416	20%	1,252	25%
BBB	4,245	7%	2,125	15%	924	45%	2,528	50%
BB and below	5,305	8%	980	7%	145	7%	135	3%
Total	64,704	100%	14,464	100%	2,070	100%	5,056	100%

Table 7: S&P Downgrade Severity by Rating from the Start of the Performance Observation Period

This table shows the mean number of fine rating notches that a security was downgraded by S&P. Each row corresponds to the security rating at the end of 2007H1.

Downgrade severity as of July 1, 2008

Rating at end of 2007H1	Not in a CDO	Collateral in a non-synth CDO	Reference asset in a synth CDO	Both collateral and a reference asset
AAA	0.16	0.28	0.39	0.52
AA	1.42	3.03	3.11	3.86
A	2.10	4.79	5.40	5.83
BBB	2.94	3.75	5.74	5.13
BB and below	2.30	2.88	5.80	5.14

Downgrade severity as of July 1, 2009

Rating at end of 2007H1	Not in a CDO	Collateral in a non-synth CDO	Reference asset in a synth CDO	Both collateral and a reference asset
AAA	2.41	5.36	4.21	5.36
AA	4.08	7.62	8.85	8.90
A	4.37	8.47	9.44	9.86
BBB	5.13	7.14	8.86	8.99
BB and below	4.64	5.75	7.36	7.30

Downgrade as of June 1, 2010

Rating at end of 2007H1	Not in a CDO	Collateral in a non-synth CDO	Reference asset in a synth CDO	Both collateral and a reference asset
AAA	6.00	12.36	8.88	9.89
AA	8.07	12.65	14.01	13.67
A	8.07	12.49	12.45	13.06
BBB	7.85	10.70	11.14	11.44
BB and below	6.31	8.13	8.97	8.76

Table 8: S&P Downgrade Severity for assets in CDOs and CDO-squareds

This table shows the mean number of fine rating notches that a security was downgraded by S&P. Each row corresponds to the security rating at the end of 2007H1. The first two columns correspond to ABS securities based on their inclusion in a CDO and the second set of two columns correspond to CDO securities based on their inclusion in a CDO-squared.

Downgrade severity as of Jul 1 2008

Rating at end of 2007H1	Non-CDO ABS		CDOs	
	Not in a CDO	In a CDO	Not in a CDO ²	In a CDO ²
AAA	0.16	0.25	0.36	1.32
AA	1.44	3.19	0.93	2.52
A	2.20	5.17	0.59	2.00
BBB	3.04	4.82	1.39	2.09
BB and below	2.36	3.56	0.75	0.60

Downgrade severity as of July 1, 2009

Rating at end of 2007H1	Non-CDO ABS		CDOs	
	Not in a CDO	In a CDO	Not in a CDO ²	In a CDO ²
AAA	2.38	4.99	4.32	9.90
AA	4.11	7.82	3.42	9.72
A	4.49	8.94	2.63	6.59
BBB	5.24	8.40	3.56	5.08
BB and below	4.75	6.26	1.98	1.80

Downgrade severity as of June 1, 2010

Rating at end of 2007H1	Non-CDO ABS		CDOs	
	Not in a CDO	In a CDO	Not in a CDO ²	In a CDO ²
AAA	5.99	11.84	6.80	13.03
AA	8.18	12.91	5.51	11.91
A	8.33	12.74	4.44	8.59
BBB	8.02	11.26	5.50	7.71
BB and below	6.42	8.41	3.65	5.33

Table 9: Tobit Regressions of S&P Downgrade Severity on whether the ABS is in a CDO and other ABS characteristics

This table reports coefficients from Tobit regressions run over all securities in the ABSNet database active at the end of 2007H1 where the dependent variable indicates how many fine rating notches a security was downgraded by S&P from end of 2007H1 to end of 2009H1. The dependent variable takes the value zero if no transition occurred or if an upgrade occurred. All ratings below CCC- are treated as censored. Subordination is calculated as $1 - [\text{face value of AAA securities}]/[\text{total balance of underlying loans}]$. Subordination is calculated for AAA securities only and interacted with a fixed effect indicating AAA securities. Coupon spreads are calculated using the coupon at origination, not during 2007H1. Standard errors are clustered by deal.

Variables	(1) All	(2) All	(3) All	(4) All	(5) All
Security in non-synthetic CDO	3.021*** (0.119)	2.891*** (0.120)	2.653*** (0.120)	1.466*** (0.083)	1.455*** (0.084)
Security in synthetic CDO	4.112*** (0.210)	3.894*** (0.208)	3.802*** (0.206)	1.723*** (0.154)	1.738*** (0.158)
Security in both synth & non-synth CDO	4.642*** (0.181)	4.457*** (0.185)	4.053*** (0.184)	2.714*** (0.140)	2.734*** (0.141)
Security downgraded before 2007H2				3.014*** (0.360)	3.282*** (0.374)
Security upgraded before 2007H2				-0.637*** (0.114)	-0.756*** (0.120)
(AAA)x(Subordination)				-2.393*** (0.423)	-2.470*** (0.444)
Floating-rate security			0.995*** (0.140)		-0.002 (0.110)
Mean spread			1.864*** (0.190)		
Difference from mean spread			-0.237*** (0.024)		0.021 (0.019)
Constant	2.389*** (0.098)	2.213*** (0.216)	1.177*** (0.254)	-1.487*** (0.302)	-1.538*** (0.315)
Observations	86294	86294	86294	86294	86294
R-squared	0.029	0.030	0.033	0.100	0.101
Initial rating FE included	Yes	Yes	Yes	Yes	Yes
Rating agency FE included	No	Yes	Yes	Yes	Yes
Vintage halfyear FE included	No	No	No	Yes	Yes
Collateral type FE included	No	No	No	Yes	Yes
Sponsor rating FE included	No	No	No	Yes	Yes
Sponsor diversification FE included	No	No	No	Yes	Yes
Servicer FE included	No	No	No	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Table 10: Tobit Regressions of Downgrade Severity Separately for each Initial Rating

As in Table 9, these regressions are run separately by security rating at the end of 2007H1. This table reports coefficients from Tobit regressions run over securities in the ABSNet database active at the end of 2007H1 where the dependent variable indicates how many rating notches a security was downgraded by S&P from end of 2007H1 to end of 2009H1. The dependent variable takes the value zero if no transition occurred or if an upgrade occurred. All ratings below CCC- are treated as censored. Standard errors are clustered by deal.

Panel A: Includes whether the ABS is in a CDO and a full set of ABS characteristics

Variables	(1) AAA	(2) AA	(3) A	(4) BBB	(5) BB and below
Security in non-synthetic CDO	1.306*** (0.138)	0.614*** (0.163)	0.798*** (0.174)	0.707*** (0.182)	0.016 (0.190)
Security in synthetic CDO	0.803** (0.335)	0.558 (0.285)	1.668*** (0.329)	1.178*** (0.255)	-0.287 (0.444)
Security in both synth & non-synth CDO	2.143*** (0.382)	0.578** (0.285)	1.784*** (0.255)	1.608*** (0.217)	-0.207 (0.379)
Security downgraded before 2007H2	3.390** (1.720)	-0.061 (0.182)	2.681*** (0.994)	3.341*** (0.891)	3.070*** (0.368)
Security upgraded before 2007H2	0.745*** (0.116)	0.138 (0.182)	-0.375 (0.259)	-0.223 (0.318)	-0.481* (0.259)
(AAA)x(Subordination)	-4.277*** (0.508)				
Floating-rate security	-0.408*** (0.122)	0.911*** (0.063)	1.223*** (0.236)	0.815*** (0.242)	0.625*** (0.225)
Difference from mean spread	0.058*** (0.020)	-0.191*** (0.063)	-0.128** (0.063)	0.189*** (0.064)	-0.066 (0.040)
Constant	-0.609** (0.294)	-2.771*** (0.163)	-3.691*** (0.764)	-5.208*** (0.802)	-3.863*** (0.905)
Observations	49488	10654	9765	9822	6565
R-squared	0.068	0.109	0.128	0.126	0.167
Rating agency FE included	Yes	Yes	Yes	Yes	Yes
Vintage halfyear FE included	Yes	Yes	Yes	Yes	Yes
Collateral type FE included	Yes	Yes	Yes	Yes	Yes
Sponsor rating FE included	Yes	Yes	Yes	Yes	Yes
Sponsor diversification FE included	Yes	Yes	Yes	Yes	Yes
Servicer FE included	Yes	Yes	Yes	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Panel B: Includes only variables for whether or not the ABS is in a CDO

	(1)	(2)	(3)	(4)	(5)
Variables	AAA	AA	A	BBB	BB and below
Security in non-synthetic CDO	2.968*** (0.184)	3.711*** (0.204)	4.538*** (0.213)	2.387*** (0.227)	1.031*** (0.262)
Security in synthetic CDO	1.832*** (0.407)	5.030*** (0.523)	5.966*** (0.448)	4.913*** (0.321)	3.060*** (0.613)
Security in both synth & non-synth CDO	3.003*** (0.509)	5.102*** (0.337)	6.308*** (0.301)	4.903*** (0.237)	2.660*** (0.579)
Constant	2.410*** (0.098)	4.179*** (0.148)	4.588*** (0.149)	5.728*** (0.157)	5.569*** (0.154)
Observations	49488	10654	9765	9822	6565
R-squared	0.003	0.011	0.021	0.018	0.003

Table 11: Tobit Regressions of Downgrade Severity Restricted to 2007H1 Vintage

These regressions include the same specifications as in Table 9, but the sample is restricted to securities issued during 2007H1 only. The dependent variable indicates how many rating notches a security was downgraded by S&P from end of 2007H1 to end of 2009H1. The dependent variable takes the value zero if no transition occurred or if an upgrade occurred. All ratings below CCC- are treated as censored. Standard errors are clustered by deal.

Variables	(1) 2007H1	(2) 2007H1	(3) 2007H1	(4) 2007H1	(5) 2007H1
Security in non-synthetic CDO	0.774** (0.322)	0.968*** (0.337)	1.035*** (0.341)	1.048*** (0.295)	1.043*** (0.296)
Security in synthetic CDO	1.782*** (0.472)	1.872*** (0.479)	1.974*** (0.481)	1.692*** (0.455)	1.678*** (0.452)
Security in both synth & non-synth CDO	0.815 (0.499)	0.903* (0.518)	1.091** (0.516)	1.176** (0.461)	1.287*** (0.459)
(AAA)x(Subordination)				-5.231*** (1.855)	-5.080*** (1.872)
Floating-rate security			-0.451 (0.539)		-0.277 (0.442)
Difference from mean spread			0.127 (0.123)		0.288*** (0.088)
Constant	7.468*** (0.398)	6.512*** (0.904)	6.722*** (0.990)	1.466 (1.371)	1.489 (1.380)
Observations	10067	10067	10067	10067	10067
R-squared	0.027	0.031	0.030	0.061	0.062
Initial rating FE included	Yes	Yes	Yes	Yes	Yes
Rating agency FE included	No	Yes	Yes	Yes	Yes
Collateral type FE included	No	No	No	Yes	Yes
Sponsor rating FE included	No	No	No	Yes	Yes
Sponsor diversification FE included	No	No	No	Yes	Yes
Servicer FE included	No	No	No	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Table 12: Tobit Regressions of Downgrade Severity Restricted to CDO Underlying Collateral

These regressions include the same specifications as in Table 9, but the sample is restricted to CDO securities only. This table reports coefficients from Tobit regressions run over securities in the ABSNet database active at the end of 2007H1 where the dependent variable indicates how many rating notches a security was downgraded by S&P from end of 2007H1 to end of 2009H1. The dependent variable takes the value zero if no transition occurred or if an upgrade occurred. All ratings below CCC- are treated as censored. Coupon spreads are calculated using the coupon at origination, not during 2007H2. Standard errors are clustered by deal.

Variables	(1) CDOs	(2) CDOs	(3) CDOs	(4) CDOs	(5) CDOs
Security in non-synthetic CDO	3.292*** (0.513)	3.343*** (0.509)	3.329*** (0.506)	1.850*** (0.433)	1.931*** (0.436)
Security in synthetic CDO	2.815*** (0.903)	3.431*** (0.884)	3.358*** (0.876)	2.466*** (0.779)	2.553*** (0.787)
Security in both synth & non-synth CDO	7.815*** (0.773)	7.977*** (0.760)	7.877*** (0.759)	5.789*** (0.629)	5.899*** (0.645)
Security downgraded before 2007H2				4.909*** (1.333)	4.965*** (1.348)
Security upgraded before 2007H2				-2.959*** (0.812)	-3.053*** (0.813)
(AAA)x(Subordination)				5.026*** (1.810)	5.025*** (1.804)
Floating-rate security			0.238 (0.424)		-0.415 (0.394)
Mean spread			0.160 (0.577)		
Difference from mean spread			-0.138* (0.079)		0.018 (0.093)
Constant	4.832*** (0.367)	6.985*** (0.637)	6.783*** (0.778)	4.946*** (1.501)	5.378*** (1.533)
Observations	2523	2523	2523	2523	2523
R-squared	0.025	0.034	0.035	0.057	0.058
Initial rating FE included	Yes	Yes	Yes	Yes	Yes
Rating agency FE included	No	Yes	Yes	Yes	Yes
Vintage halfyear FE included	No	No	No	Yes	Yes
Sponsor rating FE included	No	No	No	Yes	Yes
Sponsor diversification FE included	No	No	No	Yes	Yes
Servicer FE included	No	No	No	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Table 13: Tobit Regressions of Downgrade Severity with Additional Fixed Effects for the Number of Times an ABS is Observed in a CDO

These regressions include the same specifications as in Table 9. The dependent variable indicates how many rating notches a security was downgraded by S&P from end of 2007H1 to end of 2009H1. The dependent variable takes the value zero if no transition occurred or if an upgrade occurred. All ratings below CCC- are treated as censored. Standard errors are clustered by deal.

Variables	(1) All	(2) All	(3) All	(4) All	(5) All
Security in non-synthetic CDO	3.727*** (0.142)	3.042*** (0.134)	2.606*** (0.131)	1.319*** (0.090)	1.303*** (0.091)
Security in synthetic CDO	4.792*** (0.773)	4.114*** (0.212)	3.786*** (0.210)	1.658*** (0.156)	1.671*** (0.160)
Security in both synth & non-synth CDO	5.173*** (0.186)	5.114*** (0.186)	4.189*** (0.185)	2.771*** (0.144)	2.796*** (0.144)
Security in 2 CDOs	0.412** (0.178)	0.633*** (0.173)	0.409** (0.172)	0.422*** (0.133)	0.441*** (0.133)
Security in > 2 CDOs	0.233 (0.227)	0.768*** (0.218)	0.366* (0.218)	0.539*** (0.169)	0.560*** (0.169)
Security downgraded before 2007H2				2.962*** (0.369)	3.228*** (0.382)
Security upgraded before 2007H2				-0.712*** (0.114)	-0.833*** (0.120)
(AAA)x(Subordination)				-2.774*** (0.408)	-2.876*** (0.428)
Floating-rate security			1.481*** (0.100)		0.000 (0.110)
Mean spread			2.199*** (0.234)		
Difference from mean spread			-0.263*** (0.023)		0.020 (0.019)
Observations	86294	86294	86294	86294	86294
Initial rating FE included	Yes	Yes	Yes	Yes	Yes
Rating agency FE included	No	Yes	Yes	Yes	Yes
Vintage halfyear FE included	No	No	No	Yes	Yes
Collateral type FE included	No	No	No	Yes	Yes
Sponsor rating FE included	No	No	No	Yes	Yes
Sponsor diversification FE included	No	No	No	Yes	Yes
Servicer FE included	No	No	No	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Table 14: Tobit Regressions of Downgrade Severity with a Control for the Type of CDO Closed First

These regressions include the same specifications as in Table 9, but also have a fixed effect that identifies whether a security was observed first in a cash (non-synthetic) or synthetic CDO deal for those securities that were observed in both. The dependent variable indicates how many rating notches a security was downgraded by S&P from end of 2007H1 to end of 2009H1. The dependent variable takes the value zero if no transition occurred or if an upgrade occurred. All ratings below CCC- are treated as censored. Standard errors are clustered by deal.

Variables	(1) All	(2) All	(3) All	(4) All	(5) All
Non-synthetic (cash) deal before synthetic	-3.722*** (0.259)	-3.415*** (0.258)	-3.506*** (0.256)	-0.155 (0.209)	-0.120 (0.211)
Security in non-synthetic CDO	3.859*** (0.128)	3.305*** (0.124)	2.756*** (0.121)	1.484*** (0.083)	1.475*** (0.084)
Security in synthetic CDO	4.826*** (0.217)	4.219*** (0.208)	3.826*** (0.206)	1.741*** (0.154)	1.757*** (0.158)
Security in both synth & non-synth CDO	6.601*** (0.209)	6.402*** (0.209)	5.515*** (0.206)	2.796*** (0.166)	2.804*** (0.167)
Security downgraded before 2007H2				2.947*** (0.368)	3.210*** (0.382)
Security upgraded before 2007H2				-0.733*** (0.114)	-0.855*** (0.120)
(AAA)x(Subordination)				-2.716*** (0.408)	-2.816*** (0.428)
Floating-rate security			1.499*** (0.100)		0.010 (0.110)
Mean spread			2.203*** (0.234)		
Difference from mean spread			-0.263*** (0.023)		0.018 (0.019)
Observations	86294	86294	86294	86294	86294
Initial rating FE included	Yes	Yes	Yes	Yes	Yes
Rating agency FE included	No	Yes	Yes	Yes	Yes
Vintage halfyear FE included	No	No	No	Yes	Yes
Collateral type FE included	No	No	No	Yes	Yes
Sponsor rating FE included	No	No	No	Yes	Yes
Sponsor diversification FE included	No	No	No	Yes	Yes
Servicer FE included	No	No	No	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Table 15: Tobit Regressions of Downgrade Severity using an Alternate Trustee Report and Performance Period

These regressions include the same specification as in Table 9, but run over all securities in the ABSNet database active at the end of 2008M1 where the dependent variable indicates how many rating notches a security was downgraded by S&P from end of 2008M1 to end of 2009H1. The dependent variable takes the value zero if no transition occurred or if an upgrade occurred. All ratings below CCC- are treated as censored. Standard errors are clustered by deal.

	(1)	(2)	(3)	(4)	(5)
Variables	All	All	All	All	All
Security in non-synthetic CDO	2.329*** (0.110)	2.234*** (0.111)	2.028*** (0.111)	0.962*** (0.079)	0.955*** (0.080)
Security in synthetic CDO	3.014*** (0.201)	2.853*** (0.199)	2.824*** (0.199)	1.189*** (0.153)	1.219*** (0.157)
Security in both synth & non-synth CDO	3.085*** (0.163)	2.963*** (0.169)	2.657*** (0.168)	1.764*** (0.141)	1.807*** (0.141)
Security downgraded before 2008M1				2.258*** (0.159)	2.310*** (0.161)
Security upgraded before 2008M1				-0.852*** (0.106)	-0.978*** (0.112)
(AAA)x(Subordination)				-3.972*** (0.426)	-4.092*** (0.444)
Floating-rate security			0.753*** (0.137)		-0.120 (0.108)
Mean spread			1.953*** (0.200)		
Difference from mean spread			-0.212*** (0.024)		0.044** (0.019)
Constant	2.387 (0.098)	2.160*** (0.211)	1.265*** (0.246)	-1.149*** (0.286)	-1.163*** (0.299)
Observations	86294	86294	86294	86294	86294
R-squared	0.016	0.016	0.019	0.081	0.081
Initial rating FE included	Yes	Yes	Yes	Yes	Yes
Rating agency FE included	No	Yes	Yes	Yes	Yes
Vintage halfyear FE included	No	No	No	Yes	Yes
Collateral type FE included	No	No	No	Yes	Yes
Sponsor rating FE included	No	No	No	Yes	Yes
Sponsor diversification FE included	No	No	No	Yes	Yes
Servicer FE included	No	No	No	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Table 16: Tobit Regressions of Downgrade Severity with Controls for CDO Sponsor

These regressions include the same specification as in Table 9, but also have fixed effects for whether a security was in CDO sponsored by a Domestic Bank, Foreign Bank, Major Investment Bank. The dependent variable indicates how many rating notches a security was downgraded by S&P from end of 2007H1 to end of 2009H1. The dependent variable takes the value zero if no transition occurred or if an upgrade occurred. All ratings below CCC- are treated as censored. Standard errors are clustered by deal.

Variables	(1) All	(2) All	(3) All	(4) All	(5) All
Security in non-synthetic CDO	2.952*** (0.122)	2.831*** (0.122)	2.609*** (0.122)	1.397*** (0.086)	1.383*** (0.087)
Security in synthetic CDO	4.019*** (0.212)	3.813*** (0.210)	3.732*** (0.209)	1.602*** (0.158)	1.615*** (0.162)
Security in both synth & non-synth CDO	4.468*** (0.194)	4.303*** (0.196)	3.926*** (0.196)	2.449*** (0.150)	2.452*** (0.151)
Security in CDO sponsored by a Domestic Bank	1.271*** (0.248)	1.257*** (0.248)	1.371*** (0.242)	1.021*** (0.194)	1.069*** (0.196)
Security in CDO sponsored by a Foreign Bank	0.715*** (0.179)	0.672*** (0.179)	0.511*** (0.178)	0.281** (0.139)	0.273* (0.139)
Security in CDO sponsored by a Major Investment Bank	-1.075*** (0.179)	-1.061*** (0.180)	-0.971*** (0.177)	0.016 (0.144)	0.063 (0.146)
Security downgraded before 2007H2				3.030*** (0.360)	3.299*** (0.374)
Security upgraded before 2007H2				-0.632*** (0.114)	-0.752*** (0.120)
(AAA)x(Subordination)				-2.413*** (0.422)	-2.492*** (0.444)
Floating-rate security			0.994*** (0.139)		-0.007 (0.109)
Mean spread			1.857*** (0.190)		
Difference from mean spread			-0.237*** (0.024)		0.021 (0.019)
Constant	2.394*** (0.098)	2.220*** (0.216)	1.186*** (0.254)	-1.486*** (0.302)	-1.537*** (0.315)
Observations	86294	86294	86294	86294	86294
R-squared	0.029	0.030	0.034	0.100	0.101
Initial rating FE included	Yes	Yes	Yes	Yes	Yes
Rating agency FE included	No	Yes	Yes	Yes	Yes
Vintage halfyear FE included	No	No	No	Yes	Yes
Collateral type FE included	No	No	No	Yes	Yes
Sponsor rating FE included	No	No	No	Yes	Yes
Sponsor diversification FE included	No	No	No	Yes	Yes
Servicer FE included	No	No	No	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Table 17: Tobit Regressions of Downgrade Severity with Control for Same Sponsor

These regressions include the same specification as in Table 9, but also have fixed effects for whether the sponsor of the ABS was the same as the CDO. The dependent variable indicates how many rating notches a security was downgraded by S&P from end of 2007H1 to end of 2009H1. The dependent variable takes the value zero if no transition occurred or if an upgrade occurred. All ratings below CCC- are treated as censored. Standard errors are clustered by deal.

	(1)	(2)	(3)	(4)	(5)
Variables	All	All	All	All	All
Security in non-synthetic CDO	3.016*** (0.120)	2.887*** (0.120)	2.649*** (0.120)	1.469*** (0.083)	1.458*** (0.084)
Security in synthetic CDO	4.104*** (0.210)	3.886*** (0.208)	3.796*** (0.206)	1.735*** (0.154)	1.749*** (0.158)
Security in both synth & non-synth CDO	4.651*** (0.181)	4.466*** (0.185)	4.063*** (0.183)	2.705*** (0.141)	2.724*** (0.141)
Security in CDO with the same Sponsor	-0.789*** (0.288)	-0.812*** (0.287)	-0.730** (0.285)	0.965*** (0.271)	1.002*** (0.279)
Security downgraded before 2007H2				2.995*** (0.358)	3.265*** (0.372)
Security upgraded before 2007H2				-0.618*** (0.114)	-0.736*** (0.120)
(AAA)x(Subordination)				-2.408*** (0.422)	-2.491*** (0.443)
Floating-rate security			0.994*** (0.140)		-0.004 (0.109)
Mean spread			1.858*** (0.189)		
Difference from mean spread			-0.238*** (0.024)		0.021 (0.019)
Constant	2.399*** (0.098)	2.223*** (0.216)	1.187*** (0.254)	-1.487*** (0.301)	-1.540*** (0.315)
Observations	86294	86294	86294	86294	86294
R-squared	0.029	0.030	0.033	0.100	0.101
Initial rating FE included	Yes	Yes	Yes	Yes	Yes
Rating agency FE included	No	Yes	Yes	Yes	Yes
Vintage halfyear FE included	No	No	No	Yes	Yes
Collateral type FE included	No	No	No	Yes	Yes
Sponsor rating FE included	No	No	No	Yes	Yes
Sponsor diversification FE included	No	No	No	Yes	Yes
Servicer FE included	No	No	No	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1

Figure 1: Aggregate Dollar Volume of CDOs Rated by S&P by Quarter

This figure shows the aggregate face value of CDO securities rated by S&P in each year 2001 through 2008. Values are calculated by quarter. Data is provided by the S&P RatingsXpress issue/maturity database.

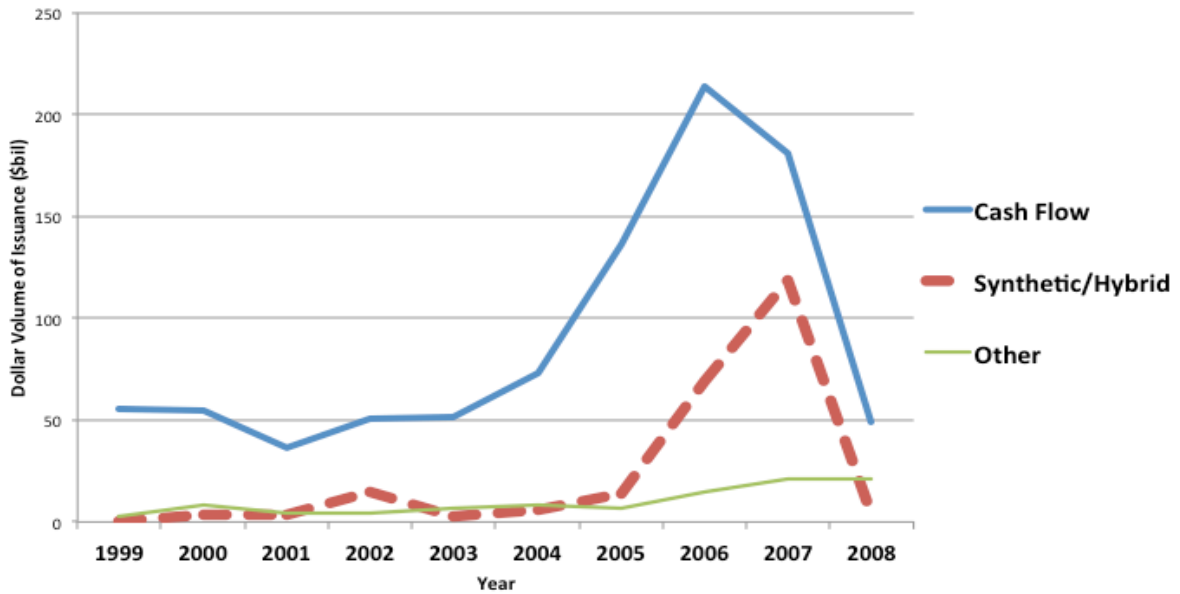


Figure 1: Distribution of Securities by Rating

This figure shows the percentage distribution of securities in the ABSNet database observed in a CDO in 2007H2 and the same type of distribution for the corresponding CDO liabilities in the Pershing Square database. Distribution calculated using security face value at origination

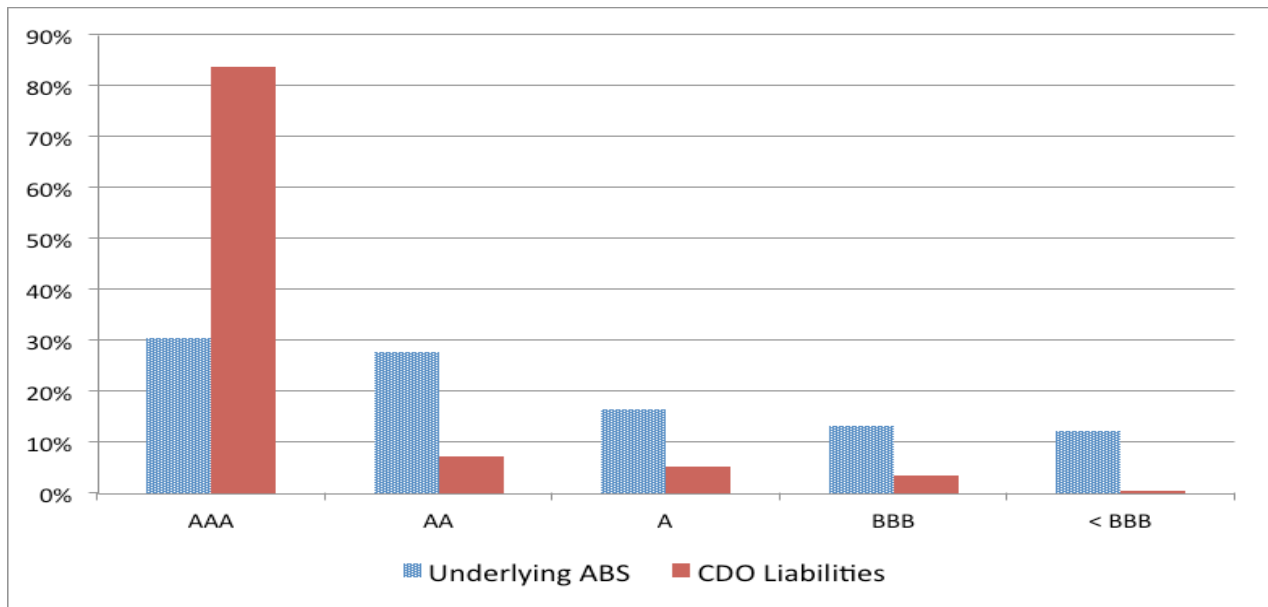
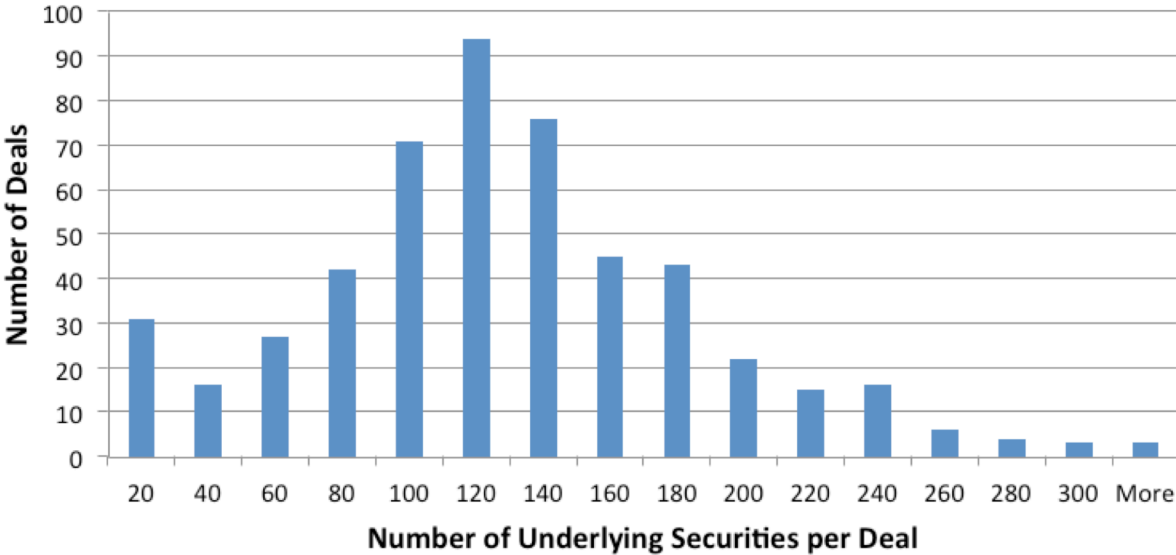


Figure 2: Histogram of Number of Underlying Securities per Deal



Appendix 1: Control Coefficients from Base Specification Regressions

This table reports coefficients from control variables not reported in Table 9. The columns correspond to the regressions indicated in Table 9.

Variables	(1)	(2)	(3)	(4)	(5)
Vintage (2002H2)				-0.003 (0.119)	0.048 (0.126)
Vintage (2003H1)				-0.388*** (0.113)	-0.335*** (0.120)
Vintage (2003H2)				-0.544*** (0.113)	-0.542*** (0.119)
Vintage (2004H1)				-0.554*** (0.116)	-0.503*** (0.124)
Vintage (2004H2)				-0.225* (0.126)	-0.158 (0.136)
Vintage (2005H1)				-0.153 (0.147)	-0.095 (0.155)
Vintage (2005H2)				2.298*** (0.194)	2.378*** (0.201)
Vintage (2006H1)				5.893*** (0.235)	6.029*** (0.240)
Vintage (2006H2)				7.340*** (0.262)	7.485*** (0.270)
Vintage (2007H1)				7.714*** (0.284)	7.879*** (0.296)
Collateral type (Others)				-0.876** (0.400)	-1.291*** (0.437)
Collateral type (CDOs)				3.847*** (0.426)	3.938*** (0.446)
Collateral type (CMBS)				-1.252*** (0.343)	-1.347*** (0.405)
Collateral type (Credit cards)				-2.265*** (0.397)	-2.208*** (0.419)
Collateral type (Home equity)				1.568*** (0.231)	1.612*** (0.255)
Collateral type (RMBS)				1.613*** (0.258)	1.639*** (0.282)
Collateral type (Student loans)				-1.043*** (0.378)	-0.994** (0.394)
Initial rating (AA+)	1.309*** (0.168)	1.325*** (0.168)	0.506*** (0.183)	1.601*** (0.134)	1.559*** (0.132)
Initial rating (AA)	1.800*** (0.122)	1.917*** (0.124)	1.090*** (0.144)	2.458*** (0.095)	2.399*** (0.093)
Initial rating (AA-)	3.866*** (0.189)	3.896*** (0.189)	3.209*** (0.205)	3.509*** (0.142)	3.485*** (0.142)

Appendix 1 Continued

Variables	(1)	(2)	(3)	(4)	(5)
Initial rating (A+)	3.846*** (0.183)	3.892*** (0.184)	2.535*** (0.234)	3.939*** (0.140)	3.927*** (0.140)
Initial rating (A)	1.961*** (0.123)	2.108*** (0.127)	0.740*** (0.192)	2.952*** (0.097)	2.895*** (0.097)
Initial rating (A-)	3.514*** (0.162)	3.590*** (0.165)	2.312*** (0.219)	3.892*** (0.131)	3.878*** (0.133)
Initial rating (BBB+)	3.409*** (0.167)	3.484*** (0.169)	0.870*** (0.330)	4.176*** (0.131)	4.178*** (0.134)
Initial rating (BBB)	2.101*** (0.130)	2.283*** (0.134)	-0.423 (0.300)	3.192*** (0.104)	3.136*** (0.105)
Initial rating (BBB-)	4.407*** (0.178)	4.558*** (0.182)	2.156*** (0.327)	4.784*** (0.147)	4.812*** (0.151)
Initial rating (BB+)	4.994*** (0.246)	5.117*** (0.250)	2.454*** (0.403)	5.228*** (0.212)	5.420*** (0.226)
Initial rating (BB)	3.127*** (0.144)	3.552*** (0.155)	0.181 (0.332)	3.749*** (0.130)	3.635*** (0.132)
Initial rating (BB-)	1.128*** (0.289)	1.285*** (0.296)	-0.822** (0.407)	2.826*** (0.216)	2.759*** (0.243)
Initial rating (B+)	-0.829*** (0.237)	-0.651*** (0.246)	-1.761*** (0.352)	2.170*** (0.220)	1.989*** (0.258)
Initial rating (B)	3.421*** (0.152)	3.991*** (0.170)	1.079*** (0.316)	4.095*** (0.141)	3.990*** (0.145)
Initial rating (B-)	-0.311 (0.272)	-0.147 (0.285)	-0.621* (0.354)	2.915*** (0.226)	2.798*** (0.282)
Initial rating (Below B)	6.990*** (0.721)	7.143*** (0.729)	4.804*** (0.781)	5.532*** (0.604)	5.502*** (0.673)
Rated by S&P only		-0.583** (0.226)	-0.373 (0.245)	-0.048 (0.175)	0.214 (0.182)
Rated by S&P and Fitch		-0.066 (0.269)	0.164 (0.290)	0.339* (0.203)	0.355* (0.211)
Rated by S&P and Moody's		0.488** (0.217)	0.523** (0.222)	-0.002 (0.161)	0.030 (0.161)
Parent rating FE (AAA)				1.141*** (0.235)	1.096*** (0.239)
Parent rating FE (AA)				0.817* (0.419)	0.817* (0.443)
Parent rating FE (A)				0.035 (0.170)	-0.009 (0.174)
Parent rating FE (BBB)				0.739*** (0.136)	0.726*** (0.140)
Parent rating FE (NR)				-0.158 (0.168)	-0.173 (0.172)
I(collateral types issued by seller > 4)				-0.905*** (0.136)	-0.944*** (0.139)
I(seller = servicer)				-0.128 (0.127)	-0.182 (0.128)
I(servicer unidentified)				0.143 (0.223)	0.098 (0.228)

Appendix Table 2:

This is a list of CDO Sponsors included in the regressions of Table 17, and the number of CDOs in our sample that they have sponsored.

Domestic Bank	# of CDO sponsored
Wachovia	5
J.P. Morgan Chase	4
PNC	4
E*Trade	3
Citigroup	2
Bank of America	1
SunTrust	1

Foreign Bank	# of CDO sponsored
Societe Generale	26
Deutsche Bank	11
Credit Suisse	8
UBS	7
Fortis Bank	5
Rabobank	3
Royal Bank of Scotland	3
Royal Bank of Canada	2
Hypo Real Estate Group	2
Gulf International Bank	1
ING	1
KBC Bank	1

Major Investment Bank	# of CDO sponsored
Goldman Sachs	16
Merrill Lynch	13
Lehman Brothers	12
Bear Stearns	9

Appendix Table 3: Tobit Regressions of Downgrade Severity with Controls for Abacus Deals

These regressions include the same specification as in Table 9, but also have fixed effects for whether a security was in an Abacus CDO. The dependent variable indicates how many rating notches a security was downgraded by S&P from end of 2007H1 to end of 2009H1. The dependent variable takes the value zero if no transition occurred or if an upgrade occurred. All ratings below CCC- are treated as censored. Standard errors are clustered by deal.

Variables	(1) All	(2) All	(3) All	(4) All	(5) All
Security in an ABACUS deal	-2.381*** (0.325)	-2.136*** (0.325)	-1.689*** (0.315)	0.584** (0.242)	0.801*** (0.254)
Security in non-synthetic CDO	3.852*** (0.128)	3.298*** (0.124)	2.749*** (0.121)	1.482*** (0.083)	1.473*** (0.084)
Security in synthetic CDO	5.051*** (0.216)	4.420*** (0.207)	3.976*** (0.206)	1.693*** (0.157)	1.701*** (0.160)
Security in both synth & non-synth CDO	5.464*** (0.187)	5.353*** (0.187)	4.374*** (0.185)	2.659*** (0.143)	2.656*** (0.144)
Security downgraded before 2007H2				2.949*** (0.368)	3.214*** (0.382)
Security upgraded before 2007H2				-0.735*** (0.114)	-0.858*** (0.120)
(AAA)x(Subordination)				-2.715*** (0.408)	-2.815*** (0.428)
Floating-rate security			1.494*** (0.100)		0.009 (0.110)
Mean spread			2.190*** (0.234)		
Difference from mean spread			-0.265*** (0.023)		0.019 (0.019)
Observations	86294	86294	86294	86294	86294
Initial rating FE included	Yes	Yes	Yes	Yes	Yes
Rating agency FE included	No	Yes	Yes	Yes	Yes
Vintage halfyear FE included	No	No	No	Yes	Yes
Collateral type FE included	No	No	No	Yes	Yes
Sponsor rating FE included	No	No	No	Yes	Yes
Sponsor diversification FE included	No	No	No	Yes	Yes
Servicer FE included	No	No	No	Yes	Yes

*** p<0.01, ** p<0.05, * p<0.1