Equity friendly or noteholder friendly? The role of collateral asset managers in the collapse of the market for ABS-CDOs

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Abstract

This paper shows that ABS-CDOs (i.e., collateralized debt obligations backed by asset-backed securities) managed by large market share managers have higher ex post collateral default rates. The paper also finds that (1) large manager deals, while having higher realized default rates, do not carry more default risk ex ante (at origination), as measured by the deal fraction rated AAA or the size of the equity tranche, (2) ex post, these deals have higher percentages of home-equity loans, subprime RMBS and synthetic assets in their collateral pools, and larger asset-specific default rates and issuer concentration levels, (3) compared to smaller managers, large market share manager deals pay out higher cash flows to equity tranche investors prior to the start of the subprime crisis (July 2007) but significantly lower cash flows afterwards, and (4) investors demand a (price) discount on non-equity tranches sold by large manager deals. In sum, this evidence is consistent with a conflict of interest/risk shifting argument: some managers boost their market share by catering to the interests of the deals' equity sponsors.

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1. Introduction

Since the beginning of the financial market crisis in the summer of 2007 securitized products, such as collateralized debt obligations (CDOs), are at the center of public criticism. Apart from the obscurity of these products and the dubious ratings they received from rating agencies, misguided incentive structures have been identified as main drivers of the financial crisis.[1] Because of the very extensive fragmentation of the securitization value chain, especially in the US, there exists a variety of incentive problems and conflicts of interest between the concerned parties. This study places its main emphasis on the asset managers of collateralized debt obligations, which are responsible for the selection and management of the assets in the reference portfolio, and examines incentive problems between managers and CDO investors. Asset managers were recently becoming the focus of enhanced public scrutiny. For example, on June 21, 2010, the SEC has filed its first case against a CDO manager (ICP Asset Management) for defrauding investors and about 50 additional managers are targets of the commission's continuing investigation (see Story, 2010).

The relationship between the asset manager (collateral manager or CDO manager) and the investors of a CDO transaction is a classic principal-agent relationship in which the manager steers the underlying asset pool as agent on behalf of investors (principals). Manager incentives and the existence of possible divergence of interest depend largely on the specific contractual arrangements for executive compensation, and the structuring of the securities issued. A specific feature of structuring CDOs, i.e., the bundling of cash flow claims on the asset pool into multiple tranches of securities or classes (notes), is that different priority claims on the incoming payments from the securitized asset pool result. There is, thus, a multiple agency relationship between the asset manager and CDO investors, as the manager is facing several groups of investors with different needs and preferences.

The payment characteristics of CDO tranches depend on their seniority. The senior and mezzanine tranches have a fixed or variable coupon, are rated by one or more rating agencies and have a more senior claim on the payments from the asset pool, compared to the lowest tranche (equity tranche or first loss piece). These tranches have the character of debt and, hence, are referred to as debt tranches (or notes). This contrasts with the equity tranche, carrying no coupon and being unrated, which represents the residual interest in the pool cash flows after full

[1] For instance, Brunnermeier (2009) argues that securitized products ultimately led to a flood of cheap credit, and a lowering of lending standards. Keys et al. (2010) provide empirical evidence suggesting that securitization practices did adversely affect the screening incentives of lenders. Titman and Tsyplakov (2010) examine conduit mortgages, which are originated with the intention of placing them into commercial mortgage-backed securities (CMBS). They find that mortgages that are originated by institutions with large negative stock returns prior to origination tend to have higher credit spreads and default rates, consistent with poorly performing originators having less incentive to carefully evaluate prospective borrowers.

satisfaction of the interest and principal requirements of senior and mezzanine tranche investors. The capital structure of a CDO is, hence, comparable to that of a company and incentive problems between the company manager and equity and debt capital holders, investigated in the corporate finance literature, can generally be applied to managed CDOs. One such problem (effort incentive) is associated with an external equity investment incentive problem that results from the fact that the manager gets only a fraction of the additional profits added by his personal effort choice. Second, given high external debt financing Jensen and Meckling (1976) describe a risk incentive problem (risk shifting or asset substitution) in which managers with an equity stake have an incentive to increase the riskiness of the company assets or, in case of managed CDOs, the risk of the reference portfolio.[2]

For managed CDOs, the last issue is of particular importance, since CDO transactions with an equity tranche size of usually between 1.40% to 4.98% have a high leverage.[3] In addition, debt tranche investors generally insist on a managerial equity stake. Hence, whereas managers have a fiduciary duty to cater to the interest of all investors, there is much recent anecdotal and limited empirical evidence suggesting that managers are systematically biased towards the interest of equity investors and follow excessively risky investment strategies. For example, in a case study of managed CBOs (collateralized bond obligations), Fu and Gus (2003) explain that "much of the portfolio under-performance can be attributed to industry concentration [...] and an "aggressive" investment philosophy. [...] In addition to making bad credit choices, some managers have purchased discounted securities or engaged in risky trading strategies to avoid triggering O/C tests that would otherwise have required diverting money from junior to the most senior noteholders."[4]

This paper looks for potential channels making managers systematically more equity prone. One such channel rests on managers' wish to increase ongoing management fees. In particular, the paper focuses on the question of why some managers where more successful than others in increasing market share (i.e., assets under management – AUM). Obviously, a first-order argument says that high-quality managers are more likely to increase market share. This "manager quality" hypothesis implies that deals from large market share managers should

[2] In Jensen and Meckling (1976) optimal capital structure will be determined by the trade-off between effort provision and risk-shifting problems, with bond covenants used to reduce the cost of risk-shifting. Both Dessi (2001) and Garvey (1995) find equity ownership to be consistent with maximal effort provision, while acknowledging the increase in asset substitution.

[3] These are the 25% and 75% quartile values in the sample described below.

[4] Several other examples of excessive manager risk taking are cited by Garrison (2005), S. 5-6. Two pieces from Bloomberg News, reporting cases in which asset managers served underwriters/equity sponsors more than note investors, include Shenn J., *How Wing Chau Helped Neo Default in Merrill CDOs Under SEC View* (May 9, 2010) and Ivry, B., and Shenn, J., *How Lou Lucido Helped AIG Lose $35 Billion With CDOs Made by Goldman Sachs* (March 31, 2010).

perform significantly better than similar deals from their smaller rivals. However, there is also an alternative argument which is consistent with excessive risk shifting behavior on the part of large market share managers. This argument is motivated mainly by two observations: managers' desire for "repeat issuance" (i.e., obtaining more management mandates from deal originators/equity sponsors) and their own equity stake make their incentives more aligned with equity investors, and this is particularly true for managers seeking to aggressively expand their market share. Hence, managers that were historically more successful in acquiring market share (either by winning more management mandates or by directly acting as deal sponsors) are also more likely to cater to the interest of equity investors. This is the conflicts of interest hypothesis.

To disentangle both hypotheses, this paper relies on the subprime crisis of 2007 and the subsequent financial crisis as an exogenous shock that makes risk shifting behavior visible and detectable. The empirical tests use a sample of 565 ABS-CDOs (i.e., CDOs backed by asset-backed securities) originated between 2000 and 2007.[5] Current deal performance (i.e., overall and asset-specific collateral default rates) is measured as of June/July 2010. By way of preview, the paper obtains the following main results. First, large market share manager deals, while having higher realized collateral default rates, do not carry more default risk at origination. In particular, there are no significant differences between *Top10* manager deals and *non-Top10* deals in the mean deal fraction rated AAA or the mean size of the equity tranche. Second, the collateral pools of large manager deals are to a higher percentage comprised of home-equity loan securitizations, subprime RMBS and synthetic assets. Moreover, for each asset class considered, these deals have higher asset-specific default rates indicating that large market share managers frequently select the riskiest part of any given asset class. Also consistent with risk shifting behaviour the reference pools are more concentrated with respect to collateral originators. Third, by employing an extensive analysis of equity tranche cash flows for a subsample of 137 deals, I find that compared to smaller managers, large market share manager deals pay out higher cash flows to equity tranche investors prior to the start of the subprime crisis (July 2007) but significantly lower cash flows afterwards. Finally, an investigation of offering yield spreads of rated (non-equity) floating rate tranches suggests that investors demand a price discount (require higher spreads) on tranches from deals managed by large managers. In contrast, I find only weak evidence that large market share managers' conflicts of interest are incorporated into tranche ratings.

[5] Despite their importance in the overall CDO market, only two other papers explicitly examine various structural features of ABS-CDOs (see Benmelech and Dlugosz, 2009, and Barnett-Hart, 2009).

This paper also provides some hard facts about what is now famously known as the "Magnetar Trade". Motivated by an earlier story in the Wall Street Journal (see Ng and Mollenkamp, 2008), in April 2010 two journalists from ProPublica (an independent non-profit newsroom that produces investigative journalism) wrote a story about the CDO program of a hedge-fund called Magnetar.[6] The story essentially claimed that Magnetar "sponsored" mortgage-backed CDOs by agreeing to buy/finance the equity tranche, and then shorted (bet against) the best tranche of those (and similar) CDOs by buying credit default swaps that insured the CDOs. The journalists also provide some anecdotal evidence that Magnetar tried to influence the managers of the CDOs it was instrumental in creating, to buy certain risky bonds that would increase the risk of those CDOs failing.[7] In this paper, I present strong evidence in line with the general view that Magnetar-sponsored CDOs were excessively risky. However, investors appear to have priced in this higher risk, at least to some extent.

The paper contributes to a growing body of empirical literature on ABS and CDOs. This literature has previously focused on credit ratings. CDO ratings may be inaccurate because of model misspecifications and data limitations (Luo et al., 2009), conflicts of interest[8] resulting from rating agencies' "issuer pays" business model (Griffin and Tang, 2009), or issuers "shopping" for the best rating. Adelino (2009) finds that while ratings provide useful information beyond what is incorporated in prices, they are not a sufficient statistic for the future performance of RMBS. In a paper related to mine, He et al. (2010) investigate whether large issuers of MBS deals assert their bargaining power over rating agencies by rating shopping. Their evidence is consistent with unduly favourable ratings granted to large MBS issuers, however, the market appears to be aware of the agencies' conflict of interests. My paper contributes to the CDO literature by showing that rating agencies are not the only ones to blame for the collapse of the CDO market. Asset managers that aggressively contributed to the phenomenal growth of this market also bear their share, implying that there is a large range of potential incentive conflicts, previously not adequately addressed. Finally, the paper is also related to literature on agency problems in the asset management arena. Important contribu-

[6] See Eisinger and Bernstein (2010). More information about the Magnetar trade and similar short practices of investment banks like Goldman and Deutsche can be found in Mählmann (2011) and Levin and Coburn (2011).

[7] The ProPublica article includes an e-mail from Magnetar's official James Prusko to a CDO manager, Ischus Capital Management, where Magnetar not only pushed for higher spread (meaning riskier) CDS on subprime bonds to be included, but also provided a spreadsheet with a "target portfolio".

[8] Bolton et al. (2009) theoretical model the agencies' conflict of understating credit risk to attract more business and find that rating agencies are more prone to inflate ratings when there is a larger fraction of naïve investors in the market or when expected reputational costs are lower.

tions include Chevalier and Ellison (1997), Golec (1992), Heinkel and Stoughton (1994), and Huddart (1999).[9]

The rest of the paper is organized as follows. Section 2 presents background information on ABS-CDOs and develops the main hypothesis. Section 3 describes the data and provides summary statistics for important deal characteristics. Section 4 details the methodology and discusses the main empirical results. Section 5 examines alternative explanations and shows some robustness checks. Section 6 focuses on pricing and rating of issued (non-equity) tranches and on important structural features like coverage and collateral quality tests. Section 7 concludes.

2. Background information and hypothesis development

2.1 Institutional details on CDOs

A cash flow collateralized debt obligation, or cash flow CDO, is a structured finance product that securitizes a diversified pool of debt assets into multiple classes of notes from the cash flows generated by such assets.[10] Subject to investment guidelines set by each individual CDO, the underlying assets may be static or revolving, and may consist of any variety and configuration of: corporate bonds, bank loans, sovereign debt, asset-backed securities (ABS) and other structured finance securities (such as CMBS, RMBS and HEL). Sometimes a CDO achieves exposure to these assets synthetically by entering into a credit default swap. In a credit default swap, the CDO receives a periodic payment from a counterparty that seeks protection against the default of a referenced asset. In return for this payment, the CDO must pay the protection buyer default losses on the referenced asset if the obligor of the referenced asset defaults. A CDO might have a few synthetic exposures (called hybrid CDO) or be comprised entirely of synthetic exposures. In the sample described below, on average 9.6% of CDO underlying exposures are produced synthetically.

The underlying collateral is managed by an asset manager who generally has demonstrated experience in managing the asset classes mandated by the transaction. The securities issued by the CDO are tranched into rated and unrated classes of notes and equity, where the rating of each note class is determined by its position in the priority of payments and other rating

[9] As far as I know, there is only one paper that theoretical examines the incentives of CDO managers. In a model in which the manager invests in debt and equity shares, Garrison (2005) shows that keeping the equity tranche is more efficient than other contracts based on debt and fees in solving the agency problem between CDO managers and CDO investors. The model also indicates that if the manager owns a higher equity than debt share he will consider risk-shifting.

[10] Cash flow CDOs should be distinguished from market value CDOs: whereas market value CDOs are managed to pay off liabilities through the trading and sale of collateral, cash flow CDOs are managed to pay off liabilities from the interest and principal payments of collateral.

criteria. Payments of interest and principal to the various note classes (or liabilities) issued by a CDO are generally made sequentially, such that payment is first made to the most senior class and then to other classes, in the order of their subordination. These payments are made solely from the cash flows received from the underlying assets (including hedges). The senior notes are usually rated AAA to A and have first claim on cash flows. The mezzanine and subordinated notes are usually rated BBB to B and have a subordinate claim on cash flows. The equity tranche, which occupies a first-loss position, is generally unrated and receives all or most of the residual interest proceeds of the collateral. The CDO equity represents a leveraged investment in the collateral; it has both a higher expected return and a higher volatility of return than the underlying assets.

CDOs are classified as either balance sheet or arbitrage CDOs, depending on the motivation behind the securitization and the source of the CDO's assets. Balance sheet CDOs are initiated by holders of securitizable assets, such as commercial banks, which desire to sell assets or transfer the risk of assets. The motivation may be to shrink the balance sheet, reduce required regulatory capital, or reduce required economic capital. Arbitrage CDOs, in contrast, are inspired by asset managers and equity tranche investors. Equity tranche investors hope to achieve a leveraged return between the after-default yield on assets and the financing cost due to debt tranches. This potential spread, or funding gap, is the "arbitrage" of the arbitrage CDO. Prominent examples of arbitrage CDOs are ABS-CDOs or two-layer securitizations, containing structured finance securities as collateral assets. Two types of ABS-CDOs are common (Gorton, 2009): "high grade" ABS-CDOs created from AAA, AA, and A tranches of different ABS/MBS transactions, and "mezzanine" ABS-CDOs created from the BBB tranches of several ABS/MBS. The total amount of CDO issuances peaked in the first half of 2007 with a record volume of $345 billion, but dropped shortly afterwards to as low as $5.7 billion in Q4 2008 (SIFMA, 2010). ABS-CDOs were the most significant segment of this market, accounting for around 60% of global CDO issuance volume until the beginning of the financial crisis. Since mid-2008, however, ABS-CDO issuances have almost ceased, with an all-time low of $30.4 million in Q3 2009.

2.2 Hypothesis development

One of the defining characteristics of structured finance is the tranching of the securities offering investors a variety of risk-return options. This tranching provides both issuers and rating agencies with one of their most challenging tasks – the design of a structure that will appropriately balance the competing/diverging interests of investors of each tranche. Senior

noteholders, receiving a fixed rate of return, for example, will want to maximise the quality of the underlying portfolio over the life of the transaction, while equity holders may prefer to trade-off some of the credit quality for higher returns and early repayment. For example, when the portfolio is assembled from the market, there is an incentive for the arranger/equity sponsor to select credits that trade inexpensively (i.e. at a high spread) relative to the weighted average rating, a margin that may reflect lower credit quality. Equity investors also have a stronger interest in higher levels of default correlation in the asset pool (with a higher probability of zero default), since this will reduce their expected loss, while senior and mezzanine investors are best served by low correlation which reduces the probability of a large number of defaults (Duffie and Gârleanu, 2001). As a result, asset managers are often called upon to make decisions which might be interpreted as benefiting one class of noteholders at the expense of another. Specifically, several reasons suggest that managers act more equity friendly: First, for asset managers, a key incentive is 'repeat issuance' – in particular, managers may seek to realize high equity returns in order to quickly establish a favourable reputation with deal sponsors (equity investors) and to be able to set up additional CDOs. Whereas the performance of a manager with respect to equity tranche holders quickly becomes visible as projected or realized interim returns; however, the performance with respect to senior tranche holders is less visible, as it only represents a binary signal (whether or not there was a breach of a test) and will likely only be fully revealed in adverse market conditions. This asymmetry may have provided incentives to managers to "gamble" and take excessive risk (risk shifting). Second, managers themselves will often hold an equity position in the transaction, which could align interests with investors, but could in itself become an important potential source of conflict. Hence, managers that were historically more successful in acquiring market share (either by winning more management mandates or by directly acting as deal sponsors) are also more likely to cater to the interest of equity investors. This is the *conflicts of interest/risk shifting* hypothesis. However, there is also a first-order explanation for why some managers are more successful in boosting assets under management: they are simply of higher quality, more experienced and have a better track record. This is what I call the *manager quality* hypothesis. I disentangle both hypotheses by focusing on potential signs of equity friendly management, including the following:

Demand for yield/spread

A manager might seek to invest in subordinated or lower rated assets to earn higher yields. A potential concern is that, while increasing the ability of the manager to meet the regular

interest payments on tranches, it also increases credit risk of the portfolio. Such a strategy represents risk shifting, since the manager can realize higher returns for equity tranche holders when economic conditions do not deteriorate.

Concentration risk

The manager may also seek to build up a portfolio with high risk concentration, such as selecting assets with high default correlation. A highly risk-concentrated portfolio either performs very well or very bad and therefore exhibits a higher volatility than a risk-diversified portfolio. As explained above, such a strategy benefits equity tranche holders but harms senior tranche holders. This strategy is thus purely risk shifting.[11]

Hence, risk shifting is a major channel through which managers can bias the distribution of collateral asset cash flows between tranche investors. However, risk shifting is hard to detect empirically during times with favourable market conditions, as experienced prior to the summer of 2007. In this sense, the financial crisis presents on ideal shock experiment designed to fully reveal any potential differences in the risk content of deals managed by various manager types.

3. Data and descriptive statistics

The data used in this study comes from BARCLAYS CAPITAL LIVE (BCL), a web-based platform that provides access to Barclays (formerly Lehman Brother's) research and fixed income, credit, and equities markets analytics. This database contains detailed surveillance information on virtually the entire population of US ABS-CDOs issued from January 1, 1999 through December 31, 2007. At the end of July, 2010, BCL contains information about 653 ABS-CDO deals. I exclude 7 deals without information on their capital structure, 8 deals with only fixed rate tranches in their capital structure, and 21 deals without the information (e.g., float formula, ratings, par amount, etc.) required for the regression analysis below for at least one of the floating rate tranches. In addition, 52 deals are either static deals or the identity of the manager (or underwriter/trustee) is unknown. This data cleaning gives a final sample of 565 ABS-CDO deals, managed by 158 distinct asset managers. Table 1 lists summary statis-

[11] A third risk shifting strategy, not covered in this paper, includes *par-building trades*. In some poorly performing managed deals in the past, for example, some managers tended to routinely buy discounted securities and book them to par value, transferring the trading gains to equity holders, including the manager, as excess spread. This also helped managers avoid triggering O/C tests, hence avoiding the diversion of payments to senior noteholders at the expense of management fees. In the case where a price below par reflects higher credit risk, such a strategy increases the credit risk of the portfolio. Hence, this strategy represents risk shifting, as equity tranche holders gain at the expense of senior tranche holders.

tics for the *Top10* managers measured by market share over the sample period and for a reference group of 65 small managers with only one deal each. The collateral manager market is not nearly as concentrated as the ABS-CDO underwriting market – the largest 10 banks underwrite over 70% of all deals (by number or amount) whereas the share of the 10 largest managers is only around 25%. A notable feature emerges from the last column in Table 1, which shows for each *Top10* management firm the average collateral default rate (measured at the end of July, 2010, as the collateral par amount currently in default) across all deals managed by that firm. As can be seen, for each of the *Top10* managers the average default rate is higher than the average rate (35.72%) across the 65 deals of the small managers. Moreover, the average deal from seven managers performs significantly worse, compared to the reference group, with GSC at the top, reaching a record default level of 92.54%.

As a first step to find plausible explanations for these different default behaviours, Table 2 compares the means of various deal and collateral pool characteristics for the deals managed by both groups (i.e., *Top10* and small managers). The two groups are remarkably different along various dimensions. First, as shown in Panel A, *Top10* managers manage larger, more leveraged deals with a lower equity share and more collateral assets. However, whereas the subsequent collateral performance is significantly different between both groups (with an average collateral default rate of 55.16% for *Top10* managers versus 35.72% for the smaller ones – see Panel C), the initial deal fraction rated AAA and the average initial deal rating[12] are surprisingly close, suggesting significant differences in the way both manager groups replaced matured or prepaid initial collateral assets over a deal's life. That is, *Top10* managers appear to be more likely having replaced good collateral with bad, compared to their smaller competitors. This becomes also evident from an analysis of the current (as of June/July 2010) asset type composition of deal collateral pools and asset type default rates (i.e., the nominal asset fraction in default), shown in Panels B and C, respectively. I differentiate between five

[12] Here, deal ratings are constructed by weighting the corresponding (average) tranche ratings by their principal amounts. Tranche ratings were converted to a point scale were AAA corresponds to 1 and then each rating notch corresponds to 1 point more (i.e., AA+ is 2, AA is 3 and so on). Hence, higher numbers reflect more default risk. I use the correspondence of the Moody's scale with that of S&P and Fitch that is common in the literature (AA of S&P/Fitch corresponds to Aa in Moody's, BBB of S&P/Fitch equals Baa, etc.). Importantly, only 2.1% of the 3276 rated tranches are rated by one agency, 70.8% are rated by two and 27.1% obtained a rating from all three rating agencies. As a summary variable for the ratings, I choose to average the ratings in the point scale. For example, one AA rating (3 in the point scale) from one agency and one AA- from another agency (4 in the point scale) corresponds to 3.5. In cases where there are three ratings and only one disagrees I approximate the rating to the closest half point. Average point ratings are transformed to the letter scale as follows: AAA corresponds to 1, AA to the half point interval [1.5, 4.5], A to [5.0, 7.5], BBB to [8.0, 10.5], BB to [11.0, 13.5], B to [14.0, 16.5], CCC to [17.0, 19.5], CC to [20.0, 20.5], C to [21.0, 21.5], and D corresponds to 22.

asset classes: HEL – home equity loans (includes all RMBS less than prime)[13], RMBS – residential mortgage-backed securities (by prime borrowers), CMBS – commercial mortgage-backed securities, CDO – tranches from other CDOs, OTHER – other asset-backed securities (including auto-loans, credit-cards, etc.).

The panels reveal at least two reasons for why *Top10* manager deals have significantly higher overall collateral default rates. First, these deals include more of the riskiest asset type – subprime RMBS/HEL with an average sample default rate of 56.5%, more than any other asset class. The average HEL share in *Top10* deals is almost twice the share (39% vs. 22%) in small manager deals, whereas the HEL default rates (57.1% vs. 56.3%) are similar between both deal types. Second, *Top10* deals have significantly lower other ABS (and to a weaker extent CDO) exposure, but this exposure is much more risky, with average default rates of 64.5% and 48.3% for CDO assets and other ABS, respectively, around 20% higher than the corresponding numbers for small manager deals.[14] In addition, large managers also construct asset pools which are significantly more concentrated, both with respect to the collateral issuer and the servicer. For example, the largest 5 collateral issuers in each pool contribute on average 38.1% of the pool balance for deals from *Top10* managers, compared to 31.0% for deals managed by their smaller rivals (see Panel B). This difference is significant at the 1% level. In sum, whereas deal characteristics indicate that deals from large managers were initially no more risky (indeed, the lower equity buffer required and the higher number of collateral assets suggests that they might in effect be less risky), current collateral characteristics reveal a significantly enlarged risk exposure, consistent with the higher default rates observed for these deals.

4. Main empirical results

4.1 Market share and collateral quality

In a first set of tests I investigate whether the observed differences in deal performance also hold in a multivariate context. If, according to the adverse incentive/risk shifting hypothesis, large market share managers cater to the interests of equity investors by taking on more risky (i.e., spread paying) assets ex ante, and this higher risk materializes after the start of the subprime crisis we should observe higher ex post collateral default rates and closer to default average collateral ratings for deals run by these managers. My main independent variable of

[13] Home equity loan securities are residential mortgage-backed securities whose cash flows are backed by a pool of home equity loans. Home equity loans, in turn, are second lien mortgages in which borrowers use the equity in their homes as collateral.

[14] *Top10* deals have almost 4% more synthetic exposure (11.0% vs. 7.1%), which is not statistically significant. Unfortunately, I have no information to calculate default rates separately for synthetic and non-synthetic assets.

interest, *Market share*, is calculated for each manager as the collateral par amount of deals managed in a given year over the total collateral par amount of all deals originated in that year. This variable is lagged by one year. Using alternative measures of manager market share based on the number of deals originated rather than principal amounts or a dummy for the *Top10* managers of Table 1 yields very similar results.

I build a number of control variables (measured at origination) to capture structural features of a deal and initial underlying collateral characteristics that may be correlated with deal performance. *Deal size* equals the principal amount of all of a deal's tranches. *Equity share* denotes the size of the most subordinated tranche as a percent of the transaction. Recall that the equity tranche is the first to cover any losses from the collateral pool. I also include the number of tranches since asymmetric information theories of tranching suggest that tranching should be particularly beneficial for better quality collateral assets. For example, in a model with asymmetric information about collateral asset quality, Boot and Thakor (1993) show that with 3 types of security issuers, those with the highest quality of collateral might split securities into 3 tranches ranked by seniority, if the gain in price appreciation is greater than the loss due to reduction in total informed demand. Hence, *No. tranches* should be negatively associated with collateral default rates. To capture the initial riskiness of the collateral pool I construct the variable *Original deal rating* in a two step procedure. First, numerical tranche ratings are formed based on the average of the ratings a tranche received at issuance: I set AAA=1, AA+=2, AA=3, and so on; hence a higher score implies a worse rating.[15] Then average tranche ratings are weighted by their principal amounts to construct the deal rating. Lastly, I include the dummy *Magnetar*, taking on the value one for deals sponsored by the hedge fund Magnetar (see Eisinger and Bernstein, 2010).[16]

As dependent variables in the ex post deal performance regressions I focus on the collateral default rate (by number and amount), and the weighted average collateral rating, constructed by weighting the average numerical collateral asset ratings by their principal amounts. Both variables are measured as of June 2010. Results from these regressions are presented in Table 3, with standard errors clustered at the manager-year level. Most importantly, the univariate performance differences between small and large managers do not disappear after including control variables. The coefficients for *Market share* (in the columns labelled I) suggest that the collateral default rate (the average rating) would be about 18.7% (1.7 notches) higher for a

[15] I use the correspondence of the Moody's scale with that of S&P and Fitch that is common in the literature (AA of S&P/Fitch corresponds to Aa in Moody's, BBB of S&P/Fitch equals Baa, etc.).

[16] I considered a number of other deal characteristics, like the number of collateral assets, the weighted average maturity of the tranches or the initial level of overcollateralization (i.e., the difference between the collateral par amount and the deals' liability balance), but found these variables to be insignificant.

manager with 10% market share relative to a very small manager. Since the average sample default rate is 45.3% and the average collateral rating is 15.3 (close to B/B2), this effect is economically and statistically significant. The coefficients on the control variables are broadly as expected: larger deals with more tranches have lower default rates and higher collateral ratings, and initially more risky deals (as indicated by a larger equity tranche and worse average deal ratings) do perform better, at least with respect to collateral defaults. This latter (not statistically significant) effect is likely due to the fact that deals containing more risky assets as collateral at origination also probably have tighter investment guidelines restricting the asset replacement and investing decisions of the manager. The coefficient signs found for the equity share variable also support a risk shifting argument: higher ex post default rates (and collateral ratings) are the result of risk shifting incentives by equity investors, and these incentives are larger if leverage is higher (i.e., there is less equity).

Interestingly, with respect to both ex post performance metrics, deals sponsored by Magnetar perform significantly worse compared to non-Magnetar deals. For example, the conditional average collateral default rate of Magnetar deals is almost 30% higher than the one for comparable non-Magnetar deals, and the weighted average collateral rating is almost 3 notches worse. Since it is possible that manager market share proxies for quality differences between trustees (i.e., deals by large managers are overseen by low-quality trustees), I include trustee fixed effects. To capture cross-sectional as well as temporal variation in the relation between deal performance and underwriter characteristics (e.g., reputation, experience, changes in structuring standards, etc.), underwriter-year dummies are included. The coefficient for *Market share* remains materially unchanged.

This paper argues that the desire to increase overall compensation by creating and managing more new deals makes managers prone to the interests of the deal/equity sponsors. The proliferation of synthetic or hybrid CDOs since 2005 has likely worsened this incentive conflict of CDO managers.[17] Once short investors are involved, the CDO has two types of investors with opposing interests: those who would benefit if the assets performed, and those who would benefit if the mortgage borrowers stopped making payments and the assets failed to perform. In particular, synthetic/hybrid CDOs enabled sophisticated investors to place bets against the housing market, making more money if CDS were written on low quality reference assets (e.g., mezzanine tranches of subprime RMBS). A prominent example that gained much public attention involved the hedge fund Paulson & Co. ("Paulson"). In April 2010, the SEC charged

[17] Hybrid and synthetic ABS-CDO issuance grew from $10 billion in 2004 to $35 billion in 2005 and $117 billion in 2006, and then dropped to $99 billion in 2007. These numbers represent 17% of the overall ABS-CDO market in 2004 but 33% in 2005, 54% in 2006 and 61% in 2007 (FCIC, 2010).

Goldman Sachs with fraud for telling investors that an independent CDO manager, ACA Management, had picked the underlying assets in a CDO when in fact a short investor, Paulson, had played a "significant role" in the selection. The SEC alleged that those misrepresentations were in Goldman's marketing materials for Abacus 2007-AC1, one of Goldman's synthetic Abacus CDO deals. In July 2010, Goldman settled the case, paying a record $550 million fine. Note that in the regressions of Table 3 the Magnetar dummy partially controls for the adverse impact of short investors acting as deal sponsors.

However, as shown below in Table 5 (Panel A), large manager deals have significantly more synthetic (CDS) collateral. Hence, if deals with a higher CDS fraction of assets were more likely to be initiated by investors who wanted to short the mortgage market and large managers are more eager to cater to the interests of these investors (to increase AUM), the effect of *Market share* should be higher for hybrid/synthetic deals, compared to cash bond deals. To test this argument, I replicate the regressions in columns I of Table 3, including the dummy *Syn_indi* (and its interaction with *Market share*) taking on the value one if the deal's collateral pool includes at least one synthetic asset, and zero otherwise. The results are shown in columns II. For both performance metrics the coefficient on *Syn_indi* is positive and significant, indicting that hybrid/synthetic deals have riskier collateral pools (11% more collateral defaults and ratings 1.23 notches closer to default). But the sign of the interaction effect is ambiguous and the coefficient insignificant. Hence, there is no evidence that manager incentive conflicts are larger for hybrid/synthetic deals. However, these findings are at best preliminary since *Syn_indi* is a noisy proxy for the influence of short investors. For example, prominent mortgage shorting strategies like capital structure arbitrage (see Mählmann, 2011) involve shorting a CDO's mezzanine tranches, not the collateral assets.

4.2 Market share and concentration risk

Besides selecting more spread paying (and, hence, more risky) assets, a second risk-shifting strategy is to build up a portfolio with high risk concentration, such as selecting assets with high default correlation. Risk concentrations can be measured along several dimensions like issuer/originator, servicer, industry, vintage year, asset class and region. In the following, I investigate whether there are systematic differences between manager types in the issuer and servicer concentration levels of their portfolios. For cases in which multiple securities generated by the same originator are included in one CDO, similarity in collateral type, geographic concentration, or underwriting standards may give rise to default correlation. Similarly, a collateral pool should also be reasonably well diversified across servicers. Here the concern is a

potential correlation in the performance of the assets associated with the performance of the servicer. In general, a badly performing or defunct servicer can be replaced, but there may be delays or a disruption of cash flows that could result in outright pool losses in connection with the transfer of servicing responsibility.

Table 4 reports coefficients from OLS regressions of issuer and servicer concentration ratios. In particular, the dependent variable *% Top X* denotes the current (as of June/July 2010) collateral balance percentage of the largest X collateral issuers and servicers, respectively. The coefficients for *Market share* are always positive (and significant in the case of issuer concentrations), suggesting that deals run by large managers are more concentrated along both dimensions. For example, the collateral percentage of the 5 largest issuers would be about 6.9% higher for a manager with 10% market share relative to a very small manager. There is also a significantly increased issuer concentration in Magnetar-sponsored deals. Furthermore, deals with higher (i.e., closer to default) average tranche ratings at origination and more leverage (i.e., less equity) face larger (but not statistically significant) issuer concentration levels in their collateral pools. This is consistent with risk shifting being more beneficial to equity investors if leverage and the initial default risk are higher. Finally and not surprisingly, larger deals have lower issuer concentration levels. In sum, these results are fully compatible with more risk shifting by large managers.

5. Alternative explanations and robustness

5.1 Market share and asset specialization

Recall from Panels B and C of Table 2 that there are significant differences between large and small managers in the chosen asset composition and the riskiness of these assets. This raises an alternative explanation for the higher riskiness of deals from large market share managers: asset specialization. That is, large managers could have specialised in some sectors, particular HEL/subprime RMBS, which are (not only ex post) more risky than the others. Hence, this could just be a story of different risks managed by different market participants. To investigate this argument, I study collateral pool compositions and asset class specific default rates.

Figure 1a shows a scatter plot (and a median spline) of the fraction of collateral nominal balance invested in each asset class. Deals are sorted by origination year and each marker represents one deal. The figure illustrates a profound increase in subprime mortgages (i.e., HEL), from a median fraction below 10% in the years 2000-2002 to over 40% in 2007. On the other hand, tranches from non-mortgage ABS were becoming far less frequent in recent years, the median fraction decreases from around 66% in 2000-2002 to 21% in 2007. This finding is in

line with previous results (Barnett-Hart, 2009; Benmelech and Dlugosz, 2009). To gain a first insight into different evolutions of asset risk over time, Figure 1b plots current default rates (i.e., the asset type nominal fraction in default as of June/July 2010) against deal origination month. Two obvious findings emerge from the figure: first, irrespective of asset type, deals originated more recently have higher default rates. Second, among asset classes, CMBS and (prime) RMBS appear to be less risky (even for the origination years 2006-2007, their default rates are often well below 50%),[18] whereas HEL carry the highest risk (the 25% quintile HEL default rate among deals originated between 2006-2007 is 73% and the median is 89%).

Next, I investigate formally whether the observed differences in asset composition and riskiness still hold in a multivariate context. Panel A of Table 5 shows results from regressing current (as of June/July 2010) collateral percentages, allocated to distinct asset types, on *Market share* and several deal controls, measured at origination. All regressions include fixed effects for the origination year, the trustee and the underwriter, and, as always in this paper, standard errors are heteroskedasticity robust and clustered at the manager-year level. The coefficients for *Market share* suggest that deals run by a manager with 10% market share have on average 12% more HEL exposure and 8% less other ABS exposure, compared to deals from very small managers. The share of synthetic (CDS) assets is also 6% higher for a large manager. In view of the sample averages reported in Table 2, these numbers are statistically and economically significant.[19]

To investigate the alternative asset specialization argument, Panel B reports regressions with current asset type default rates as dependent variables. The coefficients for *Market share* suggest that the collateral default rate would be about 6.6% higher for HEL collateral, 22.2% higher for CDO assets and 13.8% higher for non-mortgage ABS collateral when the deal is run by a manager with 10% market share relative to a very small manager. These effects are statistically significant at the 10% level or better. The coefficients for the remaining two asset types are also positive but not significant. In sum, this does not speak in favour of asset specialization being responsible for high overall collateral defaults, but supports the view that large managers systematically choose the riskier parts from each asset class as collateral.

[18] For deals originated between 2006-2007, the 25% quintile CMBS default rate is 0%, and the median is 19%. For RMBS, the corresponding numbers are 31% and 56%, respectively.

[19] There are several other interesting findings. Magnetar-sponsored deals have 19% more synthetic exposure and 8.6% less prime RMBS exposure, whereas deals with a greater equity puffer have a lower HEL fraction and less synthetic exposure. This is consistent with managers shifting less risk when more equity is at stake and hence leverage is lower. Deals with higher (i.e., closer to CCC) weighted average tranche ratings at origination include more assets from non-mortgage ABS, more synthetic assets, and less prime RMBS collateral, which could simply reflect their higher risk at issuance. Larger deals invest more in prime residential mortgages, less in commercial mortgages and less in non-mortgage assets; and finally, deals with more tranches offered to investors have less residential mortgage exposure, more commercial mortgages and more non-mortgage assets.

Similarly, the positive (and significant in four out of five cases) coefficients for the Magnetar dummy indicate that Magnetar-sponsored deals have higher default rates across all asset types, again consistent with the notion that these deals invest in the riskiest parts within each asset class. I also find that less leveraged deals have significantly lower CDO and non-mortgage ABS default rates, in line with more equity being a natural barrier to risk shifting. The average original tranche rating is only positive and significant for prime RMBS defaults, with higher (closer to default) ratings implying larger RMBS default rates. Furthermore, larger deals have significantly lower MBS default rates, both, for (prime and subprime) residential and commercial mortgages. In sum, the results from these regressions indicate that large managers select riskier HEL, CDO and non-mortgage collateral, compared to their smaller competitors. This supports the conflict of interest argument predicting greater risk shifting incentives for large market share managers.

5.2 Explicit mechanisms: Manager compensation and mandatory equity stakes

This paper argues that an implicit mechanism (desire for repeat issuance) makes managers more equity prone. In particular, because CDO managers usually receive a fixed percentage of assets under management as senior compensation (see below), they will have an incentive to take whatever actions increase the number of CDOs they manage. Since the placement of the CDO's equity is the key to the successful closing of a CDO, this, in turn, creates an implicit incentive for managers to act in the interest of a CDO's equity sponsors. There are, however, at least two alternative, explicit mechanisms that could align manager incentives with equity interests: the compensation scheme and mandatory equity stakes of the manager. The compensation scheme determines the financial incentives for a CDO manager and therefore potentially has a strong bearing on managerial slack and risk shifting incentives. In order to limit managerial slack, a remuneration scheme must be performance sensitive – that is, it must reward the manager sufficiently for efforts to increase return to the investors. Risk shifting incentives depend on the degree to which the manager's incentives are aligned with those of equity tranche holders.

The typical CDO stipulates management fees, which are embedded in the interest proceeds waterfall and paid out periodically, and an incentive fee which is paid out whenever the return to equity tranche holders exceeds a certain threshold. The management fees consist of a senior and a subordinated fee component. The senior management fee ranks senior to interest payments on senior tranches and varies between 3-30 bps of total par amount per year. This fee component resembles thus an annual management fee that depends only on the collateral size

but not on performance. The subordinated management fee equals 1-40 bps of total par amount per year. It ranks below senior tranche payments but above equity tranche payments and is therefore linked to the performance of the senior tranche. The incentive fee is paid out at each payment date given the return to equity tranche holders exceeds a certain threshold of usually 12-25% internal rate of return (IRR). The size of the incentive fee is typically 20% of returns to equity tranche holders above the threshold.[20] This fee is obviously linked to the performance of the equity tranche.

Managerial ownership of the equity tranche is sometimes required to constraint managerial slack and to give managers high-powered incentives to exert effort in screening and monitoring collateral assets. However, the manager holding (part of) the equity tranche may have incentives to take excessive risk, for example by stacking the portfolio with highly correlated and/or low-quality (but more spread paying) assets.[21] To rule out compensation and mandatory equity ownership as alternative explanations for risk shifting behaviour of large managers, I investigate whether there are any systematic differences in the compensation structures and managerial equity stake requirements between deals run by *Top10* versus *non-Top10* managers. Information on compensation structures and mandatory equity stakes is hand-collected from the initial prospectuses/offering circulars of 396 transactions, available from public sources (e.g., Irish Stock Exchange).[22] Panel A of Table 6 shows results from comparing the compensation structures. Several findings emerge. First, *Top10* deals more often include an upfront fee (34% vs. 16%), and the average fee amount ($1.99m vs. $1.46m) is more than one third higher. Second, subordinated and senior fees are also higher among *Top10* deals, both in terms of bps of total collateral par and as dollar values (calculated by multiplying the fee with the initial collateral par).[23] Third, there are no significant differences in the incentive fee structures between both deal types. In particular, 42% of *non-Top10* deals and

[20] Note that in some cases (28 out of 167 in the sample below), the incentive fee is paid out as % of total portfolio par amount – usually 10 bps – after distribution of proceeds to investors.

[21] Even abstracting from risk shifting incentives induced by equity ownership, whether equity tranche retention is the optimal contractual mechanism to influence an originator's choice of costly effort to screen borrowers is ambiguous. First, mandatory equity tranche holdings (at origination) can later simply be sold or be hedged via the use of credit derivatives. Second, the theoretical results of Fender and Mitchell (2009) suggest that the incentive for the CDO originator to screen borrowers when it holds the equity tranche may in some cases be lower than if the originator were to hold a proportional claim on the portfolio, or even the mezzanine tranche. Note that this result contrasts with the main result of Innes (1990), which would imply in the context of a structured transaction that it should always be optimal to have the originator hold the equity tranche.

[22] I reestimated the performance regressions of Table 3 for the restricted sample of 396 deals with available prospectuses/offering circulars. The results are qualitatively unchanged. For example, the coefficient of market share in model I increases from 1.865 to 1.947, and the standard error from 0.514 to 0.671, slightly reducing the t-stat from 3.63 to 2.90.

[23] Of the 396 deals with compensation information in their prospectus, 80 have an upfront fee, 392 a senior fee, 300 a subordinated fee, and 168 an incentive fee. There is no significant difference between the share of *non-Top10* and *Top10* deals with a subordinated fee.

41% of the *Top10* deals include an incentive fee, the average hurdle rates are 14.0% and 16.3%, respectively, and the mean incentive fee, as a percentage of the excess return (above the hurdle) that would otherwise be distributed to equity holders, is 21.4% and 22.2%, respectively. The only significant difference occurs for the 28 deals that pay out the incentive fee as a share of the collateral portfolio par – on average 20 bps for *non-Top10* deals and 7 bps for *Top10* deals. In sum, there is no evidence that the compensation structure acts to align the interests of large managers with equity investors. In contrast, *Top10* deals pay out a higher share of fees that are unrelated to the performance of equity tranches, possible due to a higher reputation/bargaining power of *Top10* managers.

Panel B of Table 6 reports information on mandatory manager equity stakes. Overall, 207 deals (52% of 396) require managers retaining a portion of the equity tranche. However, whereas the percentage of deals with ownership requirements is not significantly different between *non-Top10* and *Top10* managers (54.0% vs. 46.9%), the average required equity holdings (as a percentage of the equity par) are significantly higher (at the 1% level) for *Top10* managers. But given the fact that equity tranches from *Top10* deals are typically smaller (see Table 2, Panel A), *Top10* managers actually have much less "skin in the game" in terms of dollar volumes invested than *non-Top10* managers ($9.8m vs. $14.8m, *p*-value from a one-sided test is 0.06). Hence, there is no evidence that high mandatory equity stakes make large market share managers more equity prone. As a further test, I include variables that capture the structure of managerial compensation and mandatory equity stakes into the performance regressions of Table 3. The coefficients for market share remain qualitatively similar.

5.3 Market share and equity tranche cash flows

In this section I make use of the fact that any risk shifting behaviour on the part of the deal manager should be directly visible in the temporal structure of interest payments received by equity tranche investors. In particular, if large managers indeed boost equity cash flows by taking on more risky (i.e., spread paying) assets ex ante, and this higher risk materializes after the start of the subprime crisis we should observe relatively high interest payouts to equity investors in large market share manager deals (compared to smaller ones) before the crisis and relatively lower payouts after the beginning of the crisis period when the higher risk becomes visible in terms of defaults. In contrast, the manager quality hypothesis suggests that *post-crisis* equity tranche cash flows should be higher for large market share manager deals compared to the ones from their smaller peers.

To test these divergent predictions, I focus on the complete time series of cash flows (interest payments) received by equity investors over the course of the deal, i.e., from the first payment date to the end of the sample period, December 2010. For a restricted sample of 137 equity tranches (issued between 2003 and 2007), I obtain cash flow data on interest payments from ETRUSTEE, a web-based platform operated by Bank of America (BoA)/Merrill Lynch to provide interested investors with essential information about various kinds of ABS transactions. In most of these deals, BoA acts as a trustee or underwriter. I separate the sample into 57 deals with monthly and 80 deals with a quarterly payment frequency. From these cash flow data I calculate (monthly or quarterly) cash flow series by scaling the interest payments, if any, using the outstanding nominal tranche balance.[24] This results in an overall sample of 3032 monthly and 1568 quarterly scaled cash flows. To investigate whether large managers engage in risk shifting to benefit equity investors at the cost of more senior noteholders, I estimate the following regression separately for deals with monthly or quarterly payments:

$$\begin{aligned} y_{it} = {} & \beta_{MS}\text{Market Share}_i + \beta_{Crisis}\text{Crisis}_t + \beta_{MS\times C}\text{Market Share}_i \times \text{Crisis}_t \\ & + \beta_y y_{it-1} + \beta_{Controls}\text{Controls}_i + \beta_{Time}\text{Time}_t + \varepsilon_{it} \end{aligned} \tag{3}$$

where y_{it} is the equity tranche scaled cash flow of deal i in month (or quarter) t. I use specifications with different proxies for manager market share: a continuous measure (i.e., the collateral par amount of deals managed in a given year over the total collateral par amount of all deals originated in that year) and two dummy variables: *Top10* is a dummy taking on the value 1 if the deal is managed by one of the 10 largest managers (i.e., the managers from Table 2 with 10 or more deals over the sample period), and 0 otherwise. Similarly, *Top40* denotes deals from the 40 largest managers with 5 or more deals over the sample period. *Crisis* is a dummy variable taking the value 1 for payments from July/3rd quarter of 2007 (the beginning of the subprime crisis) or later, and 0 for the pre-crisis period. *Controls* is a vector of deal-level control variables and *Time* a vector of monthly or quarterly time dummies. Note that the *Market Share* x *Crisis* interaction tests for a differential effect of market share in the crisis period. Hence, if large managers indeed boost equity payments by taking on more risky assets ex ante, and this higher risk materializes after the start of the subprime crisis, we should find a positive value for β_{MS} and a negative value for $\beta_{MS\times C}$. Since the distribution of cash flows is censored at 0 (around 63% of monthly and 54% of quarterly payments are 0), I esti-

[24] Only one deal in the sample paid back any principal until the end of December 2010. That deal, Crest Exeter Street Solar 2004-1, refunded $1.055m, which equals 16.2% of its initial equity tranche balance ($6.5m). All of the results below are unchanged whether I include or exclude these principal repayments in the calculation of the deal's cash flow series.

mate equation (3) using the tobit approach.[25] That is, I assume that y_{it} is a latent variable and we observe y^*_{it}, which is bounded between 0 and infinity if y_{it} is outside those bounds, i.e.

$$y^*_{it} = \begin{cases} y_{it} & \text{if } y_{it} > 0 \\ 0 & \text{if } y_{it} \leq 0 \end{cases}. \tag{4}$$

Table 7 presents results from estimating equation (3), separately for deals with monthly and quarterly payment frequencies and the three market share proxies. I include the following control variables (measured at origination): log of *Deal size*, transaction share of the equity tranche, *Original deal rating*, *No. tranches*, *No. collateral assets*, the initial level of overcollateralization, vintage year dummies, and the lagged cash flow to capture serial correlation. Since the β coefficients in a tobit model themselves measure how the unobserved variable y_{it} changes with respect to changes in the regressors, Table 7 instead reports marginal effects (i.e., discrete changes for dummy variables) of the censored expected value $E(y^*_{it})$. They describe how the observed variable y^*_{it} changes with respect to the regressors. In addition, standard errors are heteroskedasticity robust and clustered at the tranche-year level to account for dependence between cash flows from the same equity tranche.

I find (limited) evidence for a superior cash flow performance of equity tranches from large market share manager deals in the pre-crisis period. The coefficients on the market share variable are positive for five out of six specifications but only significant (at the 5% level) in two cases. The numbers imply that, for example, an equity tranche from a *Top40* manager deal generates a conditional average monthly (quarterly) pre-crisis cash flow 13 (9) basis points (bp) higher than a comparable tranche managed by a smaller competitor. Since the sample average monthly (quarterly) pre-crisis cash flow is around 99 (323) bp, this effect is relatively small in economic terms. However, as indicated by the significant negative coefficients found for the *Market Share* x *Crisis* interaction, large manager deal equity tranches severely underperform in the crisis period. Now the same *Top40* equity tranche underperforms a comparable *non-Top40* tranche by on average 33 bp per month or 42 bp per quarter. This change in relative performance between both periods is statistically significant (at the 1% level) for all but one specification. In addition, since the average monthly (quarterly) crisis cash flow is just 29 (96) bp, this effect is also economically large. I perform several tests to check the robustness of these findings. First, I include a tranche-level Gaussian random effect into the tobit regres-

[25] Assuming that zero cash flows are censored (and the tobit model is the right one to choose) makes economically sense since equity investors face limited liability, assuring that their cash flows cannot be negative.

sions to better account for the panel-level variance component. Second, I classify cash flows into two classes, zero cash flows and those above zero, and run a binary logit regression. Third, I employ alternative choices for the start of the crisis period (e.g., October/4th quarter of 2007 or January/1st quarter of 2008). In all these tests the findings remain qualitatively unchanged. Overall, the results are consistent which the notion that large managers face stronger risk shifting incentives that after the subprime crisis materialized, evaporate equity tranche cash flows. However, the results have to be interpreted with caution since the number of deals is small and there could be a selection effect because BoA acts as a trustee in most deals.

5.4 Further robustness checks

In this section, I briefly report results from two robustness checks. First, instead of using market share as a continuous measure, I discretize the measure into a binary classification (e.g., *Top10* managers versus *non-Top10* managers). Econometrically, using a continuous measure relies on the assumption that the measure has a constant effect on the variables of interest. The binary classification avoids this assumption and enables a better inference on the qualitative differences between large, prominent managers and their smaller rivals. However, the results in this paper remain qualitatively unchanged. Second, several regressions include a proportion as dependent variable (e.g., default rate, asset fraction, concentration ratio) and the number of boundary values (i.e., either 0 or 1) could be quite high. Since OLS might not be appropriate for a proportion as a dependent variable, I employ fractional logit regressions (see Papke and Wooldridge, 1996) that can handle proportions with a high fraction of observations at the boundary.[26] The results from these alternative model specifications are qualitatively unchanged.

6. Did investors and rating agencies recognize manager's conflict of interest?

6.1 Initial yield spreads

After identifying risk shifting as the main channel through which large managers influence deal performance, I next examine whether investors and the rating agencies recognize this incentive when they try to assess these deals' riskiness. I first examine whether the market differentiates *ex ante* the credit quality of tranches from deals managed by large vs. small managers by comparing their initial yields (at issuance, over a benchmark). Since the number of fixed rate tranches is too low to justify the introduction of yield spread measurement error

[26] Since each asset fraction (i.e., HEL, RMBS, CMBS, CDO, OTHER) ranges between 0 and 1, and they add up to 1 for each deal, I also employ a fractional multinomial logit model, which is a multivariate generalization of the fractional logit model proposed by Papke and Wooldridge (1996), to analyse asset fractions.

through a combined analysis of fixed and floating rate securities, and also too low for a separate analysis of fixed rate tranches, I focus on floating rate tranches in what follows.[27] I define the yield spread as the spread over the index rate (the 3- (or 1-)month LIBOR for 73% (or 22%) of the tranches). The dependent variable in Table 8 equals the natural log of the yield spread calculated at issuance date. For the pooled sample and the two data splits (AAA and non-AAA tranches), the yield spread on tranches from deals managed by large managers is on average higher than that on tranches from small manager deals. The coefficient from the pooled model suggests that the yield would be between 11-13% higher for a manager with 10% market share relative to a very small manager. Since the average spread is 155 bp, an 11% increase equals about 17 bp. This effect is a bit smaller in magnitude (and only weakly significant) for AAA-rated tranches, but larger (up to an 18% – i.e., around 42 bp – increase) for all non-AAA tranches. In sum, the significant positive sign of *Market share* suggests that the market sees through the manager's incentive to cater the interests of equity sponsors and thus demands a higher yield for tranches from deals with managers that were more successful in boosting AUM.[28]

To further investigate whether investors priced manager quality correctly ex ante, I perform an exercise similar to the one in Faltin-Traeger et al. (2010). In particular, I replaced the manager market share variable with fixed effects for the top 58 managers (those with four or more deals) in the default rate regression from Table 3 (specification II) and in the yield spread regression from Table 8 (specification II for the non-AAA sample). Figure 2a plots the regression coefficients for the top 58 managers from the default rate regression against the same manager's fixed effects in the spread at issuance regression. Because the regressions included all managers, the excluded category includes all managers outside of the top 58. The mean of the default rate fixed effects for the top 58 managers is 5.9% (significantly different from zero

[27] There are just 386 fixed rate tranches in the sample with information on ratings and initial coupon. This number is further reduced due to missing information on control variables. On the contrary, for 2911 floating rate tranches from 547 deals, all required information is available.

[28] I also obtain a number of interesting results on how the market prices certain characteristics of ABS-CDO tranches. As expected, tranches from deals sponsored by the hedge fund Magnetar have higher yield spreads. Moreover, larger tranches (either measured in absolute terms – *Balance* – or as a fraction of the transaction size – *Tranche width*) pay lower spreads, as do more senior tranches with a higher subordination level. The first result could indicate a liquidity premium contained in credit spreads which decreases with tranche size. Since deals with a lower initial collateral quality have to increase the collateral nominal balance to reach the desired ratings for the issued tranches, we should expect a positive coefficient for the initial level of overcollateralization (a form of credit enhancement to compensate for lower average asset quality). This is what I find. In line with the theoretical result that more diversified asset pools benefit senior tranche investors but have no clear impact on mezzanine tranches (e.g., Duffie and Gârleanu, 2001), I find a negative coefficient for *No. assets*, significant, however, only among the AAA-tranches. The number implies that 10 more collateral assets decrease the average AAA spread by 1% (or 0.5 bp). Finally, tranches from deals with more different tranches sold have lower yields. Note that the R^2 of the models is quite high (up to 90% for the pooled sample) and the results are robust to various fixed effects, including underwriter-year fixed effects (153 categories).

with a *p*-value of 0.009), suggesting that deals from this group as a whole performed worse ex post compared to the non-top 58 reference group. In contrast, the mean of the spread fixed effects is negative at -2.8% (corresponds to 7 bp) but not significant (*p*-value: 0.250), indicating that this group as a whole neither received an appreciable discount nor paid a premium relative to the reference group. By looking inside the top 58 group, however, the figure reveals a positive correlation between ex post deal default rates and ex ante commanded tranche spreads. This positive relationship is statistically significantly different from zero with a *p*-value of 0.012 and also economically large; non-AAA tranches from deals run by a manager with a 10% higher ex post collateral default rate have a 4.1% (i.e., 10 bp) higher spread at issuance to compensate investors for this greater risk. This evidence suggests appreciable manager tiering in the CDO market – that is, investors are generally able to correctly separate managers into different quality tiers in which the tranches of high quality manager deals garner lower spreads. Nonetheless, the figure also indicates that investors may have overlooked beneficial information about managers when pricing tranches. Spreads are actually higher for some better-quality managers (e.g., Dynamic Credit Partners or UBS Principal Finance in the upper left corner), and investors provide lower spreads to some poor-quality managers (e.g., Blackrock Financial and Cambridge Place Investment in the lower right corner).

6.2 Structural protections and trading restrictions

CDO managers are not completely free to pursue their own goals but are subject to several constraints of various types.[29] Hence, if investors assume stronger risk shifting incentives on the part of large market share managers, they could impose tighter constraints on these managers at the time of deal structuring. The constraints on overall portfolio risk are likely the most important constraints on managers. Such constraints can be categorized into coverage tests (early amortization triggers) and collateral quality tests. Early amortization triggers are designed to protect the rated notes of CDO structures. They divert cash from lower rated notes and equity to pay down the rated notes when interest coverage or overcollateralization levels fall below certain preset levels. Most CDO structures use two types of triggers: *interest coverage tests* (IC tests) require the transaction to maintain a minimum interest coverage ratio for each rated note class. For notes of class X, this is the ratio of interest income received on the assets between payment dates to interest payments due on the class X notes and all notes senior to X at each payment date. *Principal coverage tests* (also known as par coverage tests or

[29] CDO managers have typically discretionary trading limits of 15% - 25% annually during the reinvestment period. However, there are generally no limits on defaulted, credit-improved or credit-impaired sales and it is the manager who makes this designation. As such, trading limits do not appear to limit trading in practice at all.

overcollateralization tests) require the transaction to maintain a preset minimum overcollateralization ratio for each rated note class. For notes of class X, this is the sum of the principal (par) amount of the performing assets, regardless of their market value plus the expected recovery rate on any defaulted assets divided by the sum of the aggregate outstanding principal amount of the class X notes and all notes senior to class X.

Interest payments on subordinated notes and equity (as well as certain other subordinated payments, including those to the asset manager) cannot be made, nor can principal be reinvested, unless these tests are met at each payment date. Otherwise, principal proceeds must be held in cash (or short-term investments) until the next payment date, when principal and interest proceeds must be applied to repay the rated notes, until all coverage tests are passed. Most CDO transactions require that, in the event of the failure of one or more coverage tests, the senior most outstanding class of the notes be paid down first, i.e., the notes be repaid sequentially. This requirement has two effects on the transaction: Firstly, the pay down results in prepayment risk being borne by the senior-most outstanding class. Secondly, and perhaps more importantly, the repayment of the notes paying the lowest coupon and spread first, increases the proportion of the junior notes (paying higher coupon and spread) to the total assets, reducing the excess spread available to the equity/manager. Hence, deals with tighter (i.e., higher) coverage triggers are costly for equity holders since they do not give too much room for the triggers to be breached as lower amounts of losses would breach the triggers.

Collateral quality tests define global limits on certain risk parameters of the portfolio. Since these tests are used primarily as criteria for purchasing collateral debt securities, each collateral asset must satisfy these criteria at the time of acquisition, thereby limiting the manager's ability to structure the portfolio in an adverse manner. In general, collateral quality tests consist of Moody's asset correlation factor test, Moody's maximum rating distribution test, Moody's minimum weighted average recovery rate test, the weighted average coupon test, the weighted average spread test, and the weighted average life test.[30] If one of the collateral quality tests fails, the CDO manager is restricted to reinvestments in assets that improve the test.

Information on coverage and collateral quality tests is extracted from the initial prospectuses/offering circulars of 396 transactions, as in Section 5.2. Table 9 shows, separately for each test and for *Top10* and *non-Top10* manager deals, the fraction of deals requiring the spe-

[30] The asset correlation factor test, which has replaced Moody's diversity score test during the year 2005, defines a portfolio-level maximum asset correlation, with higher values corresponding to lower diversification levels (see Moody's, 2005, for Moody's approach of inferring structured finance asset correlations). The formerly used diversity score, in contrast, is scaled in reverse order, with higher values indicating better diversified portfolios. The rating distribution test is based on Moody's weighted average rating factor, and each rating factor is equivalent to the 10-year Moody's idealized default probability associated with the rating multiplied by 10,000.

cific test and the average chosen trigger. Panel A reveals significant differences in the prevalence of coverage tests between both deal types: the frequency of *non-Top 10* deals demanding overcollateralization and interest coverage tests is significantly higher (94% vs. 87% and 76% vs. 65%, respectively). Moreover, the average trigger values (in %) for the senior classes are also higher (109.82 vs 107.95 and 114.94 vs. 110.91, respectively, significant at the 5% level in the latter case), signalling tighter coverage requirements for *non-Top 10* manager deals. In sum, this evidence stands in contrast to investors imposing tighter constraints on large market share managers but rather suggests the opposite. The collateral quality tests in Panel B, however, reveal limited evidence consistent with the notion that *Top10* manager deals bear on average more stringent collateral quality restrictions: Moody's maximum weighted average rating factor is significantly lower, and *Top10* manager deals also require more often Moody's minimum recovery rate test, the weighted average coupon and the weighted average life test.[31]

6.3 Tranche ratings

In a last set of tests I focus on the relation between average tranche ratings and manager market share. In particular, I ask whether, in addition to investors, rating agencies also recognize manager incentives to act in the interests of deal equity sponsors in order to boost AUM. Table 10 reports results from tranche rating level regressions, the first three columns for OLS and the last two for ordered probit specifications, taking into account that ratings are not linear but ordinal measures of credit quality. The controls are the same as in the yield spread regressions. The positive coefficients found for *Market share* are consistent with the adverse incentives argument, suggesting that tranches from large manager deals receive on average higher (i.e., closer to default) ratings indicating a lower credit quality. However, the coefficients become insignificant when underwriter*year fixed effects are included and are generally insignificant in the preferred ordered probit specification.[32] In sum, Table 10 provides

[31] Recall that rating factors are increasing with lower (i.e., closer to default) ratings. Consistent with the higher issuer concentration levels found in Table 4 for large manager deals, maximum allowable asset correlation factors are higher (*p*-value 0.12) for *Top10* manager deals from 2005 or later, when Moody's diversity score test is replaced by the asset correlation factor test. It should also be noted that there is a significant deal fraction (around 35% for *non-Top10* and 28% for *Top10* deals, this difference is not significant) that combines correlation and rating quality tests into a "ratings matrix": each row of this matrix specifies a separate correlation trigger for a different maximum rating factor trigger. In such a matrix, tighter correlation triggers are combined with less stringent rating triggers, and vice versa. To condense these matrices into just one correlation and rating factor number each, I use the least restrictive (i.e., maximum allowable) value for the calculation of average triggers in Table 8. Results, however, are unchanged if instead the most restrictive value is employed. Finally, around 85% of the deals that require a weighted average life test do not specify a constant trigger but a dynamic trigger which decreases over time.

[32] The results for the control variables are broadly as expected: larger tranches (measured either by nominal balance or transaction share), with a higher subordination level and longer maturity, from better-diversified

only limited evidence for adverse manager incentives being adequately reflected in tranche ratings.

To test whether tranche ratings reflect a manager quality tiering (i.e., ratings of tranches from low-quality manager deals are closer to default, holding fixed other tranche/deal characteristics), I replicate the analysis from the end of Section 6.1. In particular, Figure 2b plots the regression coefficients for the top 58 managers from the default rate regression against the same manager's fixed effects in the tranche rating regression (last specification from Table 10). There is a positive correlation between ex post default rates and ex ante tranche ratings; however, this relationship is weak and not statistically significantly different from zero (*p*-value 0.560). Also note the large number of observations in the lower right corner, indicating cases in which tranches from low-quality manager deals receive relatively favourable (i.e., closer to AAA) ratings

7. Conclusion

The modern securitization process is subject to a wide variety of informational frictions that if left uncontrolled can lead to incentive problems and conflicts of interests. This paper studies one previously neglected friction: the investor (principal)-CDO manager (agent) problem. In particular, the paper argues that managers wishing to increase their assets under management are inherently inclined to act in the interests of deal/equity sponsors. This implies that large market share managers are more likely to conduct risk shifting when replacing matured or prepaid collateral assets. Using a sample of 565 ABS-CDO deals, issued between 2000 and 2007, the paper provides several pieces of evidence consistent with this prediction. First, large manager deals, while having higher realized collateral default rates ex post, do not carry more default risk ex ante (at origination), as measured by the deal fraction rated AAA or the size of the equity tranche. Second, an analysis of the current (as of June/July 2010) collateral pool composition reveals that these deals have higher percentages of home-equity loans, subprime RMBS and synthetic assets, and larger asset-specific default rates and issuer concentration levels. Third, compared to smaller managers, large market share manager deals pay out higher cash flows to equity tranche investors prior to the start of the subprime crisis (July 2007), but

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deals, not sponsored by Magnetar, and with less initial overcollateralization, receive lower (i.e., closer to AAA) ratings. There is one inconsistency between the OLS and the ordered probit results: the variable Tranche width gets a positive (and significant) coefficient from OLS. However, this effect is likely due to the high correlation between both size measures ($\rho = 0.76$): in OLS regressions without the log of *Balance* variable, *Tranche width* receives a significant negative coefficient, the coefficient of *Market share* turns out to be insignificant, the Magnetar dummy is less significant, and the R^2 is reduced by up to 12% (coefficients of other variables remain largely unchanged). Furthermore, in ordered probit specifications without *Tranche width*, the coefficient of *Market share* increases, becoming significant at the 5% level in some specifications.

significantly lower cash flows afterwards. Finally, investors price non-equity tranches from deals run by large managers at a discount. Hence, while previously rating agencies have received much of the blame and criticism in the aftermath of the financial crisis, this paper points to a second major contributing force to the collapse of the market for securitized assets. Empirical work on the importance of other informational frictions and their role in the crisis appears to be a fruitful area for future research.

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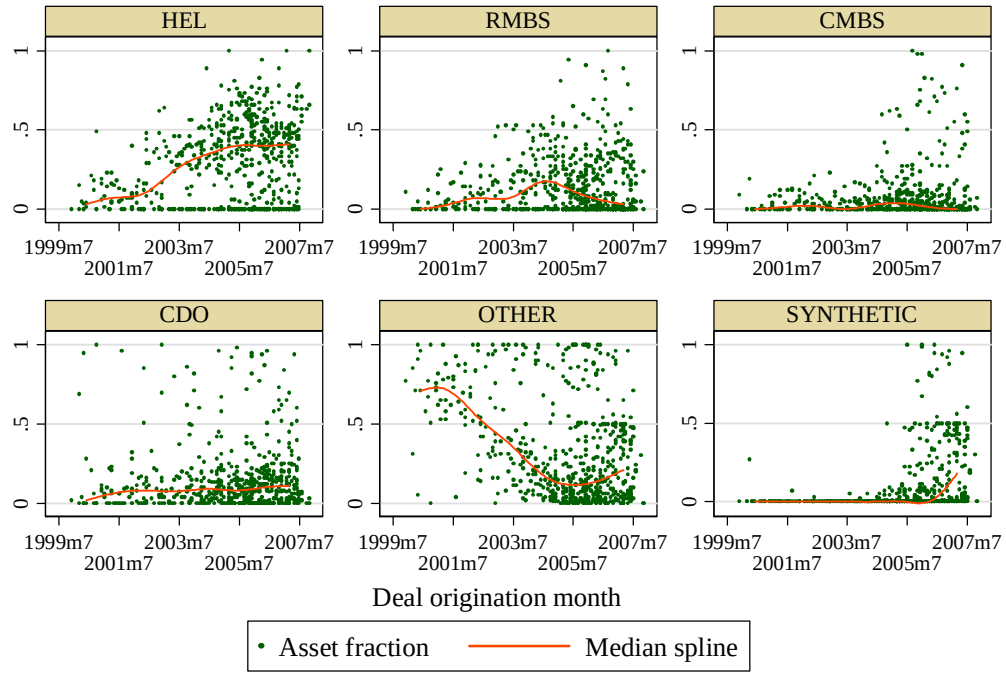

Figure 1a: Scatter plot of asset fraction against deal origination year. Asset fraction is defined as the collateral nominal balance share invested in each asset class, as of June/July 2010. Each marker represents one deal. HEL – home equity loans (includes all RMBS less than prime), RMBS – residential mortgage-backed securities (by prime borrowers), CMBS – commercial mortgage-backed securities, CDO – tranches from other CDOs, OTHER – other asset-backed securities (including auto-loans, credit-cards, etc.).

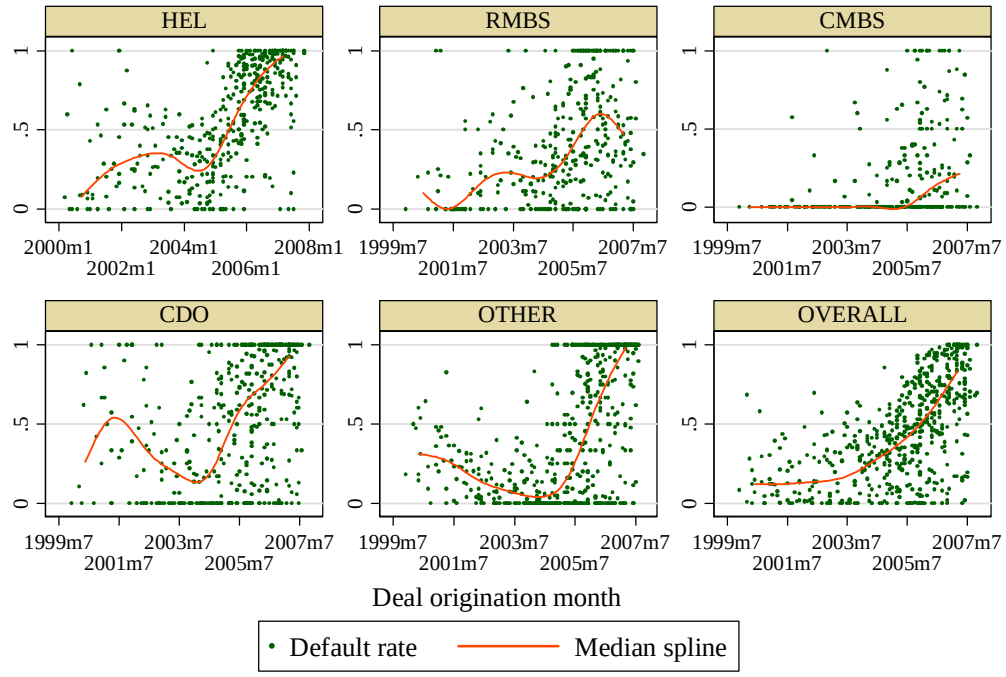

Figure 1b: Scatter plot of asset default rate against deal origination year. Default rate is defined as the asset nominal balance share in default as of June/July 2010. Each marker represents one deal. HEL – home equity loans (includes all RMBS less than prime), RMBS – residential mortgage-backed securities (by prime borrowers), CMBS – commercial mortgage-backed securities, CDO – tranches from other CDOs, OTHER – other asset-backed securities (including auto-loans, credit-cards, etc.).

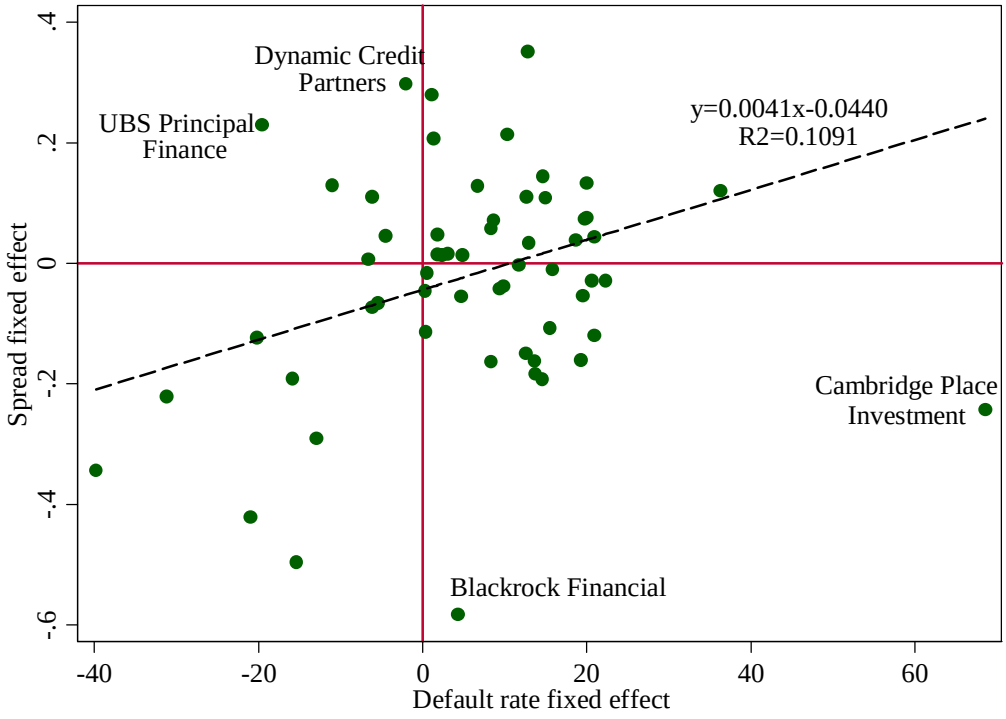

Figure 2a: Scatter plot of default rate fixed effects (specification II from Table 3) against tranche spread fixed effects (specification II for non-AAA tranches from Table 8) for the top 58 managers (those with four or more deals under management).

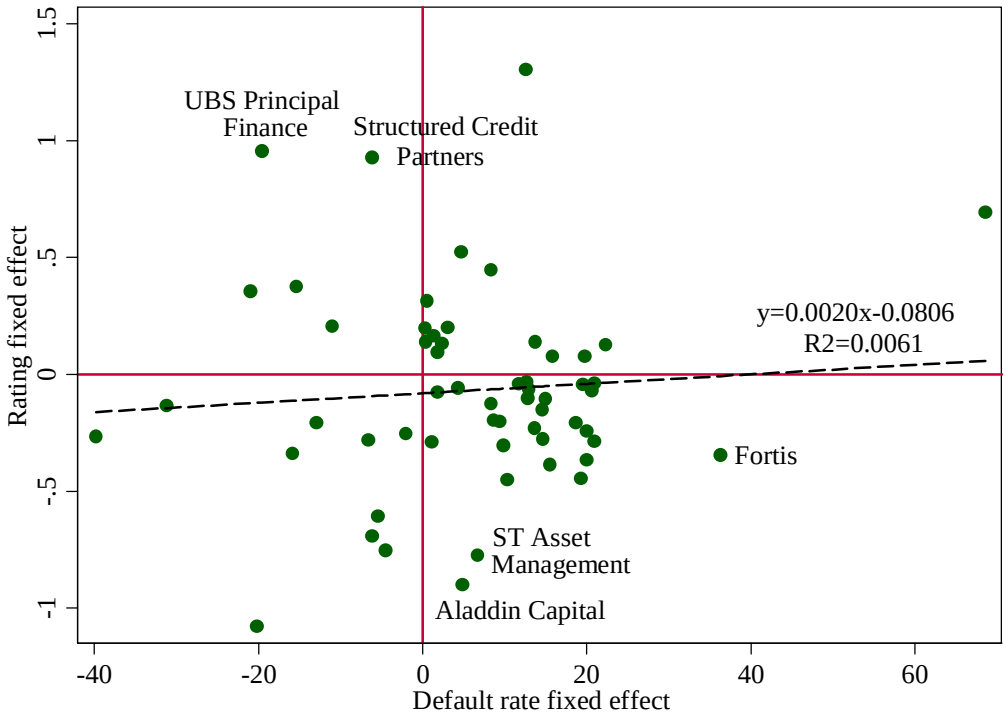

Figure 2b: Scatter plot of default rate fixed effects (specification II from Table 3) against tranche rating fixed effects (last specification from Table 10) for the top 58 managers (those with four or more deals under management).

Manager	Total amount	Total deals	Market share in amount (%)	Market share in deals (%)	Average default rate (%)
TCW Asset Management	31,774.72	30	7.15	5.34	43.85*
Strategos Capital Management	18,425.06	14	4.15	2.41	69.03***
Ellington Management Group	16,341.49	13	3.68	2.24	59.76***
Vanderbilt Capital Advisors	11,574.31	12	2.61	2.41	58.86***
GSC Group	9,969.95	11	2.24	1.90	92.54***
ACA Management	7,829.26	10	1.76	1.72	50.21
C-BASS	7,638.18	16	1.72	2.93	41.23
Deerfield Capital Management	6,833.20	11	1.54	1.90	42.75
Terwin Money Management	6,293.30	10	1.42	1.72	59.81**
Redwood Trust	3,800.00	10	0.86	1.72	61.91***
Small managers (one deal each)	44,214.80	65	10.03	11.50	35.72

Table 1: Summary statistics for Top10 managers.

This table presents summary statistics for the Top10 collateral managers in terms of market share for the 2000–2007 period. The variable total amount is the total deal nominal balance (measured in millions of dollars at origination) managed by the corresponding manager during the sample period. The market share variable is computed by dividing each manager's deal volume (amount or frequency) by the corresponding sample total. The average collateral default rate (measured at the end of July, 2010) is the collateral par amount currently in default across all deals managed by that firm. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively, of a *t*-test comparing the average default rates of Top10 managers with the one (35.72%) for small managers.

	Overall sample (n=565)	Deals managed by small managers (n=65)	Deals managed by Top10 managers (n=141)	*p*-value (*t*-test)
Panel A: Deal characteristics (at origination)				
Deal size ($ million)	780.03	680.23	854.46	0.036
No. collateral assets	111.56	96.00	126.02	0.003
Equity share (%)	4.37	5.52	3.57	0.029
Equity amount ($ million)	24.38	27.89	23.82	0.507
Fraction AAA (%)	71.00	70.73	70.30	0.912
Original deal rating	2.08	2.16	1.99	0.274
Current deal rating	15.01	13.37	15.88	0.007
Panel B: Current (as of June/July 2010) asset fractions and concentration ratios (%)				
HEL	31.14	22.15	39.11	0.000
RMBS	14.98	11.58	25.50	0.000
CMBS	7.01	7.25	6.26	0.681
CDO	14.85	12.38	9.42	0.217
OTHER	32.01	46.75	19.69	0.000
Synthetic	9.87	7.14	11.03	0.134
CR5_issuer	33.11	31.00	38.10	0.008
CR5_servicer	40.98	39.11	47.04	0.014
Panel C: Current (as of June/July 2010) collateral asset default rates (%)				
Overall default rate	45.33	35.72	55.16	0.000
HEL	56.49	56.34	57.09	0.908
RMBS	42.43	43.45	38.67	0.497
CMBS	18.78	16.65	20.25	0.599
CDO	52.74	46.60	64.79	0.015
OTHER	40.93	28.04	48.34	0.001

Table 2: Deal and collateral pool characteristics by manager size.

This table reports means of selected deal and collateral pool characteristics for deals managed by small managers (with only one deal over the period 2000-2007) and large managers (with 10 or more deals). Deal size equals the principal amount of all of a deal's tranches. Equity share denotes the size of the most subordinated tranche as a percent of the transaction. Fraction AAA includes the par balance of the unrated tranches when calculating the % of the deal balance rated AAA. Deal ratings are constructed by weighting the corresponding (average) tranche ratings by their principal amounts. Tranche ratings were converted to a point scale were AAA corresponds to 1 and then each rating notch corresponds to 1 point more (i.e., AA+ is 2, AA is 3 and so on). Hence, higher numbers reflect more default risk. HEL – home equity loans (includes all RMBS less than prime), RMBS – residential mortgage-backed securities (by prime borrowers), CMBS – commercial mortgage-backed securities, CDO – tranches from other CDOs, OTHER – other asset-backed securities (including auto-loans, credit-cards, etc.). CR5_issuer and CR5_servicer denote the concentration ratios for the largest 5 collateral issuers and servicers, respectively, in each pool. Default rates are based on nominal amounts.

Dependent variable	Default fraction		Average collateral rating	
	I	II	I	II
Market share	1.865***	1.525***	0.166**	0.184*
	(0.514)	(0.498)	(0.065)	(0.098)
Syn_indi*Market share		0.493		-0.081
		(0.696)		(0.110)
Syn_indi		11.031***		1.225**
		(3.634)		(0.496)
Magnetar	30.962***	27.127***	3.012***	2.759***
	(7.893)	(7.583)	(0.814)	(0.794)
Equity share	-0.257	-0.078	0.028	0.048
	(0.429)	(0.416)	(0.086)	(0.086)
Original deal rating	-3.167	-3.644*	-0.380	-0.429
	(2.246)	(2.128)	(0.287)	(0.279)
Ln(Deal size)	-6.806**	-6.698**	-0.785*	-0.762*
	(3.021)	(2.815)	(0.424)	(0.415)
No. tranches	-1.683**	-1.613***	-0.118	-0.112
	(0.679)	(0.625)	(0.129)	(0.124)
Trustee FE	Yes	Yes	Yes	Yes
Underwriter*year FE	Yes	Yes	Yes	Yes
R^2	0.536	0.559	0.586	0.595
N	565	565	547	547

Table 3: Deal performance and manager market share.

This table reports coefficients from OLS regressions. The dependent variable in the first two columns is the collateral default rate (by amount), and the weighted average collateral rating, constructed by weighting the average numerical collateral asset ratings by their principal amounts, in the remaining columns. Ratings were converted to a point scale were AAA corresponds to 1 and then each rating notch corresponds to 1 point more (i.e., AA+ is 2, AA is 3 and so on). Hence, higher numbers reflect more default risk. Market share is calculated for each manager as the collateral par amount of deals managed in a given year over the total collateral par amount of all deals originated in that year. This variable is lagged by one year. Syn_indi takes on the value one if the deal's collateral pool includes at least one synthetic (CDS) asset, and zero otherwise. The dummy Magnetar takes on the value 1 for deals sponsored by the hedge fund Magnetar. Clustered standard errors (in parentheses) are robust standard errors adjusted for clustering at the manager-year level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable	Issuer concentration			Servicer concentration		
	% Top 3	% Top 5	% Top 10	% Top 3	% Top 5	% Top 10
Market share	0.487**	0.689***	0.940***	0.379	0.425	0.205
	(0.202)	(0.261)	(0.335)	(0.297)	(0.315)	(0.315)
Magnetar	12.369**	13.878**	13.270**	-7.094	-10.880	-15.927*
	(5.449)	(5.972)	(5.808)	(5.741)	(6.882)	(9.234)
Equity share	-0.022	-0.056	-0.143	-0.303	-0.242	0.139
	(0.224)	(0.303)	(0.414)	(0.447)	(0.487)	(0.472)
Original deal rating	0.928	1.294	1.542	-2.620*	-2.866*	-2.276
	(0.736)	(0.919)	(1.161)	(1.349)	(1.575)	(2.308)
Ln(Deal size)	-3.856***	-5.268***	-6.834***	0.586	0.993	0.842
	(1.197)	(1.513)	(1.888)	(2.240)	(2.540)	(2.494)
No. tranches	0.407	0.414	0.297	-0.703	-0.705	0.141
	(0.277)	(0.365)	(0.517)	(0.510)	(0.613)	(0.567)
Issue year FE	Yes	Yes	Yes	Yes	Yes	Yes
Underwriter FE	Yes	Yes	Yes	Yes	Yes	Yes
Trustee FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.325	0.308	0.281	0.165	0.179	0.225
N	565	565	565	446	430	362

Table 4: Collateral pool concentration ratio analysis.

This table reports coefficients from OLS regressions of issuer and servicer concentration ratios. % Top X denotes the current (as of June/July 2010) collateral balance percentage of the largest X collateral issuers and servicers, respectively. The largest X issuers/servicers are separately determined for each deal. For definitions of the independent variables see Table 3. Clustered standard errors (in parentheses) are robust standard errors adjusted for clustering at the manager-year level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Asset type	HEL	RMBS	CMBS	CDO	OTHER	Synthetic
Panel A: dependent variable – collateral fraction (in %)						
Market share	1.214***	0.310	0.026	-0.757	-0.796*	0.586*
	(0.430)	(0.331)	(0.222)	(0.483)	(0.446)	(0.324)
Magnetar	-0.230	-8.638*	1.133	-6.329	14.113	18.863*
	(7.035)	(4.910)	(5.861)	(7.094)	(10.163)	(10.108)
Equity share	-0.861**	0.007	0.178	0.602*	0.072	-1.029***
	(0.347)	(0.358)	(0.218)	(0.315)	(0.564)	(0.287)
Original deal rating	-0.472	-3.879***	0.284	-2.325	6.381***	7.351***
	(1.418)	(1.301)	(0.681)	(1.435)	(2.448)	(1.920)
Ln(Deal size)	3.508	7.139***	-3.657**	-0.175	-6.847**	-2.663
	(2.506)	(1.957)	(1.579)	(2.547)	(3.071)	(1.997)
No. tranches	-2.178***	-1.354***	1.731***	-0.509	2.326***	0.054
	(0.518)	(0.375)	(0.512)	(0.384)	(0.788)	(0.484)
R^2	0.254	0.237	0.302	0.102	0.333	0.277
N	565	565	565	565	565	565
Panel B: dependent variable – default rate (in %)						
Market share	0.663*	0.299	0.794	2.222**	1.381*	
	(0.379)	(0.644)	(0.768)	(0.919)	(0.778)	
Magnetar	21.964***	32.898***	29.292*	16.460	21.902**	
	(6.082)	(9.921)	(15.472)	(10.964)	(10.295)	
Equity share	-0.460	-0.319	0.387	-1.273**	-0.724*	
	(0.712)	(0.732)	(0.680)	(0.588)	(0.424)	
Original deal rating	-0.245	4.341**	-1.026	-4.253	-0.748	
	(1.949)	(2.070)	(2.227)	(2.815)	(2.063)	
Ln(Deal size)	-6.325**	-14.982***	-19.529***	1.918	4.456	
	(3.218)	(3.975)	(4.293)	(4.123)	(3.682)	
No. tranches	2.623**	1.746	0.558	-2.461**	-1.284	
	(1.260)	(1.193)	(0.958)	(0.978)	(0.901)	
R^2	0.526	0.293	0.124	0.327	0.432	
N	416	357	279	423	495	

Table 5: Collateral pool asset fractions and default rates.

This table reports coefficients from OLS regressions of asset type-specific collateral percentages (Panel A) and default rates (Panel B), both measured as of June/July 2010. For definitions of asset types see Table 2, and Table 3 for definitions of independent variables. In Panel B, asset-specific default rates are only calculated for deals that contain the asset in question as collateral. All regressions include fixed effects for the origination year, the trustee and the underwriter. Clustered standard errors (in parentheses) are robust standard errors adjusted for clustering at the manager-year level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	N	Deals managed by		
		non-Top10 managers	Top10 managers	*p*-value
Panel A: Compensation structure				
Upfront fee – yes?	396	0.158 (298)	0.337 (98)	0.001
Upfront fee – amount (in $ million)	60	1.460 (39)	1.986 (21)	0.333
Subordinated fee – share of par (in %)	300	0.141 (227)	0.154(73)	0.314
Subordinated fee – amount (in $ million)	296	0.724 (225)	0.955 (71)	0.011
Senior fee – share of par (in %)	392	0.135 (297)	0.156 (95)	0.023
Senior fee – amount (in $ million)	388	0.831 (295)	1.169 (93)	0.001
Incentive fee – yes?	396	0.423 (298)	0.408 (98)	0.799
Incentive fee – share of excess (in %)	139	21.403 (103)	22.222 (36)	0.528
Incentive fee – share of par (in %)	28	0.203 (24)	0.065 (4)	0.046
Incentive fee – hurdle rate (in %)	168	13.964 (124)	16.318 (44)	0.122
Panel B: Mandatory equity stake				
Equity stake – yes?	396	0.540 (298)	0.469 (98)	0.226
Equity stake – share (in %)	179	41.247 (143)	61.833 (36)	0.009
Equity stake – amount (in $ million)	179	14.771 (143)	9.804 (36)	0.120

Table 6: Manager compensation and mandatory equity stakes.

Information on manager compensation and mandatory equity stakes is extracted from the prospectuses/offering circulars of 396 deals. Shown are variable averages for non-Top10 and Top10 deals. Share of par denotes the annualized fee as a percentage of collateral par, and share of excess is the incentive fee as a percentage of equity returns above the hurdle rate. The numbers in parentheses are the deal numbers for which the specific information is available. The *p*-value is from a test that the fractions/means are different across both deal types.

	Dependent variable: scaled equity tranche cash flow (in %)					
	monthly			quarterly		
Market share proxy	continuous	Top40	Top10	continuous	Top40	Top10
Market share	0.017	0.128**	0.082	-0.011	0.086	0.255**
	(0.011)	(0.061)	(0.088)	(0.038)	(0.110)	(0.117)
Crisis	-1.100*	-0.789	-1.321*	-2.408	-2.133	-2.599*
	(0.651)	(0.567)	(0.704)	(1.475)	(1.327)	(1.430)
Market share*Crisis	-0.052***	-0.453***	-0.488***	-0.065	-0.501**	-0.994***
	(0.015)	(0.118)	(0.128)	(0.054)	(0.206)	(0.218)
Lagged cash flow	0.115***	0.113***	0.112***	0.224***	0.223***	0.218***
	(0.032)	(0.031)	(0.032)	(0.054)	(0.054)	(0.053)
Deal controls	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
No. cash flows	3032	3032	3032	1568	1568	1568
No. zero cash flows	1911	1911	1911	850	850	850
No. deals	57	57	57	80	80	80
No. Top10 deals	12	12	12	29	29	29
No. Top40 deals	30	30	30	51	51	51
Pseudo R^2	0.265	0.268	0.269	0.244	0.245	0.249

Table 7: Analysis of equity tranche cash flows (scaled by nominal amount) for 137 deals.

This table reports marginal effects from tobit regressions of equity cash flows. For each deal cash flow time series are observed from the first payment date until December 2010. Deals are from the 2003-2007 year period. There are 57 deals with monthly and 80 deals with a quarterly payment frequency. Separately for both series, the cash flow distribution is truncated at the 99% level. Manager market share is proxied for by three variables: a continuous measure (i.e., the collateral par amount of deals managed in a given year over the total collateral par amount of all deals originated in that year) and two dummy variables: Top10 is a dummy taking on the value 1 if the deal is managed by one of the 10 largest managers (i.e., the managers from Table 2 with 10 or more deals over the sample period), and 0 otherwise. Similarly, Top40 denotes deals from the 40 largest managers with 5 or more deals over the sample period. Crisis is a dummy variable taking on the value 1 for returns from July/the 3rd quarter of 2007 (the beginning of the subprime crisis) or later, and 0 for the pre-crisis period. Deal controls are: log of deal size (in $ Mio.), transaction share of the equity tranche, original deal rating, number of tranches, number of collateral assets, the initial level of overcollateralization, and vintage year dummies. Time fixed effects are on a monthly (first three columns) or quarterly basis (last three columns). Standard errors (in parentheses) are heteroskedasticity robust and clustered at the tranche-year level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Dependent variable: ln(Spread)					
	Pooled		AAA		Non-AAA	
	I	II	I	II	I	II
Market share	0.011**	0.013***	0.007	0.008*	0.014***	0.018***
	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)
Magnetar	0.247***	0.215**	0.177**	0.136	0.225***	0.218**
	(0.062)	(0.086)	(0.086)	(0.123)	(0.066)	(0.087)
Ln(Balance)	-0.042***	-0.055***	-0.035*	-0.028	-0.029	-0.067***
	(0.014)	(0.015)	(0.019)	(0.021)	(0.021)	(0.021)
% Subordination	-0.005***	-0.006***	-0.005***	-0.006***	-0.005***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ln(Maturity)	0.024	0.065	0.120	0.157	-0.067	-0.035
	(0.092)	(0.106)	(0.117)	(0.132)	(0.066)	(0.077)
Tranche width	-0.005***	-0.004***	-0.006***	-0.006***	0.003	0.006
	(0.001)	(0.001)	(0.001)	(0.001)	(0.005)	(0.005)
% Overcoll.	0.003***	0.003***	0.003***	0.002**	0.002**	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
No. assets	>-0.001**	-0.001***	-0.001***	-0.001***	>-0.001	>-0.001
	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)	(<0.001)
No. tranches	-0.024***	-0.022***	-0.017**	-0.013*	-0.030***	-0.031***
	(0.007)	(0.007)	(0.007)	(0.008)	(0.009)	(0.009)
Issue year FE	Yes		Yes		Yes	
Rating FE	Yes	Yes			Yes	Yes
Trustee FE	Yes	Yes	Yes	Yes	Yes	Yes
Underwriter FE	Yes		Yes		Yes	
Underwriter*year FE		Yes		Yes		Yes
R^2	0.885	0.895	0.510	0.559	0.854	0.869
N	2913	2911	1189	1188	1724	1723

Table 8: Tranche spread at issuance and manager market share.

This table reports coefficients from OLS regressions of tranche yield spreads, i.e. the spread over the index rate (the 3- (or 1-)month LIBOR for 73% (or 22%) of the tranches). For definitions of Market share and Magnetar see Table 3. The effective subordination percentage of a security is the percentage of the total collateral principal which is subordinate to the security in question. Tranche width denotes the tranche balance as a percent of all outstanding deal liabilities. Three deal level variables are included: %Overcoll. denotes the difference between the collateral pool principal and the deal principal as a fraction of the pool par value at origination, and No. assets/tranches gives the number of collateral assets and tranches issued, respectively. Clustered standard errors (in parentheses) are robust standard errors adjusted for clustering at the deal level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	N	Deals managed by		*p*-value
		non-Top10 managers	Top10 managers	
Panel A: Coverage tests				
Overcollateralization test (O/C tests)				
Required?	396	0.940 (298)	0.867 (98)	0.021
Senior notes – trigger (in %)	360	109.820 (275)	107.952 (85)	0.162
Most subordinated notes – trigger (in %)	360	102.738 (275)	103.315 (85)	0.395
Interest coverage test (I/C tests)				
Required?	396	0.762 (298)	0.653 (98)	0.035
Senior notes – trigger (in %)	282	114.941 (219)	110.907 (63)	0.023
Most subordinated notes – trigger (in %)	282	105.936 (219)	105.100 (63)	0.368
Panel B: Collateral quality tests				
Correlation test				
Required?	396	0.866 (298)	0.827 (98)	0.337
Moody's minimum diversity score test (until 2004) – trigger	126	17.808 (98)	18.143 (28)	0.800
Moody's maximum asset correlation test (since 2005) – trigger	197	0.218 (145)	0.232 (52)	0.116
Rating test				
Required?	396	0.899 (298)	0.908 (98)	0.796
Moody's maximum rating distribution test – trigger	330	503.477 (249)	364.049 (81)	0.035
Fitch's maximum weighted average rating test – trigger	105	9.853 (71)	8.729 (34)	0.412
Moody's minimum weighted average recovery rate (as a fraction of par) test				
Required?	396	0.906 (298)	0.990 (98)	0.006
Trigger	331	0.342 (250)	0.332 (81)	0.396
Minimum weighted average spread test				
Required?	396	0.876 (298)	0.908 (98)	0.386
Trigger (in basis points)	342	158.000 (255)	151.000 (87)	0.512
Minimum weighted average coupon test				
Required?	396	0.735 (298)	0.867 (98)	0.007
Trigger (in %)	294	6.064 (211)	5.663 (83)	0.000
Maximum weighted average life test				
Required?	396	0.872 (298)	1.000 (98)	0.000
Trigger (in years)	53	6.780 (34)	6.098 (19)	0.090

Table 9: Coverage and collateral quality tests.

Information on test characteristics is extracted from the prospectuses/offering circulars of 396 deals. For each test, the fraction of deals requiring the specific test ("Required?") and the average trigger values are reported. The numbers in parentheses are the deal numbers for which the specific information is available. The *p*-value is from a test that the fractions/means are different across both deal types. Moody's (and Fitch's) rating test uses a non-linear transformation of ratings into rating factors (a closer to default rating corresponds to a higher rating factor); and a higher diversity score reflects a more diverse portfolio in terms of issuer and industry concentration.

Specification	Dependent variable: Tranche rating				
	OLS	OLS	OLS	Ordered Probit	Ordered Probit
Market share	0.058**	0.057**	0.039	0.016	0.020
	(0.023)	(0.025)	(0.025)	(0.013)	(0.015)
Magnetar	1.265***	1.608***	1.778***	0.517***	0.737***
	(0.340)	(0.367)	(0.334)	(0.150)	(0.182)
Ln(Balance)	-1.498***	-1.518***	-1.561***	-0.482***	-0.533***
	(0.095)	(0.099)	(0.104)	(0.061)	(0.069)
% Subordination	-0.066***	-0.072***	-0.076***	-0.034***	-0.043***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Ln(Maturity)	-1.145***	-0.816***	-0.625***	-0.607***	-0.510***
	(0.230)	(0.207)	(0.212)	(0.121)	(0.131)
Tranche width	0.012***	0.017***	0.020***	-0.058***	-0.057***
	(0.005)	(0.005)	(0.005)	(0.013)	(0.016)
% Overcoll.	0.032***	0.031***	0.033***	0.022***	0.025***
	(0.007)	(0.007)	(0.007)	(0.005)	(0.006)
No. assets	-0.003***	-0.002*	-0.002**	-0.003***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
No. tranches	0.106***	0.091***	0.117***	0.022	0.013
	(0.033)	(0.032)	(0.033)	(0.017)	(0.017)
Issue year FE	Yes	Yes		Yes	Yes
Trustee FE		Yes	Yes		Yes
Underwriter FE		Yes			Yes
Underwriter*year FE			Yes		
R^2/Pseudo R^2	0.491	0.508	0.515	0.211	0.233
N	3276	3240	3240	3276	3240

Table 10: Initial tranche ratings and manager market share.

This table reports coefficients from OLS and ordered probit regressions of tranche ratings. Average tranche ratings are coded on a point scale with higher numbers denoting greater default risk. For definitions of independent variables see Table 8. Clustered standard errors (in parentheses) are robust standard errors adjusted for clustering at the deal level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.