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"Bid-Ask Spreads and the Pricing of Securitizations: 144a vs. Registered Securitizations"

by

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“Bid-Ask Spreads and the Pricing of Securitizations: 144a vs. Registered Securitizations”

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<u>Abstract</u>

Traditionally, various types of securitizations have traded in opaque markets. During May 2011 the Financial Industry Regulatory Authority (FINRA) began to *collect* transaction data from broker-dealers (without any public dissemination) as an initial step towards increasing transparency and enhancing its understanding of these markets. Securitization markets are highly fragmented and require transaction matching methods to construct bid-ask spreads. We study the relationship between bid-ask spreads and transaction characteristics, such as the size of the underlying trade and the path by which trade execution and intermediation occurs. Retail-sized transactions lead to relatively wide spreads because of the absence of competition, while institutionally-sized transactions often result in much tighter spreads. We study the contrast between Registered instruments that are freely tradable and Rule 144a instruments with much more limited disclosures that can only be purchased by sophisticated investors.

We study the structure of the dealer network and how that influences the nature of bid-ask spreads. Some dealers are relatively central in the network and trade with many other dealers, while many others are more peripheral. Central dealers receive relatively lower spreads than peripheral dealers. This could reflect greater competition and reduced bargaining power of central dealers or lower costs for the transactions which they intermediate. The order flow is more evenly divided among dealers and the customer spreads are relatively smaller for central dealers in Rule 144a than in Registered instruments.

Keywords: Securitization; transparency; sophisticated investors; Rule 144a; network analysis

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1. Introduction

Relatively little is known about the pricing of securitizations, because these have traded traditionally in opaque markets. The importance of the shadow banking system, in general, and securitization, in particular, has been recognized strongly in the aftermath of the financial crisis. In May 2011 the Financial Industry Regulatory Authority (FINRA) used its regulatory authority to begin to *collect* transaction data on securitizations from broker-dealers, which it regulates.[1] This was an initial step by FINRA to increase potentially the transparency of these markets, a measure also intended to enhance understanding of the markets.

A second step by FINRA occurred five months later when it began to *disseminate*, in conjunction with IDC, daily price index data by collateral type. These informational releases potentially offered market participants more detailed information and transparency about valuations for various collateral types and indirectly, greater transparency about spreads and trading costs. Of course, this represents only a limited step towards full-blown transparency because it entails considerable aggregation across individual instruments in a category and involves daily rather than transaction level disclosure.[2] These steps follow FINRA's efforts to increase the transparency of the corporate bond markets a decade ago, and parallel efforts by the Municipal Securities Rule-making Board (MSRB) to increase transparency in the municipal bond markets, for which it is the Self-Regulatory Organization (SRO).

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[1]FINRA's jurisdiction applies to broker-dealers, so under current FINRA rules all broker-dealers have been required to report trades undertaken by them, starting May 16, 2011. Our analysis is based upon these data (adjusting out identical interdealer trades between a pair of broker-dealers that are reported twice). The market design changed on October 18, 2011 with the public release of price index data by FINRA and IDC. The release of daily index valuation data represented a change in market structure and potentially increased the transparency of both valuations and spreads. We have transaction data through the end of February 2012, so our sample is of roughly comparable length between the pre-release interval (five months) and post-release interval (4.5 months). We examine how spreads changed with the dissemination of the public index data. Our full dataset has been provided to us on a confidential basis to facilitate analysis of securitization markets under opacity by FINRA. We also use the interdealer transactions data to study the structure of the trading network among dealers and the impact of the network structure on spreads.

[2]The interaction between the aggregation across instruments and the temporal aggregation further weakens the extent of transparency introduced.

In studying securitizations we focus upon the contrast between Registered instruments, which require detailed disclosures in the issuance process, and Rule 144a instruments, which exempt private resale of restricted instruments to QIBs (Qualified Institutional Buyers) from these disclosure requirements. We focus our analysis upon ABS ("Asset-Backed Securities"), CDOs ("Collateralized Debt (Bond/Loan) Obligations"), CMBS ("Commercial-Mortgage-Backed Securities") and CMO ("Collateralized Mortgage Obligations") instruments due to the mix of trading of Rule 144a instruments and benchmark these against corresponding public (Registered) instruments in the ABS, CMBS and CMO cases.[3]

Preliminary to our statistical analysis we discuss the economics of Rule 144a. First, we emphasize that the use of Rule 144a is a choice by the issuer and that the nature of the choice is one in which the required disclosures are more limited than for Registered securitizations. The Rule 144a instruments experience a corresponding potential reduction in issuance cost and exemption from liability. These Rule 144a instruments are designed for sophisticated (i.e., relatively informed) investors and the purchase of Rule 144a instruments would reflect self-selection on the part of the buyers, including recognition of the restrictions on re-trading for the Rule 144a instruments. This suggests relatively less interest ex post in trading the Rule 144a instruments since these are oriented to buy-and-hold investors, which can further heighten the spread from a liquidity perspective. Without Registration, the Rule 144a instruments can only be resold to QIBs. Potentially, the Rule 144a instruments are of higher quality as the issuer can sell to QIBs (without accessing the full potential market) those that it desires to sell without incurring the costs of Registration, including potential liability. On the other hand, issuers of low quality instruments could find it more

[3]Since there are not 144a instruments in the TBA and MBS categories, we have not used these in our benchmark analysis. Similarly, we also have excluded agency CMOs from our analysis, as these do not arise for 144a instruments. We also have limited our treatment of CDOs ("Collateralized Debt Obligations") as these are largely 144a instruments.

appealing to issue Rule 144a instruments due to the limited required disclosure (as in models of signaling).

One focus of our empirical analysis is on descriptive comparison in trading and spreads between the Rule 144a and Registered instruments. This does not reflect analysis of the endogenous choice of Rule 144a or Registration. In particular, we note that the effect of adverse selection (information asymmetry) is ambiguous. Rule 144a instruments can have larger spreads than Registered offerings due to the more limited initial publicly available information or can have smaller spreads, if either these instruments are of higher quality or if the Rule 144a buyers have greater informational sophistication. Indeed, empirically within some asset classes Rule 144a securitizations have higher spreads than Registered securitizations, and within other asset classes Rule 144a securitizations have lower spreads than Registered securitizations. These may reflect in part substantial differences in the composition of Registered and Rule 144a markets. To limit these distortions and composition effects, we examine only *non-agency* CMO trading (see footnote 3), the impact of the size of transactions (there are very few retailed-sized transactions in the Rule 144a context) upon spreads (small transactions have especially large spreads) and then we exclude retail-sized transactions from our regression analyses.

Our findings suggest a number of interesting results about the nature of trading in securitization markets. Most fundamentally, trading is very fragmented and there is relatively little trading in most individual instruments, especially (but not only) for Rule 144a instruments. In fact, there are a large number of securitization issues, but many of these do not trade at all in our sample. Consequently, we do not use traditional time series techniques for estimating spreads, but instead use matching techniques to locate chains of transactions involving a buy from a customer and sell to a customer. We note that some of the absolute spreads in the ABS, CDOs, CMBS and non-agency

CMO markets are surprisingly large, especially for CMOs and retail-sized matches in all other instruments. The average spread for non-agency CMO instruments is 3.46% of the mid-quote for high-yield and 2.87% for investment grade instruments. The average spread for retail-size matches in ABS instruments is 2.07% of the mid-quote for high-yield and 1.40% for investment grade instruments.

For all instruments except high-yield CMBS the Rule 144a spreads are smaller than the spreads for Registered instruments (both for retail-size and non-retail matches). The overall comparison in the spreads between Rule 144a and Registered instruments reflects the underlying composition of securitization instruments among subgroups. In interpreting the result it is important to recognize that there is considerable selection as to the use of Rule 144a versus Registered status.

For ABS, CMBS and non-agency CMO instruments there is a volume discount with respect to the spread—larger volume matches lead to lower spreads than for retail matches, and the difference is statistically significant. This finding is consistent with greater competition or ability by sophisticated investors to negotiate terms of trade with more potential counterparties. The fact that larger investors obtain better prices is reminiscent of one of the insights from the pricing of municipal bonds (Green, Hollifield, and Schürhoff (2007), and Harris and Piwowar (2006)) and corporate bonds (Bessembinder, Maxwell, and Venkataraman (2006), Edwards, Harris, and Piwowar (2007), and Goldstein, Hotchkiss, and Sirri (2007)).

We study the relationship between bid-ask spreads and dealer's ability to access and participate in the interdealer market. We use network analysis to measure dealers' participation and their relative importance on interdealer markets following two alternative methodologies. Under both methodologies we obtain evidence of a negative relationship between dealers' importance and spreads in general for most types of securitizations.

The results concerning the connection between the structure of the intermediary network and how it influences the nature of bid-ask spreads are especially informative. Of course, there are some intermediaries who are relatively central in the network and trade with many other dealers, while there are many others who are more tangential. More important dealers as measured by their centrality receive relatively lower spreads. The finding is consistent with the equilibrium in a search-and-bargaining model of a decentralized interdealer market in which dealers differ in their trade execution efficiency to proxy for dealer centrality in Neklyudov (2012). Here, the more connected dealers charge lower spreads because their endogenous reservation values reflect their search efficiency and they intermediate trade flows among the less efficient dealers.

2. The Market for Registered and Rule 144a Securitizations

Our sample contains all trading activity between May 16, 2011 and February 29, 2012 in ABS, CDOs, CMBS and non-agency CMO instruments. These data are a sequence of trade reports, providing the trade identifier, the execution timestamp and settlement date, the side of the reporting party—either the buy side or sell side, the entered volume of the trade measured in dollars of original par balance, and the entered price measured in dollars per $100 par. The trade report allows us to determine if the trade is between a dealer and an outside customer, or between two dealers. The Appendix provides additional details on the dataset and our data-cleaning procedures.

Table 1 reports the total number of instruments in the population and the number of instruments traded with customers in the overall, pre-release, and post-release samples (these instruments had at least a buy from a customer and a sell to a customer at most 2 weeks apart). In the population there are more Rule 144a than Registered ABS and CMBS instruments, and there are more Registered than Rule 144a CDOs and non-agency CMO instruments. One interpretation is that the selection effects for CDOs and non-agency CMO instruments are different compared to ABS and CMBS instruments. Approximately the same number of instruments traded with customers at least once in the pre-release and post-release period, and many instruments traded only in one of the two sample periods.

Across all categories Registered instruments are more likely to have a buy from a customer and a sell to a customer at most two weeks apart compared to Rule 144a instruments. Perhaps the higher frequency of trading in Registered instruments reflects that a larger number of traders can hold and trade Registered instruments than can hold and trade Rule 144a instruments, as well as ex ante selection associated with the difficulty of trading the Rule 144a instruments. It also may reflect that there are fewer disclosure requirements for Rule 144a instruments, so that potential investors have less public information about them and therefore, are reluctant to trade them due to adverse selection risk.

We observe similar results within various categories of instruments. We use the collateral type to categorize ABS instruments. We split the CDOs into CDO instruments, CLO instruments and CBO instruments. We use the tranche type to categorize CMBS and CMO instruments.

Tables 2a through 3b report additional summary statistics for all types of ABS, CDOs, CMBS, and non-agency CMO instruments. In Tables 2a and 3a, we report how many instruments are investment grade or high yield,[4] how many instruments have fixed- or floating-rate coupons; indicator variables for the instruments' vintage—with vintage defined as the number of years

[4] We classified unrated instruments as high yield rather than investment grade throughout the paper.

between the trade execution date and the instrument's issue date; the instruments' average coupon rates, and the instruments' average factors. For many instruments, the principal balance can be reduced through amortization or prepayment; the factor represents the fraction of the original principal outstanding. Tables 2b and Table 3b report the average number of trades per day, the average number of dealers active in each instrument, the average number of interdealer trades, and the distribution of trade sizes. We categorize trade sizes into three groups: Retail-size being trades with original par value less than $100,000, Medium-size trades being trades with original par value between $100,000 and $1,000,000, and Institutional-size trades being trades with original par value greater than $1,000,000. Registered instruments and Rule 144a instruments tend to have similar bond characteristics for all the various categories.

It is apparent from the trading frequencies reported in Table 2b and Table 3b that securitized products do not trade very frequently: For example, on average ABS instruments have 0.097 trades per day and CDOs have 0.026 trades per day. Registered instruments tend to have more trades on average than Rule 144a instruments: For example, registered ABS instruments have 0.108 trades per day, and Rule 144a ABS instruments have 0.074 trades per day. The distribution of trades across instruments is quite skewed: There are a few instruments with many trades per day, but most of the instruments in our sample do not trade very often. The trading frequency for CMBS instruments is similar to ABS and slightly larger than the frequency for non-agency CMO instruments.

For the ABS and CDOs instruments, retail-sized trades constitute the smallest fraction of total trades. There are more retail-sized trades in the Registered instruments than in the Rule 144a instruments.[5] Retail-sized trades constitute a much larger fraction of the trades in non-agency CMO instruments than in ABS instruments.

On average, there are 6.03 dealers who traded in an average ABS security, with even fewer dealers in other types of instruments. Typically there are more active dealers trading Registered instruments than trading Rule 144a instruments.

Figure 1 depicts the kernel density function of the number of distinct customer-dealer and interdealer transactions (conditional on that number being positive) in the entire sample, truncating the plot at the 95th percentile of the distribution. In the top left panel we show ABS instruments (separate graphs for Registered and Rule 144a instruments), in the bottom left panel we plot CMBS instruments, in the top right panel we plot CDOs, and in the bottom right panel we plot non-agency CMO instruments. These plots and the 95th percentiles illustrate that there are not many trades in individual instruments, with especially limited trading in the Rule l44a instruments. Though we truncate from these plots those instruments with the largest number of trading records to improve the display of this density, we note that these truncated observations are potentially the most important because they correspond to the largest number of trading records and provide the most information for estimating spreads. At the same time, given the dispersed nature of the overall trading and the relatively small number of trades in individual instruments (including interdealer trades), for the most part we are unable to use structured time series methods to estimate spreads (except potentially for the most active instruments or indices). Consequently, we use a matching method to identify chains of related transactions and estimate spreads.

[5]Only a tiny fraction of the trade in Rule 144a instruments is retail sized (less than $100,000 of original par volume). We would not expect substantial retail activity in these instruments, so the small matches may reflect in part order splitting by larger investors.

We include Figures 2a through 2d to illustrate the nature of trading activity in our sample. In the figures, we provide several examples of Registered and Rule 144a instruments that are highly traded in our sample. Each panel (two panels per page) depicts trading in a security. There are three subpanels within each panel—the upper subpanel shows buy and sell transactions by volumes during our sample period, the middle subpanel shows the corresponding interdealer trades by volumes and the bottom subpanel shows the corresponding transaction prices (ask, bid and interdealer) during our sample period.

The limited extent of trading highlighted by the figures illustrates some of the conceptual difficulty in estimating spreads and the importance of using matching methods, especially for less actively traded instruments. The figures illustrate the potential importance of interdealer transactions in reallocating inventory and exposures and matching buy and sell transactions at the aggregate or market level. For our formal analysis we use matching techniques to identify chains of related transactions. In some cases we may be able to match activity at a daily level (see right panel of Figure 2b, where the matching is especially striking in terms of volumes), but in other situations there will be insufficient matches at that level (and to utilize the data effectively and not excessively bias our results we need to formulate matches more broadly).[6] The bottom subpanels of the plots illustrate the positive nature of the bid-ask spread and that in some situations with relatively active instruments that the bid-ask spreads can nevertheless be quite substantial. We also note that the interdealer trades do not always lie between the customer buy and sell trades.

In many situations dealers are potentially buying or selling from existing inventory, but the nature of our data does not provide direct information identifying the initial inventory. Of course, in some cases the matching may be relatively apparent—but in most situations we only have a limited set of

[6] We discuss in detail the matching method we use in the Appendix called "Data Cleaning."

matches at a daily level and therefore, we consider broader matching criteria. Indeed, in at least some situations (e.g., see Figure 2b, right panel) there are considerable imbalances in trading with customers (as reflected in the figure we see indications of clustered selling) and dealer reliance on trading from pre-existing inventory.

We obtain data on Moody's ratings for all instruments that have at least a buy from a customer and a sell to a customer at most 2 weeks apart in our sample period from May 16, 2011 to February 29, 2012. Among ABS, CMBS, Rule 144a CDOs and non-agency CMOs there were 20,392 such instruments. 15,216 of these instruments have been rated by Moody's, for other instruments the Moody's ratings were not available (539 instruments were rated "NR", others had missing Moody's rating). When the Moody's rating is missing, we use the information on whether the instrument is high yield or investment grade provided by FINRA. We use the proprietary list of CUSIPs provided by FINRA to locate Moody's ratings for these instruments.

Figure 3 summarizes the distribution of the first rating observed within our sample period per security. We observe differences in rating levels for instruments traded in our sample, with relatively frequent high-grade ratings in ABS and CMBS instruments.

There were 3 Registered ABS instruments that were upgraded from high yield to investment grade during our sample period and 1 Registered ABS security that was downgraded. Similar numbers for other instrument types are: 11 and 3 for Rule 144a ABS, 105 and 2 for Rule 144a CDOs, 1 and 46 for Registered CMBS, 6 and 94 for Rule 144a CMBS, 16 and 102 for Registered non-agency CMO, 7 and 24 for Rule 144a non-agency CMOs. These facts highlight that rating upgrades and downgrades crossing the investment grade boundary are relatively infrequent in our sample period.

Overall there were more downgrades than upgrades (149 upgrades and 272 downgrades crossing the investment grade boundary); interestingly, CDOs were mostly upgraded in our sample.

Figure 4 demonstrates the trading activity around the security upgrade or downgrade dates. In this figure we consider all rating changes that do not necessarily cross the investment grade boundary, such as from A3 to A1 or from Ba1 to B3. For each such security we only consider transactions that were executed 45 days before a rating change or 31 days after. We observe 407 upgraded instruments that have at least one trade within that period and 562 downgraded instruments. Our main observation is that rating downgrades are associated with increased trading activity with customers within 10 days after the rating change, however subsequently trading volumes tend to drop (right panel of Figure 4). We do not observe such effects for instruments around the rating upgrade dates (left panel of Figure 4).

We use a multi-stage matching technique to disentangle trading activity in each instrument and organize related trades into chains of transactions. Each chain captures the movement of a particular block of volume from a customer to the interdealer network, within the interdealer network, and from the dealer network back to the customer sector. To perform sorting of this nature, we first match related interdealer and customer transactions that have the same volume moving from one party to another in a particular instrument. Second, we look for chains of transactions that may have different volume traded and thus involve volume splits as the security moves from one party to another.[7] Each chain has one buy from customer and one sell to customer, as well as several rounds of intermediation between dealers (however, a large part of the resulting sample has just one round of dealer intermediation). We are able to disentangle 75% of the total absolute turnover in ABS market, 86% in the CDOs market, 74% in CMBS market, and 80% in

[7] We provide additional details on the matching algorithm we use in the Data Cleaning Appendix.

non-agency CMO market into complete chains that we use to compute total customer bid-ask spreads.[8] The rest of the turnover in these markets corresponds to: 1) imbalanced trades with no pair of opposite trades with customers: a buy from customer and a sell to customer within a two-week horizon; 2) broken chains that do not link buy from a customer with a sell to customer based on the dealer mask (masks do not match).

3. Bid-Ask Spreads

For each chain of transactions we compute the total client bid-ask spread by using a buy price from a customer and a sell price to a customer, ignoring dealer-to-dealer intermediation rounds in between. At the same time for each link in a chain we compute a dealer-specific spread. The total client bid-ask spread for a chain is a weighted sum of dealer-specific spreads corresponding to that chain. Since the quotes observed in our dataset are clean prices per unit of current balance, we adjust the resulting spreads for accrued interest and factor prepayments. We present detailed discussion of these adjustments in the Appendix.

For each resulting spread observation we have information on how many rounds of intermediation occurred between the two customer transactions; the average dealers' participation on the interdealer market throughout the sample; the time gap between a buy from a customer and a sell to a customer or vice versa; trade volumes; and whether any volume splitting occurred. Few of the resulting spread observations are extreme due to price data entry errors. We remove such observations from the final sample by winsorizing the upper and lower tails of spread distributions within each of the four types of instruments (ABS, CDO, CMBS, and non-agency CMO), two placement types (Registered and Rule 144a, except for CDOs category) and credit quality

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[8] We use information on dealer masks to relate different trade reports with each other and construct chains of transactions.

(investment grade and high yield). In total we modify 2% of extreme observations, controlling for major categories and subtypes.

Table 4 reports mean client bid-ask spreads computed as a percentage of the average bid and ask prices for the ABS, CDO, CMBS and non-agency CMO categories, for Registered and Rule 144a instruments. Dealers may possess potential bargaining advantages with respect to retail-sized trading, thus retail-sized trades may face especially large spreads. For this reason we distinguish spreads among trades of different sizes and adjust for differences in the trade-size composition within different types of instruments. Trades with less than $100,000 of original par generally come from retail traders, so we define a retail-size spread to be the bid-ask spread resulting from two opposite trades both having volume less than $100,000. We refer to all other spread observations as non-retail since they result from paired trades of larger volumes.

Each column of the table reports statistics on the spreads for the four different types of instruments: ABS, CDO, CMBS, and non-agency CMO in the investment grade and high yield categories. The table reports the differences in the average spreads for retail-sized and non-retail-sized trades for the different categories, along with standard errors and the F-test for equality of the average spreads between retail and non-retail sized trades. The top panel of the table reports overall spreads across categories; the second panel reports the spreads for Registered instruments; the third panel reports the spreads for the Rule 144a instruments; and the final panel reports F-tests for differences in spreads between Registered and Rule 144a instruments.

Perhaps the most striking result reported in Table 4 is the difference in spreads between retail-size and other-size trades. For all categories, retail-size spreads are significantly larger than other-size transactions. In general we confirm the finding from other fixed-income markets that retail-size trades tend to have significantly higher spreads than institutional-size transactions.

We also compare spreads across instrument types. Overall spreads are the largest for non-agency CMO instruments and overall spreads are the smallest for CMBS instruments. Average spreads are higher for Registered instruments than for Rule 144a instruments, with an exception of high-yield CMBS instruments—average spreads are lower for Registered CMBS instruments than for Rule 144a CMBS instruments. Perhaps the differences between the relative spreads for Registered and Rule 144a instruments across instrument types reflect selection effects, or that the customers in Rule 144a instruments are more sophisticated than the customers in Registered instruments.

Table 5a reports the average bid-ask spread sorted by the size of the dealers' buys from customers and sells to customers for Registered and Rule 144a ABS and CDOs instruments, sorted by the credit rating of the underlying instruments. Table 5b reports similar analysis of Registered and Rule 144a CMBS and non-agency CMO instruments.

Each cell of the table reports the average spread, the standard error of that estimate, and the number of spread observations computed for different transactions sizes, with each panel corresponding to a different instrument type: ABS or CMO instruments, Registered or Rule 144a instruments, and investment grade or high yield instruments. Each row of Tables 5a and 5b reports the average spread for all pairs of transactions with dealers' buy from customer having different sizes: Retail—less than \$100,000 in par value, Medium—between \$100,000 and \$1,000,000 in par value, and Large—greater than \$1,000,000 in par value. Each column reports the average spread for all pairs of transactions with different sizes of dealers' sales to customers. For example, the top left cell in each panel reports the average spread computed for a retail-sized dealer buy from a customer matched to a retail-sized dealer sell to a customer.

The number of observations of Retail Buys and Retail Sells shows that most of the trade in Rule 144a instruments is Large Buys and Large Sells. There are not many retail trades in Rule 144a instruments relative to the amount of retail trades in Registered instruments. Comparing the average spreads between Investment Grade instruments and High Yield instruments, the average spreads are lower for Investment Grade instruments than for High Yield instruments.

Table 6a reports descriptive statistics of spreads for non-retail transactions in our sample by category of instruments. We report the average, the standard deviation, the median, the 10th, the 25th, the 75th and the 90th percentiles of the spread distributions. The first panel of the Table is for ABS instruments, the second panel is for CDOs instruments, the third panel is for CMBS, and the fourth panel is for non-agency CMO instruments. Across all categories and both for pre-release and post-release subsamples, the mean spread is higher than the median spread, indicating that the spread distributions are skewed to the right—there are some large spreads in all categories. For all categories of instruments, the standard deviation of the spread distributions is larger than the mean, indicating a lot of dispersion in spreads. This is also evidence about spreads in the reported percentiles. The 10th percentile of the spread distribution is zero or negative for all types of instruments, indicating that dealers sometimes can make losses on their transactions.

Table 6b reports the mean, median and standard deviations of the spreads in the pre-release and post-release samples, as well as test statistics for the null hypothesis that average and median spreads are the same in the pre-release and post-release samples. We find a statistically significant decrease in average bid-ask spreads for the Registered non-agency CMO category. We observe the reverse pattern in Registered CMBS instruments and mixed results in other categories. Median spreads are largest for non-agency CMO instruments, and smallest for ABS instruments both pre-release and post-release. We compare median spreads between publicly Registered instruments and Rule 144a instruments. In the pre-release sample Registered ABS and non-agency CMOs instruments have higher median spreads than Rule 144a counterparts, with the difference between Registered and Rule 144a instruments much larger for non-agency CMO instruments. In the post-release sample this holds for CMO instruments only. Across all types of instruments, high yield instruments have higher median spreads than investment grade instruments.

In order to visualize the realized spreads, Figure 5 provides time-series plot of the realized spreads. The instruments are sorted by instrument type, and by credit rating (investment grade and high yield). The blue triangles correspond to spreads in Rule 144a instruments and the orange circles correspond to spreads in Registered instruments. The plots are consistent with the percentiles reported in Table 6a. Registered instruments tend to have more dispersion in realized spreads than the Rule 144a instruments in all categories. The plots also show the positive skewness in the realized spreads and that for all categories of instruments, dealers do sometimes make losses.

Only sophisticated investors can hold Rule 144a instruments, while both sophisticated and unsophisticated investors can hold Registered instruments. Rule 144a instruments have a smaller pool of potential owners and so the market may be more limited. Our finding that many types of Rule 144a instruments have smaller spreads than Registered instruments may reflect that sophisticated investors face lower transactions costs than unsophisticated investors. Registered non-agency CMO instruments have significantly higher average and median spreads that Rule 144a non-agency CMO instruments. Perhaps the lower spread for Rule 144a instruments relative to Registered instruments in these categories reflects that more sophisticated investors are trading the

Rule 144a non-agency CMOs than the Registered non-agency CMOs and more sophisticated investors have higher bargaining power when trading with dealers than less sophisticated investors.

In order to study the importance of the underlying collateral to the spreads, Table 7a reports non-retail spreads for different types of ABS collateral, and for CDOs. We report the average spreads for overall trade, for Registered and Rule 144a instruments, and by rating (investment grade and high yield). Overall and across all collateral types, Registered ABS instruments have higher average spreads than Rule 144a instruments. For the investment grade ABS instruments, Registered ABS instruments of all collateral types have higher average spreads than Rule 144a instruments. For High Yield instruments, overall Registered ABS have a higher average spreads than overall Rule 144a ABS, but the ordering is mixed across collateral types: SBA and Student loan backed Registered instruments have higher spreads than the Rule 144a instruments, while all other collateral types have the opposite ranking.

The bottom panel of Tables 7a reports F-statistics for the null hypothesis that investment grade and high yield instruments have the same spreads across different collateral types. For the majority of collateral types, the difference between average spreads is statistically significant: High yield instruments have wider average spreads than investment grade instruments in all categories.

Table 7b reports non-retail spreads for CMBS and non-agency CMO categories for different types of underlying tranches. The table has a similar structure to Table 7a, with both CMBS instruments and the non-agency instruments sorted by tranche type. Overall, Rule 144a CMBS have higher average spreads than Registered CMBS. Registered non-agency CMO instruments have higher average spreads than Rule 144a non-agency CMO instruments. For all tranche types of non-agency CMO instruments except support tranches and Z-tranches (SUP/Z), Registered CMO instruments have higher average spreads than Rule 144a instruments (although there are few Rule 144a SUP/Z instruments). In most subcategories, high yield instruments have higher average spreads than Investment Grade instruments.

Goldstein, Hotchkiss and Sirri (2007) provide estimates of spreads on BBB-rated corporate bonds after the introduction of the TRACE system in 2002. They compute a round-trip spread measure similar in spirit to our measures. Table 6 in their paper reports average spreads for different trade sizes. We can compare our estimated average spreads pre-release and post-release to the spreads reported by Goldstein, Hotchkiss and Sirri (2007). They report the mean spread in Panel A in Table 6 for different transactions sizes computed using a LIFO method[9] with transactions size measured in the number of $100 face value bonds. The mean spread reported in their Table 6 ranges from $2.37 per $100 of face value for transactions of less than or equal to 10 bonds, to $1.96 per $100 of face for transactions between 21 and 50 bonds, to $0.56 per $100 of face for institutional-size transactions over 1,000 bonds. From Table 4 in our study, our estimates of the retail and non-retail sized spreads both pre-release and post-release are approximately the same order of magnitude as those in the post-transparency corporate bond sample for all categories, except for non-agency CMOs. In our sample, non-agency CMO instruments have larger spreads than in the post transparency sample.

We also compare the non-retail spreads reported in Tables 6a through 7b with the spreads for corporate bonds reported by Goldstein, Hotchkiss, and Sirri (2007) in their Table 6. For ABS instruments, the spreads for Registered instruments reported in our Table 7a tend to be smaller than

[9] Goldstein, Hotchkiss and Sirri (2007) compute spreads matching the trade by dealer while we compute the spread aggregating over all dealers. Our spread measures are computed as a percentage of average trade prices, while their approach is dollars per unit of par. Both calculations should produce similar sized spreads as a first approximation, since the corporate bonds should have been trading close to the order of their par values.

the spreads in the corporate bond market for institutional-sized trades, with an exception being ABS backed by Manufacturing. The spreads for Rule 144a instruments in Table 7a tend to be larger than institutional sized trades reported for the corporate bond market; instead the spreads for Rule 144a instruments are similar to spreads for trade sizes of 51-100 bonds in the corporate bond market. We find similar results both pre-release and post-release.

We use the regression methodology to study the relationship between characteristics of the instruments, and the structure of the dealer networks and the bid-ask spreads.

4. Dealer Networks

In order to study the dealer networks, we employ network analysis and analyze properties of interdealer trading relationships. Our sample of interdealer trades allows us to determine links between different dealers and estimate relative participation measures for different market players. We employ two alternative methodologies to perform network analysis and construct variables that capture overall as well as relative importance of a particular dealer. We study how customer bid-ask spreads are related to these dealers' importance measures.

The interdealer markets we observe exhibit interdependence across different products we study in the two samples. For example, in the pre-release sample of trade records from May 16, 2011 to October 17, 2011 we observe 580 active dealers, of which 573 dealers participated at least once in interdealer trading—315 in ABS, 186 in CDOs, 228 in CMBS, and 469 in CMO—implying that many dealers participate in several markets. On average each dealer participated in 40 interdealer trades in ABS market, 12 interdealer trades in CDOs, 43 interdealer trades in CMBS, and 101 interdealer trades in non-agency CMO, either as a seller or a buyer. Over the sample, an average dealer transacted $112 million of original balance on interdealer market in ABS, $43 million in

CDOs, $361 million in CMBS, and $277 million in CMO. Similar interdealer activity is observed in the post-release sample. In the post-release sample from October 18, 2011 to February 29, 2012 we observe 542 active dealers, of whom 532 dealers participated at least once in interdealer trading (275 in ABS, 164 in CDOs, 247 in CMBS, and 449 in CMO. There were 441 dealers active in both samples, and this suggests that some dealers trade only in one of the two sample periods.

On average each dealer participated in 39 interdealer trades in ABS market, 11 interdealer trades in CDOs, 45 interdealer trades in CMBS, and 85 interdealer trades in non-agency CMO, either as a seller or a buyer. Over the sample, an average dealer transacted $185 million of original balance on interdealer market in ABS, $126 million in CDOs, $283 million in CMBS, and $259 million in CMO. Figure 6 shows the break-up of total volume transacted on interdealer market by the four major product types and the two samples.

Dealers are heterogeneous both in terms of their trading with customers and interdealer market participation. Figure 7 presents the Lorenz curves computed using dealers' shares of the original order balance with customers for ABS, CDOs, CMBS and non-agency CMO, and the two placement types. We observe heterogeneity of dealers in terms of total volume traded with customers. A small number of dealers account for a major fraction of customer volume in all markets and for both placement types. There is a noticeable dispersion and skewness in interdealer market participation by different dealers. The order flow is more evenly divided among dealers in Rule 144a markets than in Registered markets.

A median dealer participated in 9.5 interdealer transactions in the pre-release sample (10 transactions in the post-release sample) and transacted in total $3 million ($5 million, respectively), while the 75th percentile of interdealer trade participation by a dealer is 69 transactions in the pre-release sample (57 transactions in the post-release) and $71 million of original balance traded ($102 million, respectively). There is also evidence that some links between different pairs of dealers are stronger than others, and some dealers have higher levels of importance to the functioning of the interdealer market and act as the key providers of interdealer liquidity.

Figure 8 summarizes the topology of the grand interdealer market for all products—its strongest links. In this figure we include links between two dealers when more than 50 trade reports were observed in the overall sample and more than $10 million of current balance in total was transacted during the sample period. Links with more than $100 million transacted are shown as solid lines.

The four broad markets we analyze are significantly interconnected. Individual dealers often participate in different markets at the same time. Some interdealer markets are generally more active than others in terms of number of interdealer trade records with the non-agency CMO market particularly active. For these reasons we measure dealers' activity in different instruments separately, then following Li and Schürhoff (2012) and Milbourn (2003), we perform normalizations of the resulting measures to preserve information on dealers' ranks in the network. For the purpose of our empirical analysis we follow two alternative methodologies. Under the first methodology we construct a single aggregate proxy for dealer-specific importance on interdealer market by performing principal component analysis and use that proxy in the fixed-effects regression. Under the second methodology for each dealer and each submarket we measure coreness and degree centrality, and use the relationship between the two variables to describe dealers' relative position in the network and resulting bargaining power. We describe both methodologies in greater detail below.

We measure the relationship between dealers by their interdealer trade. Under our first empirical methodology we compute the following centrality measures for each dealer:

> **Degree centrality** is defined as the number of closest neighboring dealers around a particular dealer in the network.
>
> **Eigenvector centrality** is computed using eigenvalues of the adjacency matrix (matrix describing links between dealers in the network), for each particular dealer it emphasizes connections with relatively more important dealers of the network.
>
> **Betweenness centrality** is equal to the total number of shortest trading paths from every single dealer to any potential counterparty that passes through this particular dealer.[10]
>
> **Closeness measure** is defined as the inverse of the total distance from each particular dealer to any other dealer in the network based on observed trading relationships.

Estimated centrality measures for dealers differ in their nature: Degree centrality is a local property taking into account only the closest sub-network of dealer's neighbors, while eigenvector centrality or betweenness centrality account for its global structure, and across different markets (e.g. some dealers are relatively more active in Registered ABS than Rule 144a non-agency CMO). Li and Schürhoff (2012) explored all of these alternative centrality measures in the context of municipal bond trading and demonstrated existence of a significant common component in these measures. We obtain similar results in our sample.

[10] The betweenness centrality measure is a widely used tool in the literature on social networks. Reference on betweenness: Freeman, Linton, "A Set of Measures of Centrality Based upon Betweenness", 1977, Sociometry 40, 35–41.

We divide all interdealer trades between May 16, 2011 and February 29, 2012 for the overall sample into seven buckets based on the four types of instruments (ABS, CDOs, CMBS, and non-agency CMO) and two placement types—Registered and Rule 144a. Within each bucket we compute the total volume transacted by all pairs of dealers, differentiated from each other by their dealer masks.[11] We estimate the following four centrality measures: 1) degree centrality (unweighted and weighted by volume transacted), 2) eigenvector centrality (unweighted and weighted by volume transacted), 3) betweenness centrality measure, and 4) the closeness measure.

All of the measures are estimated for each dealer, and the first two of these measures allow us to differently weight the links between dealers based on total volume traded over the particular sample period. We differentiate between buys from and sells to a particular dealer in the interdealer network and use directed networks in our estimation. We apply the empirical cumulative-density function transformation to each of the six centrality measures obtained, and then extract the first principal component. For each of the seven buckets we have two versions of the dealers' importance—unweighted and weighted by total volume transacted within each market. We perform principal component analysis separately for these two versions to aggregate across different markets. In our empirical analysis we use the measure weighted by total volume transacted, with the correlation between the weighted and unweighted versions at 0.98. We linearly normalize the resulting variable to a zero-to-one scale. Dealers that did not participate in interdealer trades are assigned zero centrality value.

[11] Dealer masks may not identify separate dealers perfectly in case when a single dealer has several trading desks having different dealer masks for reporting purposes.

In our analysis of total client bid-ask spreads we use the average dealer centrality variable, which is the average aggregate centrality measure of all dealers that intermediated in a particular chain of matched transactions.

Overall we find evidence for a negative relationship between dealers' interdealer activity measured by aggregate centrality and total client bid-ask spreads. Figures 11a and 11b present scatter plots of spreads against dealers' centrality for non-retail size matches in Registered and Rule 144a instruments. Dealers who participate more actively in the interdealer market have lower inventory risk and may require lower compensation for their services. But these dealers may be generally more visible to other market participants and have a certain degree of market power—in this case we expect these dealers to charge higher compensation through customers' bid-ask spreads. We use average dealers' centrality in our regression analysis to check the validity of these conjectures when we control for other factors and characteristics as well.

Under the second methodology for each dealer we compute the following two measures:

Coreness measure is defined using the *k*-core sub-network. The k-core sub-network is the largest sub-network in which all dealers have at least k trading partners in this sub-network. There are many sub-networks a particular dealer participates in characterized by different values of k. The dealer's coreness is the maximum k such that the dealer belongs to a k-core sub-network.

Coreness-Degree Residual is defined as the difference between dealer's degree centrality and dealer's coreness.

A dealer's Degree Centrality is always larger than the dealer's Coreness. Higher Degree Centrality relative to the Coreness means that the dealer is more important as an intermediary between different groups of dealers, because the dealer is bridging different smaller sub-networks. The Coreness-Degree Residual therefore measures the relative importance of a dealer in the sub-network, and is a proxy for the dealer's local bargaining power.

We present graphical illustrations of four different scenarios for dealer's coreness and Coreness-Degree residual in Figure 9. The figure shows sub-networks constructed using the ABS Registered market within the overall network presented in Figure 8, with a relaxed restriction on what constitutes a strong link—we do not require the volume transacted between two parties to be above $10 million in total. The dealer with 23 trading partners has the largest degree centrality in the sub-network. The second order neighborhood of that dealer is shown in the top left panel of Figure 9. That dealer's coreness is 4, meaning that the largest sub-network that this dealer participates in has all dealers with at least 4 trading partners in this sub-network.

In the Registered ABS sample of interdealer trades the maximum coreness is 4 and there are a few dealers with coreness of 4. We can think of all these dealers corresponding to the 4-core sub-network as the set of most important and frequent counterparties for the dealer with 23 partners. This dealer has links to other sub-networks as well and performs the role of a "bridge" across different parts of the interdealer market. There is also another dealer with degree 4, which is the same as its coreness—the weakest node in the 4-core sub-network. The Coreness-Degree residual captures this relative difference in dealer's local positions.

A single centrality measure cannot capture these relative differences in dealers' positions. Two dealers may have similar numbers of trading partners; however, differences in their coreness may result in different bargaining power between the dealers. A dealer with coreness similar to the degree centrality will be the least connected dealer in the main k-core sub-network he belongs to. On the other hand a dealer with coreness much smaller than degree will have the strongest outside options. We perform empirical analysis based on these two measures of dealers' standing in the network and for some of our markets we find their effects having different directions on bid-ask spreads. Figures 12a and 12b maps the average dealer bid-ask spreads against dealers' coreness and degree centrality.

5. Regression Analysis

Table 8 provides the definitions of the right-hand-side variables we use in the regression analysis. The dependent variable is the bid-ask spread, with one observation per pair of matched trades in the sample. We use X to denote the right-hand-side variables in the regressions. We allow the slope coefficients to be different across categories of instruments and placement types (Registered and Rule 144a). We also include fixed effects for each of the six different collateral types of ABS issues, for CDO, CBO, and CLO instruments, CMBS interest-only or principal-only (IO/PO) and all other CMBS instruments (P/I), and six different types of CMO tranches separately, which we define as subcategories. We combine CBO and CLO in a single category. Denote each category of instruments by $j \in \{1, \dots, 5\}$, each subcategory of instruments by k, and placement type by $l \in \{0,1\}$, with $l = 0$ for Registered instruments and $l = 1$ for Rule 144a instruments. We estimate the equation, allowing for heteroskedasticity in the residuals.[12]

$$y_{it} = \alpha_{jkl} + (X_{it})^T \beta_{jl} + \varepsilon_{it},$$

[12] We also experiment by including fixed effects for individual instruments. Our main results are robust to using the individual instrument fixed effects.

We allow the regression constant to depend on the category, subcategory and placement types, and we allow the marginal effects β to differ across the five categories and two placement types.

We also perform analysis of overall categories without differentiating between Registered and Rule 144a security types. We pool together Registered and Rule 144a instruments and obtain overall marginal effects of the aforementioned factors. The estimation equation is:

$$y_{it} = \sum_{k=1}^{6} \mathbf{1}_{\{i \in k\}} \times (X_{it})^T \beta_{ABS} + \sum_{k=7}^{9} \mathbf{1}_{\{i \in k\}} \times (X_{it})^T \beta_{CDO/CBO/CLO} + \sum_{k=10}^{11} \mathbf{1}_{\{i \in k\}} \times (X_{it})^T \beta_{CMBS} + \sum_{k=12}^{17} \mathbf{1}_{\{i \in k\}} \times (X_{it})^T \beta_{CMO} + \sum_{j=0}^{1} \sum_{k=1}^{17} \mathbf{1}_{\{i \in k, R144a=j\}} \alpha_k + \varepsilon_{it}$$

Table 9 reports the results from the regressions for the total client spreads. The total client spreads are computed using the complete customer-to-customer chains of matched transactions. In each group of columns, we report the point estimates of the coefficients with standard errors in parentheses below. All regressions include fixed effects for subcategories of instruments. We report the estimates for the overall category, estimates for Registered instruments within the category, and estimates for the Rule 144a instruments.

The point estimates of the coefficients on 4-6 Year Vintage and >6 Year Vintage are positive for all types of instruments except CDOs and Registered CMBS: Older maturity instruments tend to have higher spreads, reflecting their lack of trade, and also the possibility that there is more asymmetric information about these instruments. Across all categories of instruments, the point estimate on the Investment Grade is negative and economically significant: High yield instruments tend to have higher spreads than Investment Grade instruments.

The point estimate of the coefficient on Security-Specific Match Volume is negative for most categories of instruments. A negative coefficient on Security-Specific Volume indicates that instruments with larger trades tend to have small spreads, consistent with more actively-traded instruments having lower transactions costs. This is indeed the case for all security types except for Rule 144a CMBS.

Deviation of a Particular Match is a measure of the size of the matched transaction relative to the average transaction size in that security. The point estimates are negative across all types of instruments. A negative coefficient on Deviation of Particular Match indicates that when the matched trade is larger than typical for that instrument, the match will have a lower spread reflecting a volume discount. In typical equity markets, larger trades tend to have larger spreads, with the typical explanation that larger trades carry information so that dealers face higher adverse selection costs on larger trades. In many bond markets, smaller trades have larger spreads; with the typical explanation being that smaller trades tend to proxy for less sophisticated customers so that dealers have greater bargaining power in smaller trades and so are able to earn higher spreads on smaller trades. The securitized markets we analyze resemble bond markets with respect to volume effects. Our finding here does not depend on retail-sized trades, since those trades are removed from the regression analysis.

The effect of Floating Coupon is positive for all ABS instruments, Registered CMBS instruments and Registered CMO instruments: For these categories, instruments with floating coupons tend to have higher spreads. For CDO, CBO/CLO, Rule 144a CMBS, and Rule 144a CMO instruments floating coupon instruments tend to have lower spreads. Generally the point estimates on Investment Grade and Floating Coupon together imply that instruments with riskier cash flows tend to have higher spreads.

The point estimates on Gap in Execution Time are of mixed magnitude and sign, and are generally not statistically significant. One interpretation of a negative coefficient on Gap in Execution Time is that the dealers offer a price concession to close out a trade when the holding period is long. One interpretation of a positive coefficient on Gap in Execution Time is that the dealers in such instruments earn a higher rate-of-return the longer that the instrument is in the dealers' inventory.

The coefficients on Number of Dealers are of mixed magnitude and sign and economically small: Perhaps the mixed results on Number of Dealers indicate that the choice of the Number of Dealers in an instrument is endogenous to the size of the spread that the dealers can earn.

The point estimate on the Dealer Importance Dummy is negative and statistically significant for all categories with the exception of overall CDOs, where the positive point estimate is not statistically significant. A negative coefficient on Dealer Importance Dummy implies that the average spread is lower if the inventory passes through a dealer who is more active in the inter-dealer network. The coefficients for Rule 144a instruments are lower than the coefficients for Registered instruments: The relative benefits for customers to have orders intermediated by central dealers rather than peripheral dealers are larger in Rule 144a markets.

The point estimate on Multi Round Trade is positive except for CBO/CLO instruments, and is economically and statistically significant for most categories. A positive coefficient implies that deals that pass through many dealers as they go from a customer to another customer tend to have larger spreads. In this sense, deals with more intermediation are more costly to the customers.

Table 10 reports the results from regressions for the dealer spreads. The spreads used in the regression result from decomposing the total client spreads used in Table 9 into individual dealer spreads. For example, the two round chain: Customer to Dealer A, Dealer A to Dealer B and Dealer

B to Customer yields two dealer spreads. The first spread is computed from Dealer A's purchase price from the customer and Dealer A's sale price to Dealer B, and the second spread is computed from Dealer B's purchase price from Dealer A and Dealer B's sale price to the customer. If N dealers intermediate a chain between customers, then we compute N dealer spreads.

Overall, we find similar effects of the control variables as in the total client spread regressions reported in Table 9, and we include additional control variables: Dealer's Coreness, Dealer's Degree Residual, and the two customer participation dummies—Buy from Customer and Sell to Dealer, Sell to Customer and Buy from Dealer.

The point estimate of Dealer's Coreness in Table 10 is negative for all instruments except for non-agency CMO instruments and the CDO subcategory. The negative point estimates could reflect greater competition and reduced bargaining power of more central dealers or lower trading costs on the transactions they intermediate. These findings suggest a degree of specialization in the trading of different instruments and the need to look at competition in more subtle ways. Central dealers perform a valuable function by enhancing the linkages in the network and the integration of customer activity.

The point estimate of Dealer's Degree Residual is negative for all instruments except Rule 144a CMBS instruments and Registered CMO instruments. Holding the size of the interdealer k-core sub-network constant, the higher relative position of a dealer in that sub-network captured by positive Degree Residual results in lower dealer spreads on average. The result is the opposite from the generally positive relationship between dealer's centrality and bid-ask spreads found in the literature on municipal bonds (Li and Schürhoff (2012)). The finding is consistent with the equilibrium in a search-and-bargaining model of a decentralized interdealer market in which dealers differ in their trade execution efficiency that proxy for dealer centrality in Neklyudov (2012). In this paper, the more connected dealers charge lower spreads because their endogenous reservation values reflect their search efficiency and they intermediate trade flows among the less efficient dealers. Our result also highlights the importance of the decomposition of single centrality measure into the Coreness-Degree residual.

The point estimate on Multi Round Trade is positive except for Registered ABS instruments, and is economically and statistically significant for most categories. A positive coefficient implies that interdealer spreads in multi-round deals tend to be higher. The point estimate on Buy from Customer and Sell to Dealer is negative except for ABS instruments indicating that spreads are lower when the dealer is in the first link of a multi-round intermediation. Perhaps this reflects that dealers need to offer price concessions to sell to another dealer rather than a customer. The point estimate on Buy from Dealer and Sell to Customer is positive except for CDOs and Rule 144a CMO instruments indicating that spreads are higher when the dealer is in the last link of a multi-round intermediation. It is more valuable to find a customer to sell to and finish the intermediation chain rather than to sell to another dealer and keep the intermediation chain going.

6. Publication of Price Index Data

An important event within our sample period is the public release of price index data on a daily basis by FINRA and IDC starting in mid-October 2011 for various types of securitizations. This has the potential to lead to substantial informational changes in the market. We examined whether these indices provide market participants information about pricing and spreads, and whether that information becomes common knowledge to all market participants, including dealers. We anticipated that this could affect spreads after the initial public release of the indices (five months of such data were initially released in mid-October) and then the indices were updated on a daily basis (even without a full-blown roll-out of post-trade transaction level price reporting). Analysis of this data after its public release and comparison to an environment in which the indices were not anticipated to be released (such as prior to the initial release of index data) would allow analysis of the impact of a form of price transparency. To control for other considerations that alter the spreads, we examine both Registered and Rule 144a instruments, as this is one issue of our focus and because for categories except for the CDO/CBO/CLOs, there is more weight and trading in Registered rather than Rule 144a instruments and because the investors in Rule 144a instruments are potentially more sophisticated than those in Registered instruments.

The publication of these data began on October 18, 2011. Initially the data was published back to the start of the data collection interval and then updated daily with a one-day lag. In examining the price index data we are struck by the substantial negative first-order serial correlation in the price index—both pre- and post-release (see Figure 13). Using standard market microstructure interpretations this highlights the extent of noise in the data, which suggests the difficulty confronting market participants in extracting valuation information from the data. Conceptually, the nature of improvement in transparency at the level of individual instruments from the release of index data may have been modest, both because of the portfolio composition and the daily nature of the index. The negative serial correlation in the index points to the potential construction of spreads using time series approaches (e.g., see the Roll (1984) estimator of bid-ask spreads using the negative serial correlation in transaction prices) and is suggestive of relatively wide spreads implicit in the index data (and the underlying securitizations). Given the limited set of observations, we focus our analyses of spreads at the securitization level in our matching analyses, but time series perspectives are potentially useful as we try to understand the public index data. In other contexts (such as the equity markets) cash index returns or differences often reflect substantial positive serial correlation due to staleness in components of the pricing and strong positive cross-sectional correlation among the assets. In the current context the index construction only reflects the assets that have traded recently, so there is not an obvious rationale that would lead to underlying positive serial correlation. Indeed, this aspect of the index construction suggests an additional source of noise not present in the standard equity index, as the composition of the index here is changing because it reflects only assets that have traded recently.

The newly disseminated price index data provides us an opportunity to study the impact on spreads for Registered and Rule 144a instruments. Table 6b reports information on the spreads before and after the public dissemination of price indices, specifically whether the spreads increased or decreased from the pre- to the post-release samples for both Registered and Rule 144a instruments. The conventional view is that the spread should decrease after transparency enhancing events. We find such decrease in spreads in the Registered non-agency CMO category with the mean spreads post-release being statistically significantly smaller than the pre-release sample. However we observe the reverse pattern in Registered CMBS instruments and mixed results in other categories, that are not statistically significant.

The interpretation of the increase in spreads that we document above is not straightforward for a second reason. In particular, our graphical evidence suggests that there is a lot of variability in the spreads and not a sharp change in regime at the point at which the price index disclosure begins (see especially Figure 10, which documents the weekly moving averages of the total client bid-ask spread, and less directly, Figure 5, which offers scatter plots of the spreads). In fact, the graphical evidence suggests the plausibility of identifying changes in spread levels at a variety of alternative dates—undercutting the strength of the evidence with respect to the actual regime change.

7. Concluding Comments

In this paper, we utilize data on dealer transactions in securitizations markets to study the nature of dealer networks and how bid-ask spreads vary within the trading network. While trading among instruments is highly fragmented and relatively infrequent, trading is highly concentrated among a relatively small number of dealers. Dealer networks reflect a core-peripheral structure. We document a negative relationship between the importance and interconnectedness of dealers and their bid-ask spreads. Theoretical work studying over-the-counter markets predicts that customers that trade with more interconnected dealers with higher trade execution efficiency face lower bid-ask spreads on average in equilibrium (Neklyudov (2012)). The evidence contrasts with the empirical findings in municipal bond markets, where a positive relationship arises between dealers' importance and bid-ask spreads (Li and Schürhoff (2012)).

Our matching techniques allow us to look in more detail at how the total client bid-ask spread gets split among different parties involved in a deal. Longer chains of intermediation result in larger total spreads. Dealer spreads are especially wide on transactions that complete the chain—it is more valuable to find a customer to sell to and finish the intermediation chain rather than to sell to another dealer and keep the intermediation chain going.

We observe a smaller number of active dealers trading in an average Rule 144a instrument than in an average Registered instrument, but at the same time tighter customer bid-ask spreads. We also observe that the order flow is more evenly divided among dealers in Rule 144a instruments and that customers in Rule 144a markets face smaller bid-ask spreads when trading with more central dealers. These findings emphasize that the extent of competition differs between Registered and Rule 144a instruments.

It is important to understand the microeconomic aspects of the trading process, especially in light of the dramatic disclosure differences between Registered and Rule 144a instruments. Rule 144a securitizations have less disclosure requirements than Registered securitizations, but they could represent higher quality assets, that are held only by sophisticated investors with access to additional sources of information.

Our study points to a variety of additional directions for study. Empirical findings that emerge from the data have natural potential to inform the theory of over-the-counter markets and provide grounds for validation of different theoretical models. The nature of the data allows one to identify different counterparties and construct trading networks, offering a natural environment to perform network analysis. Network analysis has the potential to enhance our understanding of intermediation patterns for dealer markets and concentrations of risk more broadly, including systemic risks.

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APPENDIX: Data Cleaning

For the purpose of this study we have trading activity data ranging from May 16, 2011 to February 29, 2012 in several classes of securitized products: ABS, CDO/CBO/CLO, CMBS, CMO, MBS and TBA, as well as the database with issue characteristics for all issues subject to FINRA reporting requirement.[13] On October 18, 2011 FINRA and IDC began to disseminate the price index data, and to extend our analysis we study both the overall sample as well as separate data from the period prior to that date (referred to as pre-release sample) and the period beginning on that date (referred to as post-release sample). We limit our attention to ABS, CMBS and non-agency CMO securitizations because these classes have both Registered as well as Rule 144a placed instruments in our sample. We also present our results for CDO, CBO and CLO Rule 144a instruments separately to allow for comparisons across asset classes. In our analysis we use Moody's ratings for instruments that have at least two opposite trades with customers. For other instruments we were able to utilize the investment grade data for these instruments provided by FINRA. Moody's ratings were collected for all instruments that satisfy our minimal-trading requirement: There are at least two opposite transactions with customers at most 2 weeks apart in our sample period from May 16, 2011 to February 29, 2012. We used the proprietary list of CUSIPs provided by FINRA to locate Moody's ratings for these instruments on the corporate website.

We perform several rounds of cleaning before we obtain a workable sample of trades: 1) Adjust for trade corrections and removed cancelled trades; 2) address double-reporting issue for interdealer trades—both dealers were typically reporting the same trade from opposite sides; 3) match trading reports with issue-specific characteristics from the database provided by FINRA; 4) clean the data from the issues with insufficient trading activity to perform our analysis; 5) compute bid-ask

[13] Among others the characteristics included: maturity date, coupons with update dates, type of coupon (fixed or floating), factors with update dates, type of placement (Registered or Rule 144a), description of the issue.

spreads using an iterative cascading matching technique discussed below; 6) adjust resulting spreads for coupon and factor payments; 7) perform cleaning for outliers. Below we discuss each of these rounds of data cleaning in greater detail.

For some trade records, traders entered incorrect trade information or canceled previous transactions. Traders corrected the records by entering additional reports marked as "Corrected Trades", "Trade Cancels" or "Cancels", and "Historical Reversals" (if correction was reported not on the say trading day). In the first round of cleaning we remove all trade records that were subsequently corrected to keep only the effective transaction records, we remove all records that were cancelled and do not count them in our subsequent analyses, and we disregard all corrections when no initial trade record is reliably identified by entered volume, entered price, trade execution date and counterparty masks.

According to the FINRA reporting rule, each interdealer trade must be reported by both sides to the transaction, effectively leading to double reporting in our sample, with a few exceptions. Customer transactions and so-called "locked-in trades"[14] are always reported once. In order to cope with the double-reporting problem we implement an iterative pair-matching procedure. We look at pairs of identical transactions reported from different sides by the same counterparties. The counterparties often reported slightly different trade execution timestamps, so that we have to be careful distinguishing the second report for a particular transaction from other trading activity unrelated to it. The pair-matching procedure consists of one hundred iterative rounds of search for very similar entries in terms of entered volume, price, execution timestamps, settlement date, counterparty masks. In each round we flag trade reports that are sufficiently similar to constitute candidates for a double-entry of the same trade. Anytime we find several alternative candidate trades, we pick the

[14] Locked-in trades are defined in the layouts for trading data files provided by FINRA.

ones closest in time according to the reported execution timestamp. Anytime we cannot identify a match based on the above criteria, we assume there was no second report for the trade. For 84.77% of all trade reports we were able to identify unique matching reports, which were subsequently removed from the sample.[15] The result of this cleaning constitutes our working sample of transactions.

We match each transaction report to the issue-specific characteristics and description from the database provided by FINRA. The database for ABS, CDOs, CMBS and non-agency CMO instruments consists of eleven time-stamped files corresponding to May 15, May 31, June 30, July 31, August 31, September 31, October 31, November 30, December 31, January 31, 2012, and February 29, 2012. Using these files we are able to reconstruct the time-series of coupon rates and prepayment factors, as well as product collateral or underlying pool types, maturity, original balance, type of placement (Registered or Rule 144a), type of coupon (fixed or floating). In the few cases when the instrument-specific characteristics (such as the product category or the type of placement) are different in different files for the same issue identifier—we take the data from the latest files available for this issue, having in mind potential data entry issues. In the very rare cases when instruments with the same CUSIP code have different symbol IDs we treat those as different instruments.

It is worth noting that most of securitizations in our sample traded very thinly during either of the two sample periods (pre-release and post-release). For example, only 2,807 out of 12,663 ABS issues, 1,219 out of 7,471 CDOs issues, 2,967 out of 13,720 CMBS issues, and 13,396 out of 78,698 non-agency CMO issues did have at least two opposite trades with customers at most two

[15] These numbers apply to ABS, CDO, CMBS, and non-agency CMO only.

weeks apart in time. Table 1 presents more detailed information. We could compute client spreads for these instruments only.

Then we perform several steps of matching seemingly related transaction into chains. We use the complete trading sample from May 16, 2011 to February 29, 2012 to look for chains, and then tag each chain we find with the relevant pre-release or post-release sample tag. The implementation of our matching technique consists of three rounds.

In the first round we match related interdealer and customer transactions that have the same volume and each pair in a chain is no further than one month apart. For example, when we see among other trading activity three transactions in the same instrument of $1 million original balance that form a potential chain: Customer to dealer A, dealer A to dealer B, dealer B to customer, we perform two checks: 1) For each link of the potential chain there are no other alternative candidates resulting in a different branch of a chain that are closer in time based on the execution timestamp; 2) each link in the chain is no further than 1 month apart based on execution timestamp. If both conditions are satisfied, we take this chain out of the dataset and proceed with search for other chains iteratively. Different links of a single chain can be tangled in other trading activity in a given instrument, so in order to find candidates and establish links we sort our dataset by execution timestamp within each separate instrument and look for each trade record we look for candidate matches 15 record forward and 15 records backward. Note that we do not impose any timing sequence within a chain—buy from customers can follow as well as precede the sell to customer, and all seemingly related interdealer trades may happen at any point in time that satisfies the one-month maximum link span. We find most of our chains with a step size smaller than 15, so this step size limit does not constrain our results in a noticeable way. In order to search for all chains with no splits of volume we perform the aforementioned algorithm iteratively 100 times, which completely exhausts all candidate links that fall in the non-split category. The result of the first round is a set of chains of various lengths: C-D-C (1 link), C-D-D-C (2 links), etc., with the same volume moving through the chain. We find 10,871 non-split chains in ABS (1.2 links on average, 5 links maximum), 1,959 chains in CDOs (1.08 links on average, 6 links maximum), 11,298 chains in CMBS (1.15 links on average, 9 links maximum), and 30,179 chains in non-agency CMO (1.32 links on average, 7 links maximum).

In the second round we allow transaction volume to split when moving through a chain. For example, when we see among other trading activity three transactions in the same instrument forming a potential chain but having different trade volumes: $1 million customer to dealer A, $2 million dealer A to dealer B, $0.5 million dealer B to customer, we perform the same two checks as in the first round for the candidate links and in case these checks are satisfied we split the chain in three pieces: 1) $0.5 million customer to dealer A; 2) $1.5 million dealer A to dealer B; 3) $0.5 million customer to dealer A, $0.5 million dealer A to dealer B, $0.5 million dealer B to customer. The last piece corresponds to a valid two-links chain we take out from the sample, while the first two pieces are returned back for further iterations of search-for-chains. This splitting is designed to treat the trading patterns when different chains branch into sub-chains or merge together and potentially have common links. Similarly to the first round we search for candidate links 15 records forward and backward each in a sorted trade sample, and perform 100 rounds. This way we find 8,719 additional chains in ABS (1.51 links on average, 9 links maximum), 794 chains in CDOs (1.43 links on average, 10 links maximum), 10,111 chains in CMBS (1.38 links on average, 15 links maximum), and 41,135 chains in non-agency CMO (1.9 links on average, 9 links maximum).

In the second round the 15 step size constraint binds for instruments with heavy trading activity and many trade records happening within a trading day. The second round ensures that we link most of the related interdealer links to trades with customers when they are less than 15 trade records away from each other. After the second round we drop all interdealer trades that have not yet been used to form a chain with any client transactions and perform LIFO matching of the opposite client transactions. This constitutes our third and final round of matching process. We keep track of all interdealer links established in prior rounds that were attached to these transactions. This way we find 3,396 additional chains in ABS (1.86 links on average, 11 links maximum), 406 chains in CDOs (1.72 links on average, 7 links maximum), 4,621 chains in CMBS (1.8 links on average, 19 links maximum), and 13,192 chains in non-agency CMO (2.3 links on average, 10 links maximum).

After the three rounds we have a sample of chains both involving splits of volume and non-split chains. We have in total 23,036 chains in ABS (1.41 links on average, 11 links maximum), 3,198 chains in CDOs (1.25 links on average, 10 links maximum), 26,124 chains in CMBS (1.35 links on average, 19 links maximum), and 84,788 chains in non-agency CMO (1.76 links on average, 10 links maximum). On average we find relatively longer chains in non-agency CMO market. In our regression analysis we refer to the number of links in a chain as number of rounds in the deal.

The complete chains we find constitute 75% of the total absolute turnover in the ABS market, 86% in the CDOs market, 74% in the CMBS market, and 80% in the non-agency CMO market. We also include broken chains in which dealer codes do not match.

Approximately 54.64% of chains we find using our matching process occur in the pre-release sample (between May 16, 2011 and October 17, 2011).

Within each chain of related transaction we adjust prices for coupon and factor payments that happened between the settlement time of a particular trade and the settlement time of the logical beginning of the chain (a buy from customer, not necessary the first trade to happen within a chain by execution time). For each chain of transactions having two opposite trades with customers, we compute two types of bid-ask spread measures: total client bid-ask spread and dealer-specific spread—both measured per $100 of current value (capital committed). The quotes observed in our dataset are clean prices per unit of current balance, thus we adjust our bid-ask spread measures for accrued interest and factor prepayments. We use the following approach to perform these adjustments:

Firstly, the direct way to compute bid-ask spread having two quotes on the opposite sides of an intermediating trade and the full information on factor and coupon payments in between is the following. Here we consider the case when settlement date effective for the ask quote occurs after the settlement date effective for the bid quote, however the formulas generalize to allow for opposite cases (below T stands for number of calendar days in between and c is the annual dollar coupon amount per $100 of original balance):

$$Spread = 100 \times \frac{(P_{ask} \times factor_{ask} - P_{bid} \times factor_{bid} + adj)}{\left({(P_{ask} \times factor_{ask} + P_{bid} \times factor_{bid} + adj)}/{2} \right)}, where:$$

$$adj = c \times \frac{T}{360} \times factor_{bid} + factor\ prepayment$$

We use the following fair-pricing condition to simplify the above formula:

$$\frac{factor\ prepayment}{P_{ask}} = factor_{bid} - factor_{ask}$$

Assuming the above condition holds, the bid-ask spread calculation simplifies to:

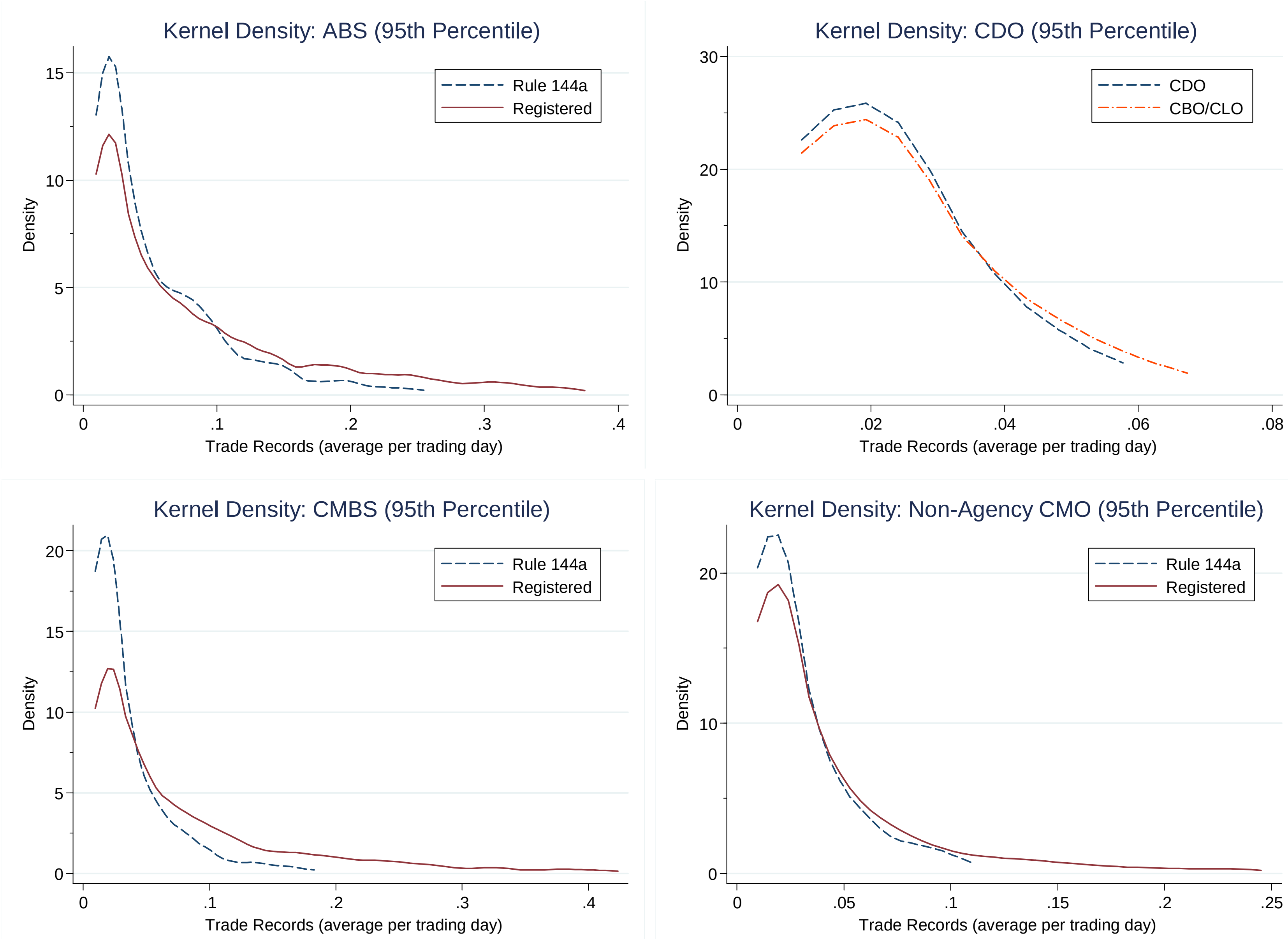
$$Spread = 100 \times \frac{\left(P_{ask} - P_{bid} + c \times \frac{T}{365}\right)}{\left(P_{ask} + P_{bid} + c \times \frac{T}{365}\right)\Big/_2}$$

We performed both the direct spread computation and the simplified computation and did not find significant difference in terms of spread distributions. This can be explained by the fair-pricing condition outlined being a relatively good approximation for those matches that involve factor payments in between the two settlement dates. All results that follow correspond to the simplified approach.

The obtained spread observations contain outliers. In order to address this issue we winsorize 1% off each tail of the distribution of total client spreads within each subtype of instrument based on its overall type (ABS, CDOs, CMBS, non-agency CMO) and collateral sub-type, its placement type -- Registered or Rule 144a, and its investment rating. The distribution characteristics of resulting total client bid-ask spreads are presented in Table 6a for the overall sample from May 16, 2011 to February 29, 2012. We compare non-retail client spread distributions for pre-release and post-release samples and present results in Table 6b.

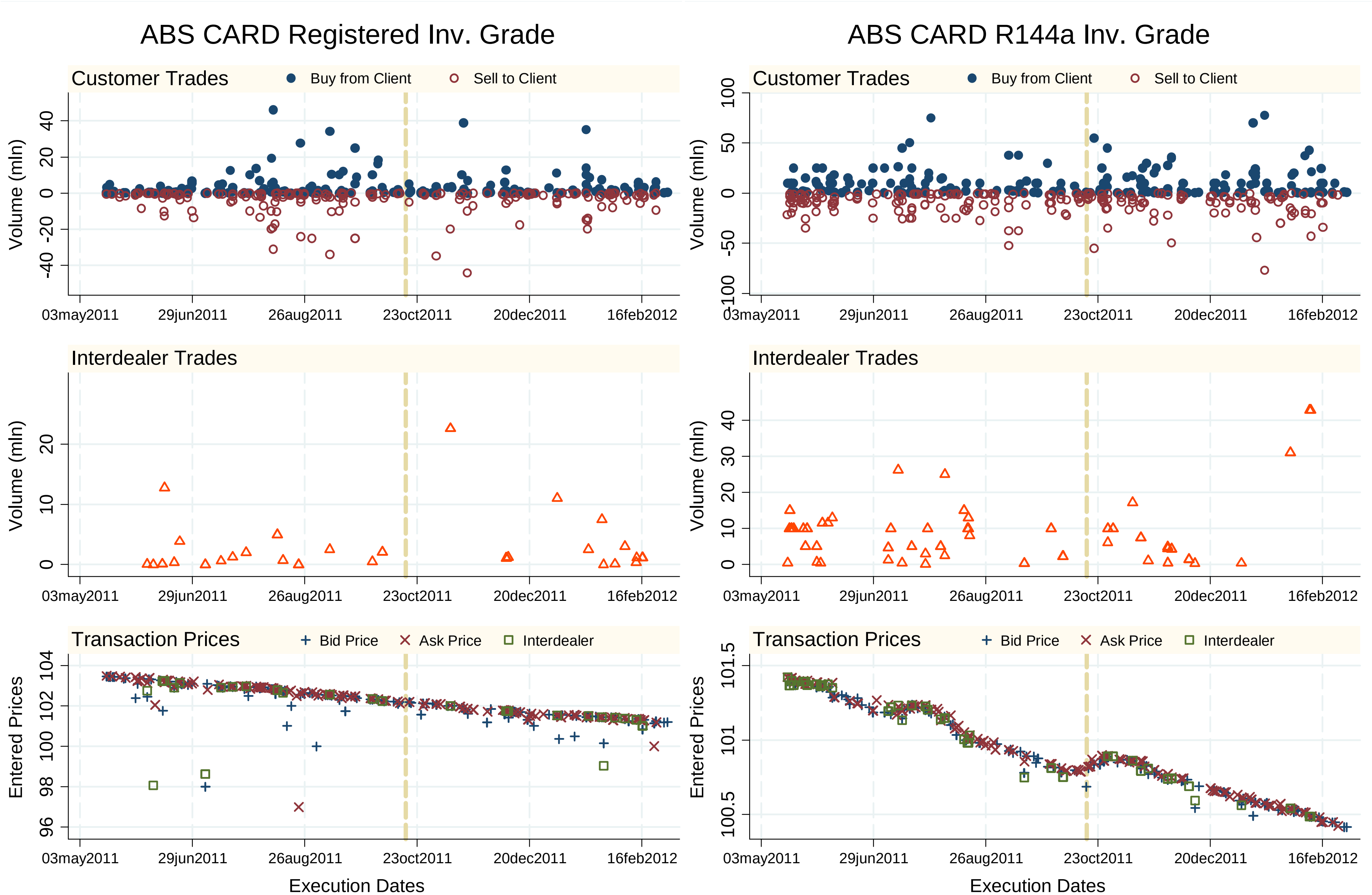
In our analysis we use information on trade sizes measured in dollars of original par underlying pairs of trades we use to construct each spread observation. We use three buckets for trade sizes: Retail trades (R), amounting to less than $100,000 original par, medium trades (M) between $100,000 and $1,000,000 original par, and institutional trades (I) amounting to more than $1,000,000 original par. Tables 2b and 3b report proportions of trade reports falling within each bucket. In our analysis we focus on non-retail chains when both original buy from customer and sell to customer volumes were greater than $100,000 original par (when a chain of transactions involves a split, we take into consideration the volume.

Figure 1: Distribution of Number of Trading Records per Day



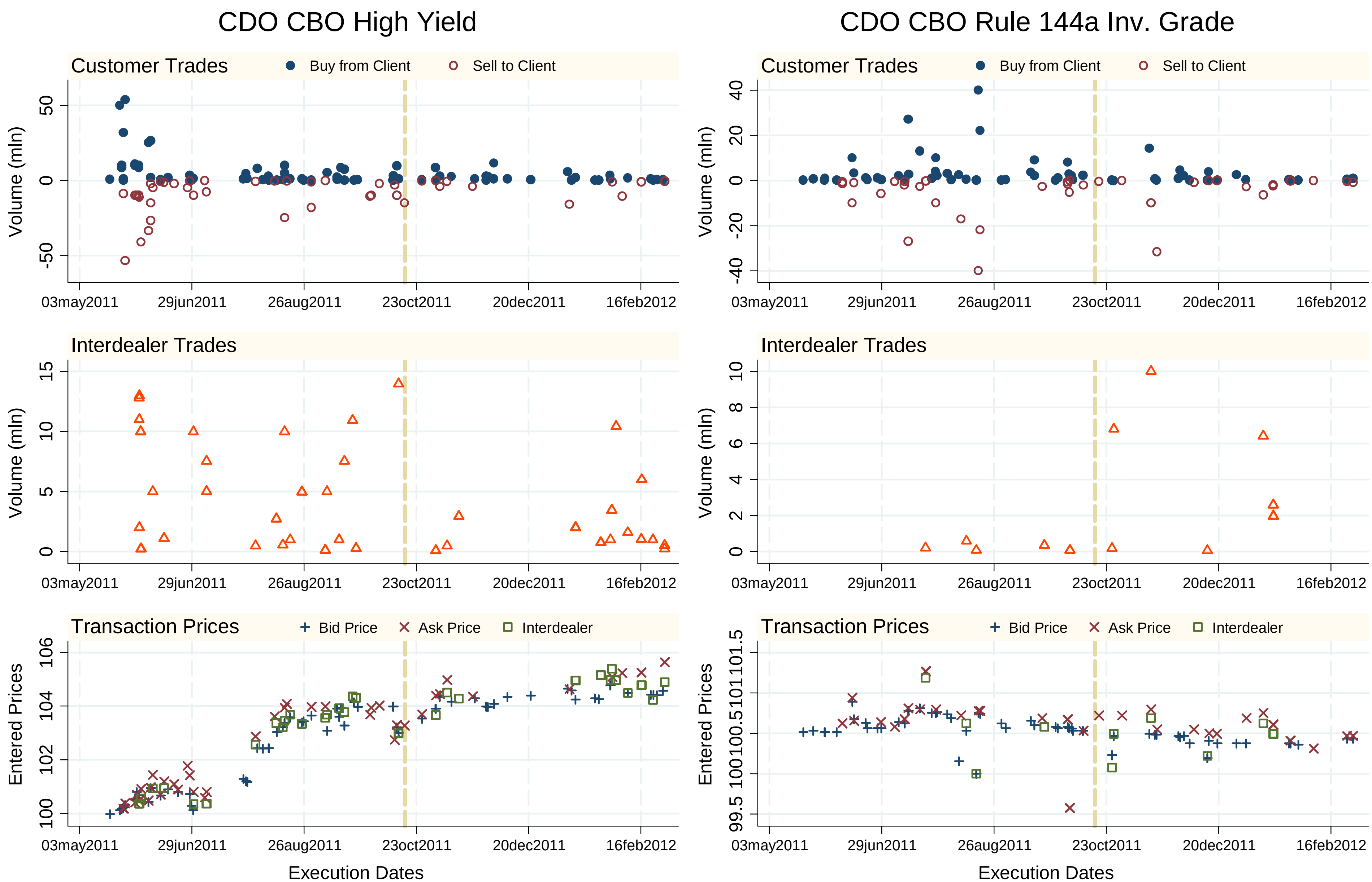
Legend: Number of trade records includes both trades with customers and interdealer trades after appropriate records cleaning (discussed in the Data section). The graphs show estimated distributions of the lower 95^{th} percentile within each group of instruments. The distribution is estimated using epanechnikov kernel density with 1/100 bandwidth. The sample period is from May 16, 2011 to February 29, 2012.

Figure 2a: Trading Patterns of Frequently Traded ABS Instruments



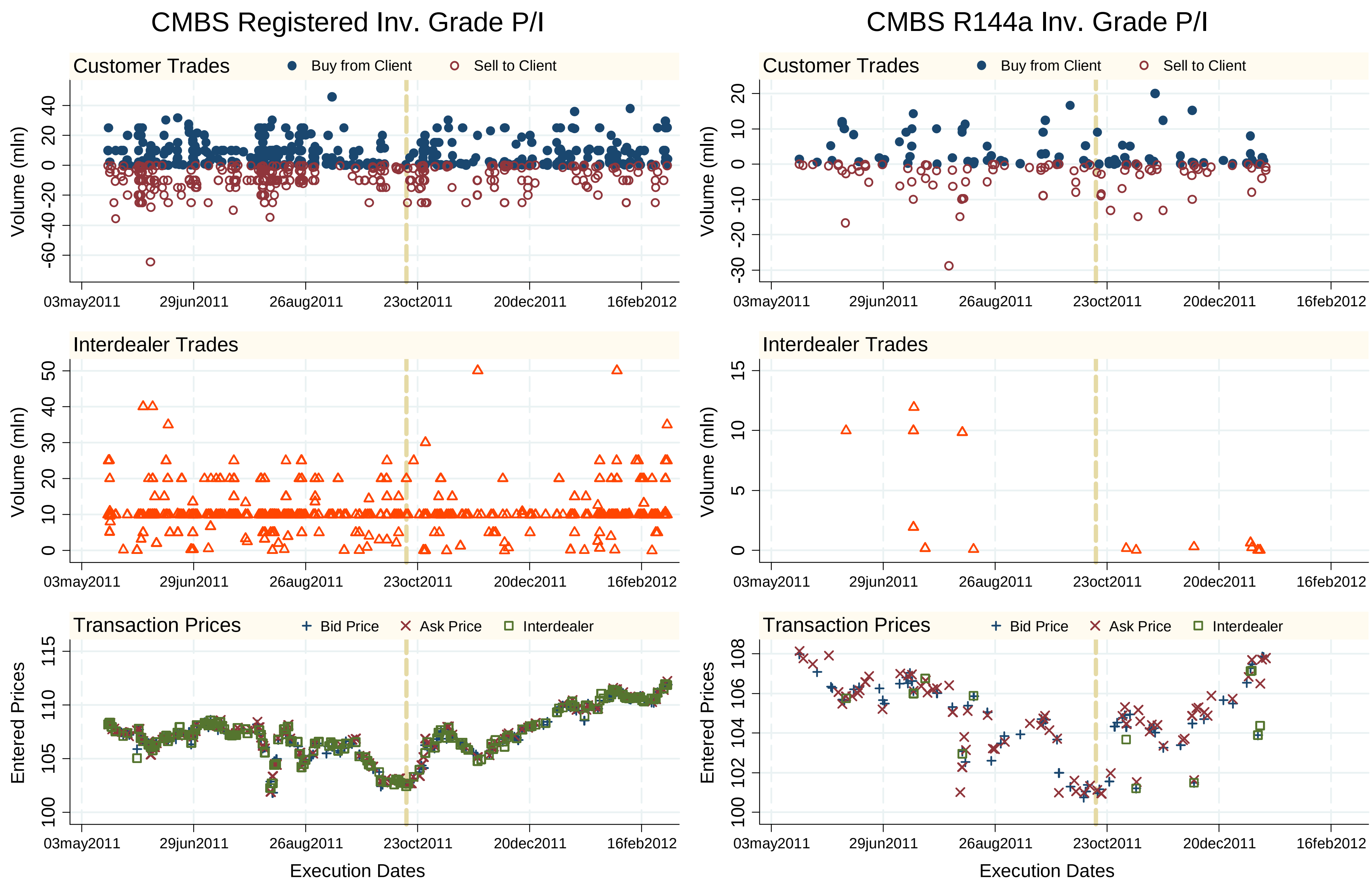
Legend: Total number of reports includes both customer and interdealer trades. Buys from customers are shown as having positive volumes traded and sells to customers are shown as having negative volume. Bold vertical line corresponds to the Index release date (October 17, 2011).

Figure 2b: Trading Patterns of Frequently Traded CDOs Instruments



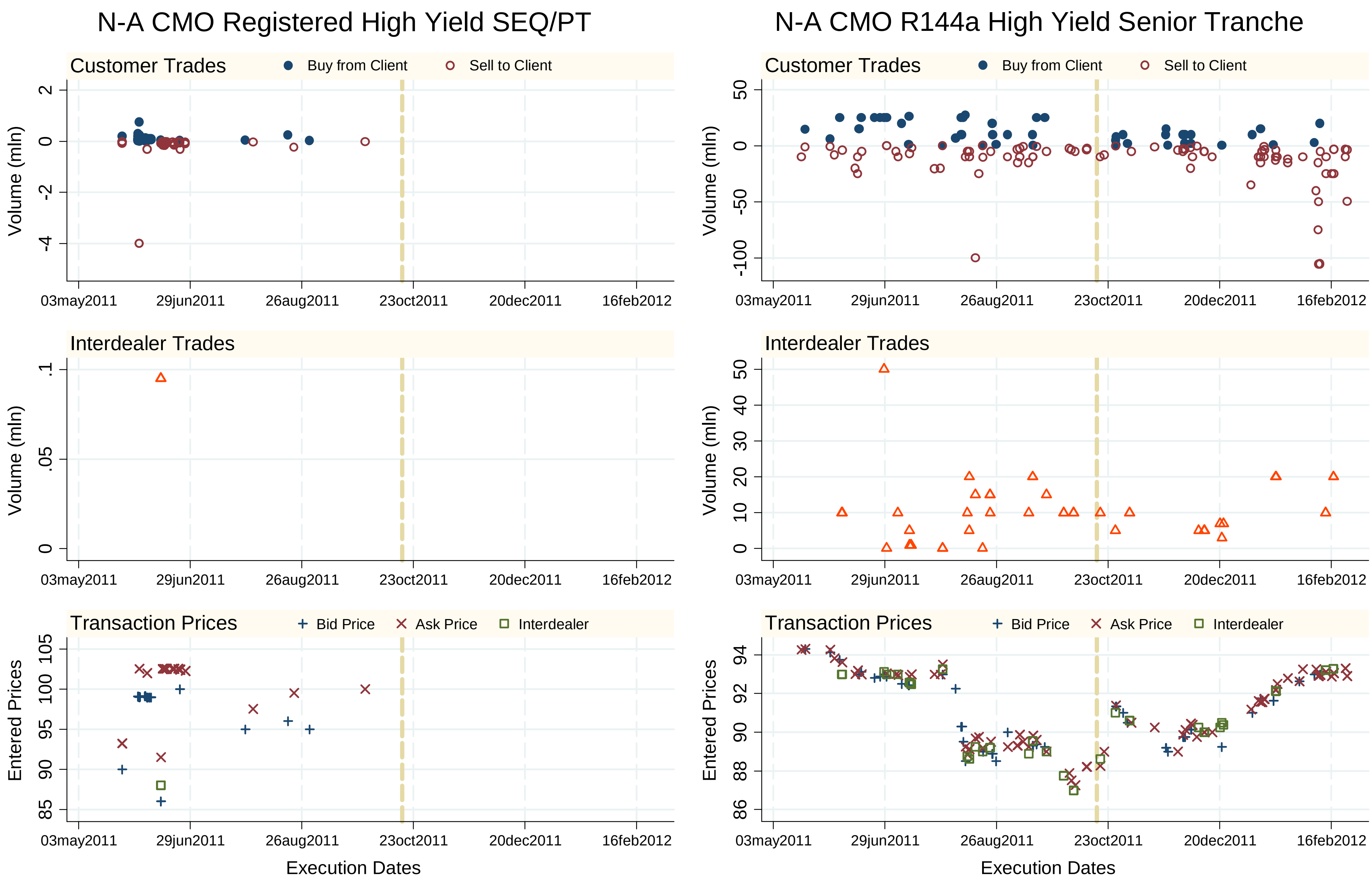
Legend: Total number of reports includes both customer and interdealer trades. Buys from customers are shown as having positive volumes traded and sells to customers are shown as having negative volume. Gray vertical line corresponds to the Index release date (October 17, 2011).

Figure 2c: Trading Patterns of Frequently Traded CMBS Instruments



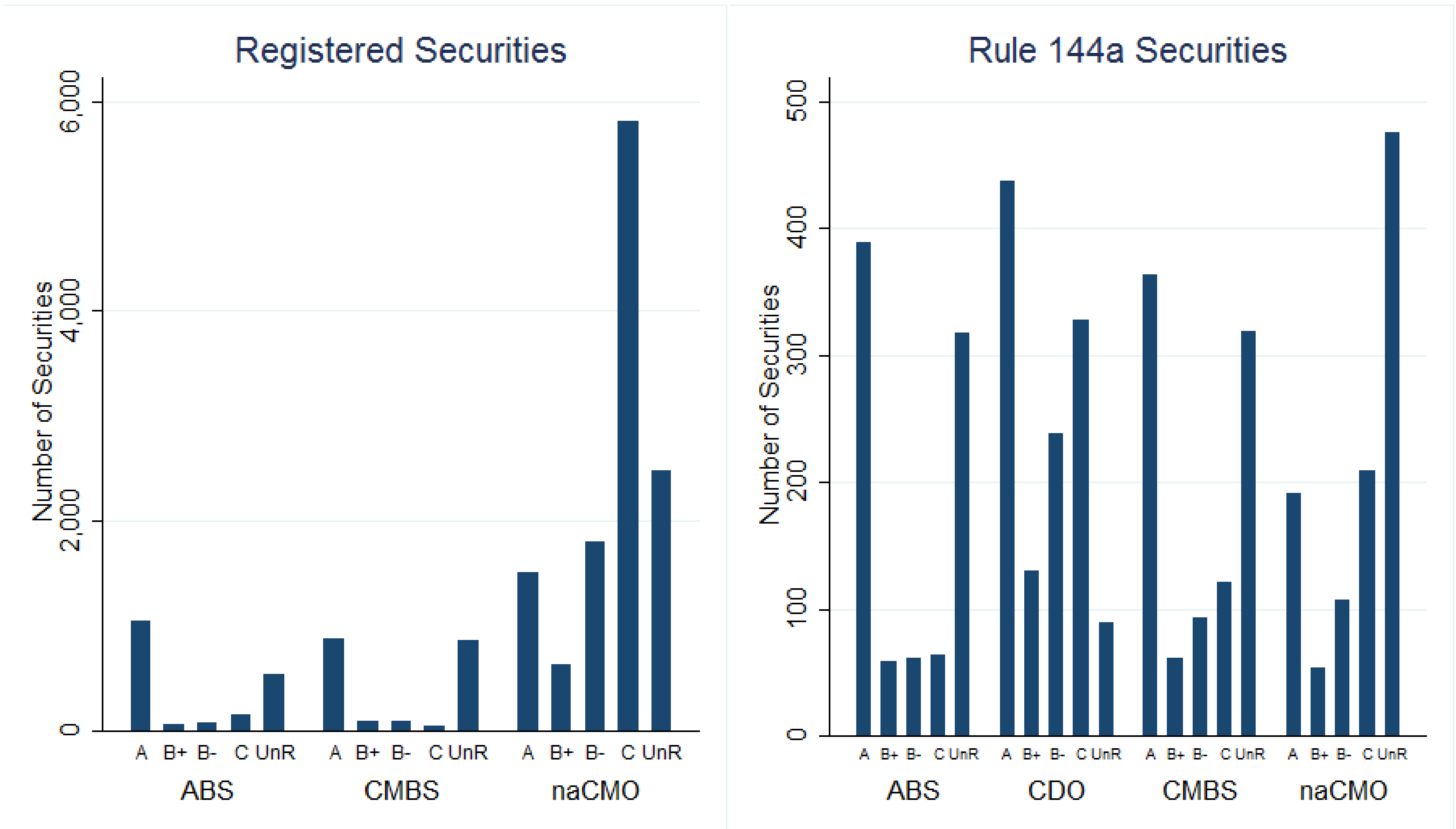
Legend: Total number of reports includes both customer and interdealer trades. Buys from customers are shown as having positive volumes traded and sells to customers are shown as having negative volume. Bold vertical line corresponds to the Index release date (October 17, 2011).

Figure 2d: Trading Patterns of Frequently Traded Non-Agency CMO Instruments



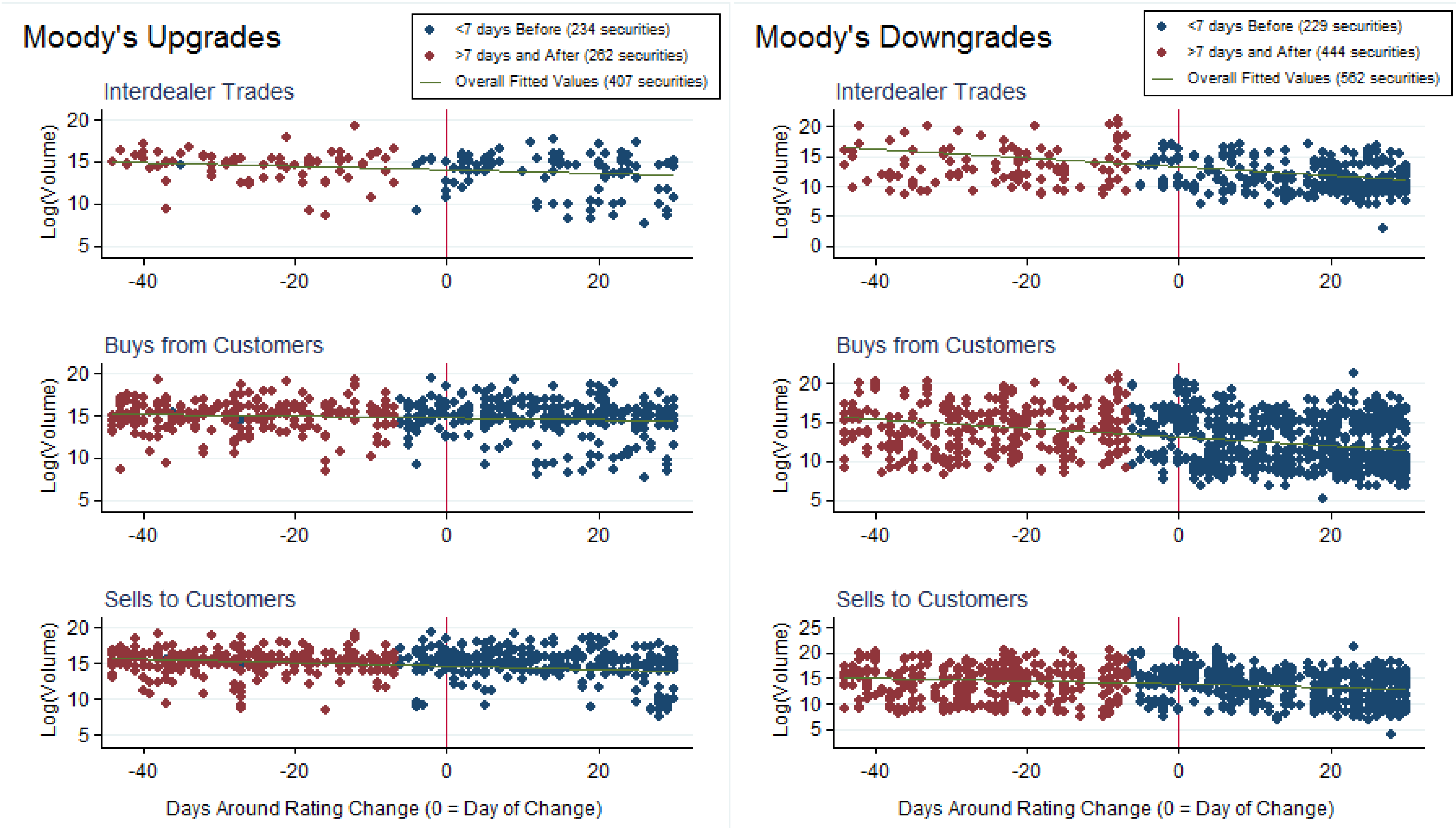
Legend: Total number of reports includes both customer and interdealer trades. Buys from customers are shown as having positive volumes traded and sells to customers are shown as having negative volume. Bold vertical line corresponds to the Index release date (October 17, 2011).

Figure 3: Distribution of Moody's Ratings in the Sample



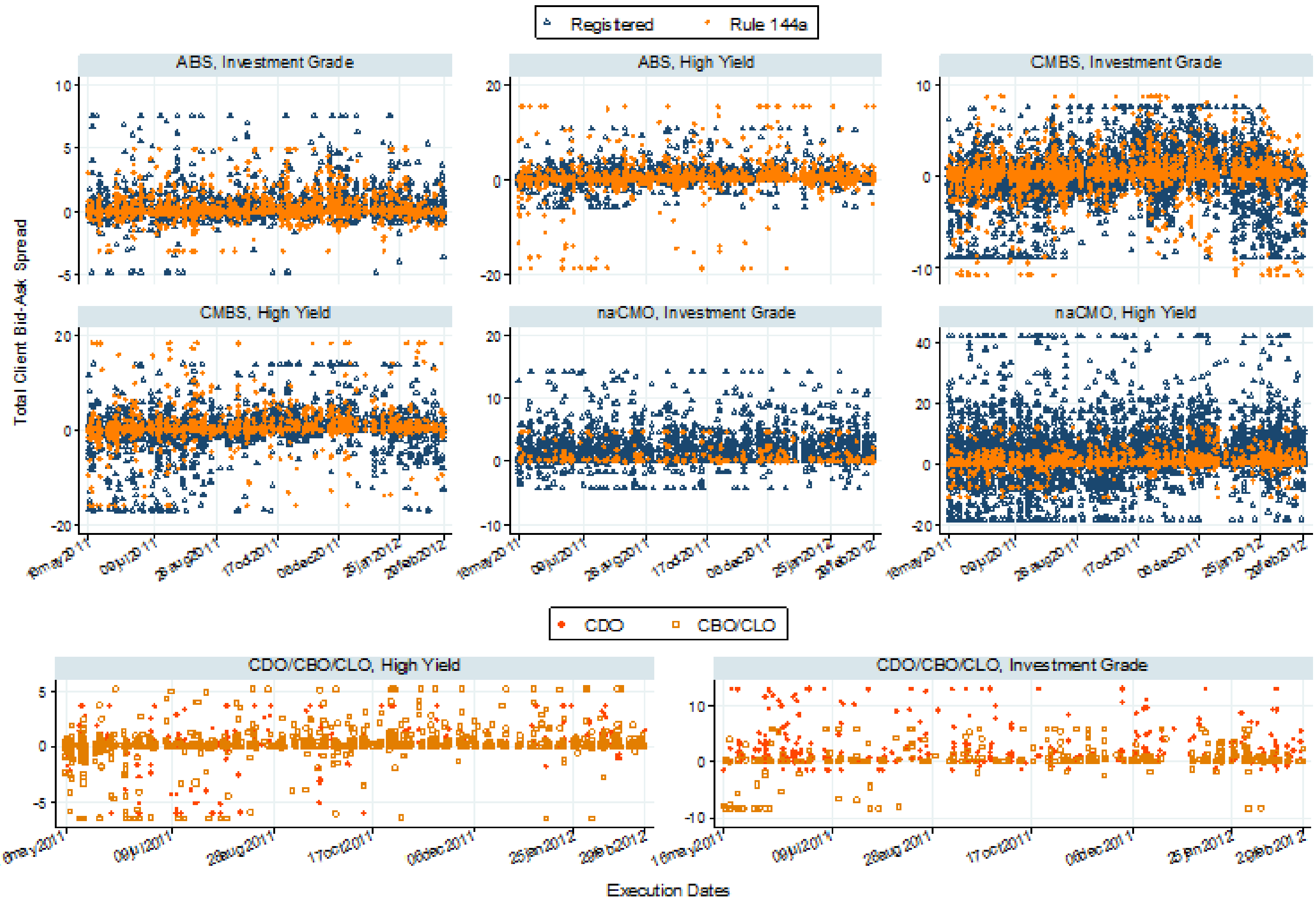
Legend: The bars show the distribution of the first Moody's rating effective in the sample period from May 16, 2011 to February 29, 2012. A category includes Aaa, Aa1, Aa2, Aa3, A1, A2, A3. B+ category includes Baa1, Baa2, and Baa3. B- category includes Ba1, Ba2, Ba3, B1, B2, B3. C category includes Caa1, Caa2, Caa3, Ca, C. "UnR" category includes instruments rated NR, instruments for which rating is withdrawn, or instruments not found on Moody's website.

Figure 4: Trading Activity around Rating Change Dates



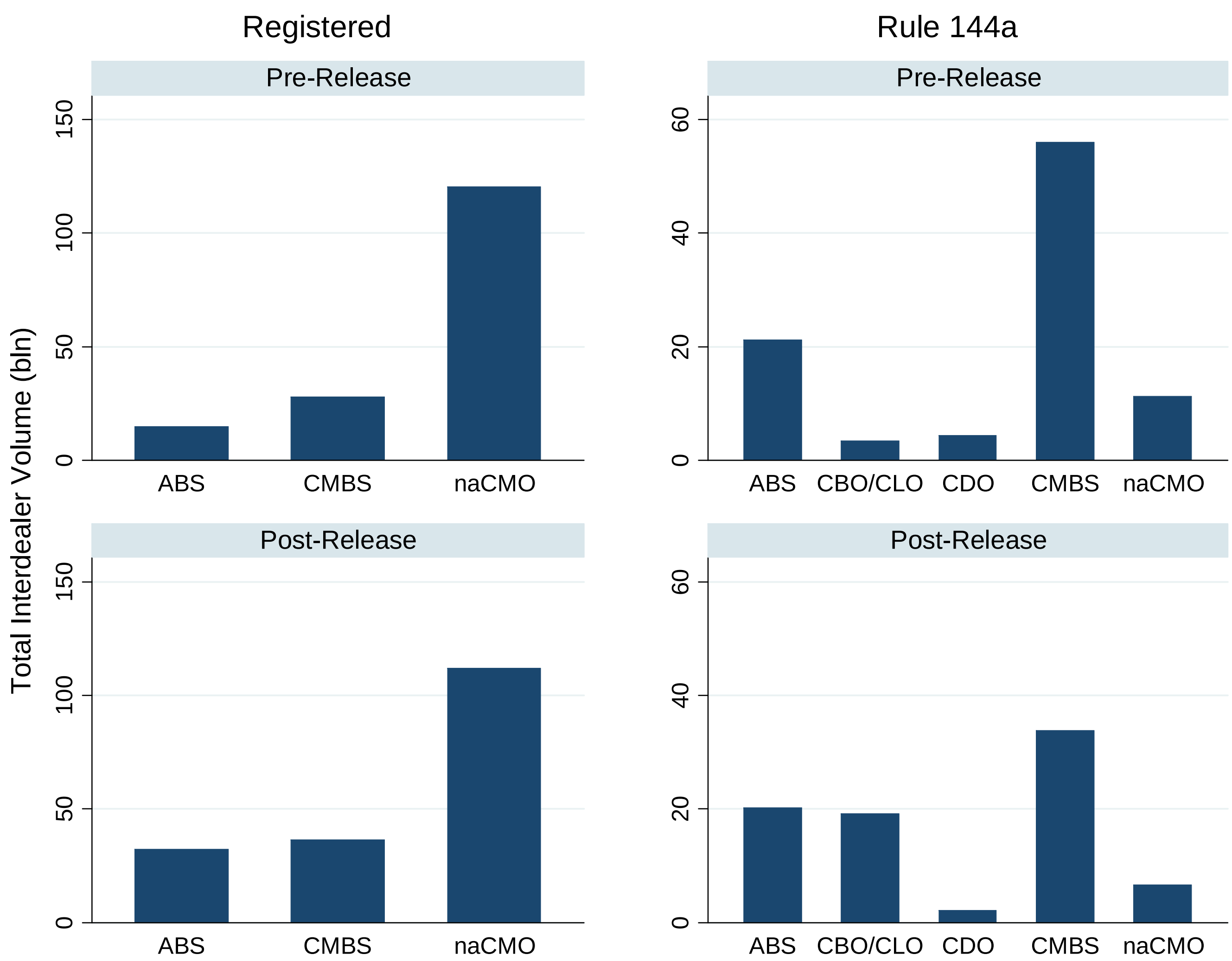
Legend: We look at instruments that had a Moody's upgrade and/or downgrade. For each such security we look at transactions that were executed 45 days before rating change and/or 31 days after. 7 days before rating change onward transactions are marked as "affected", they are shown as blue dots on the right part of each graph. All prior transactions are market as "before activity" (for a period of equal comparable length of 38 days, red dots). The line fits pooled sample of "before" and "after" transactions along time. An upward sloping line means volume tends to increase after the event. A downward-sloping line means volume tends to decrease.

Figure 5: Scatter Plots of Total Client Bid-Ask Spreads (Non-Retail Matches)



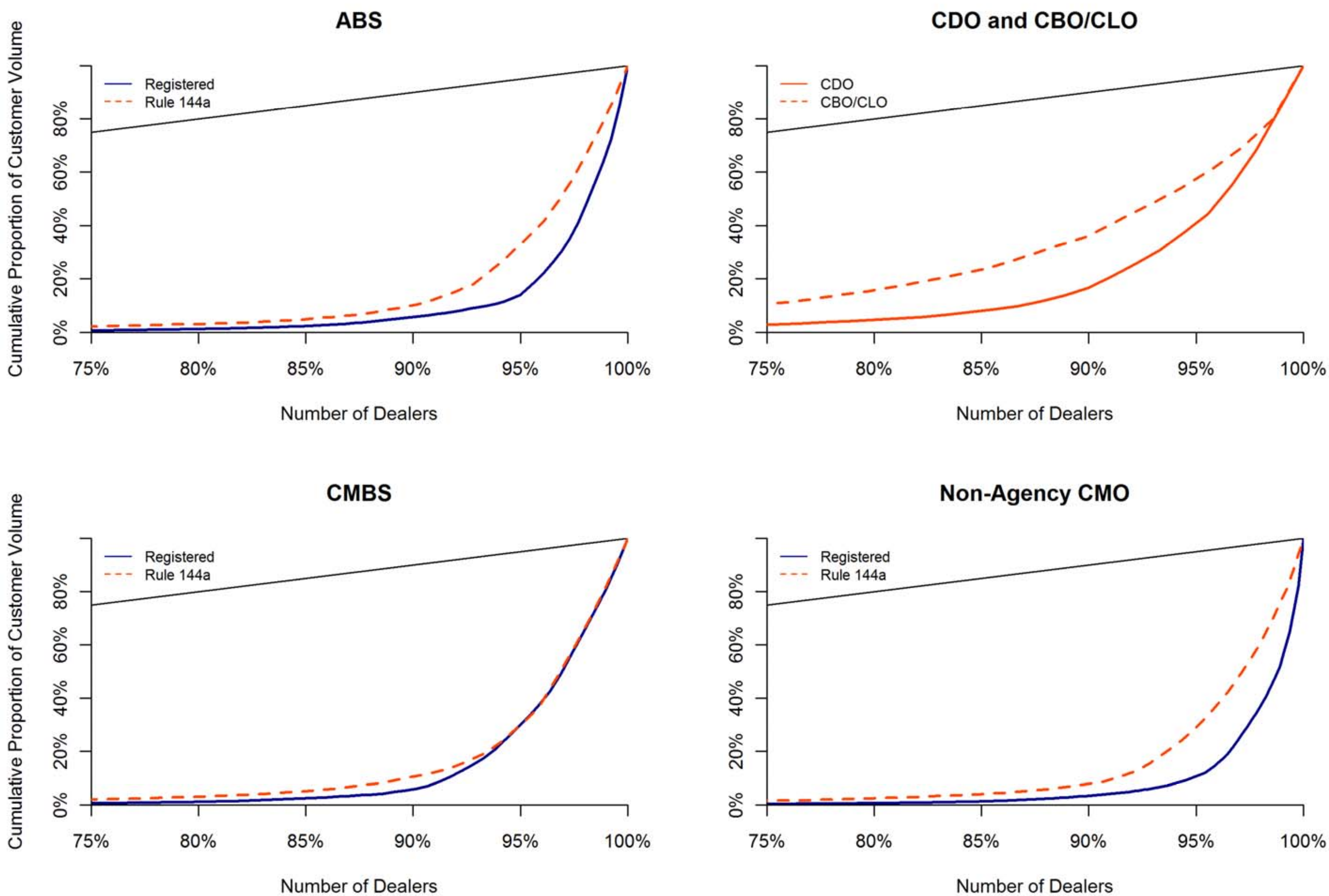
Legend: Larger size spreads are total client bid-ask spreads resulting from a chain with both buy from customer and sell to customer having volume greater than $100,000 of original balance.

Figure 6: Total Volume of Interdealer Trades by Security Types



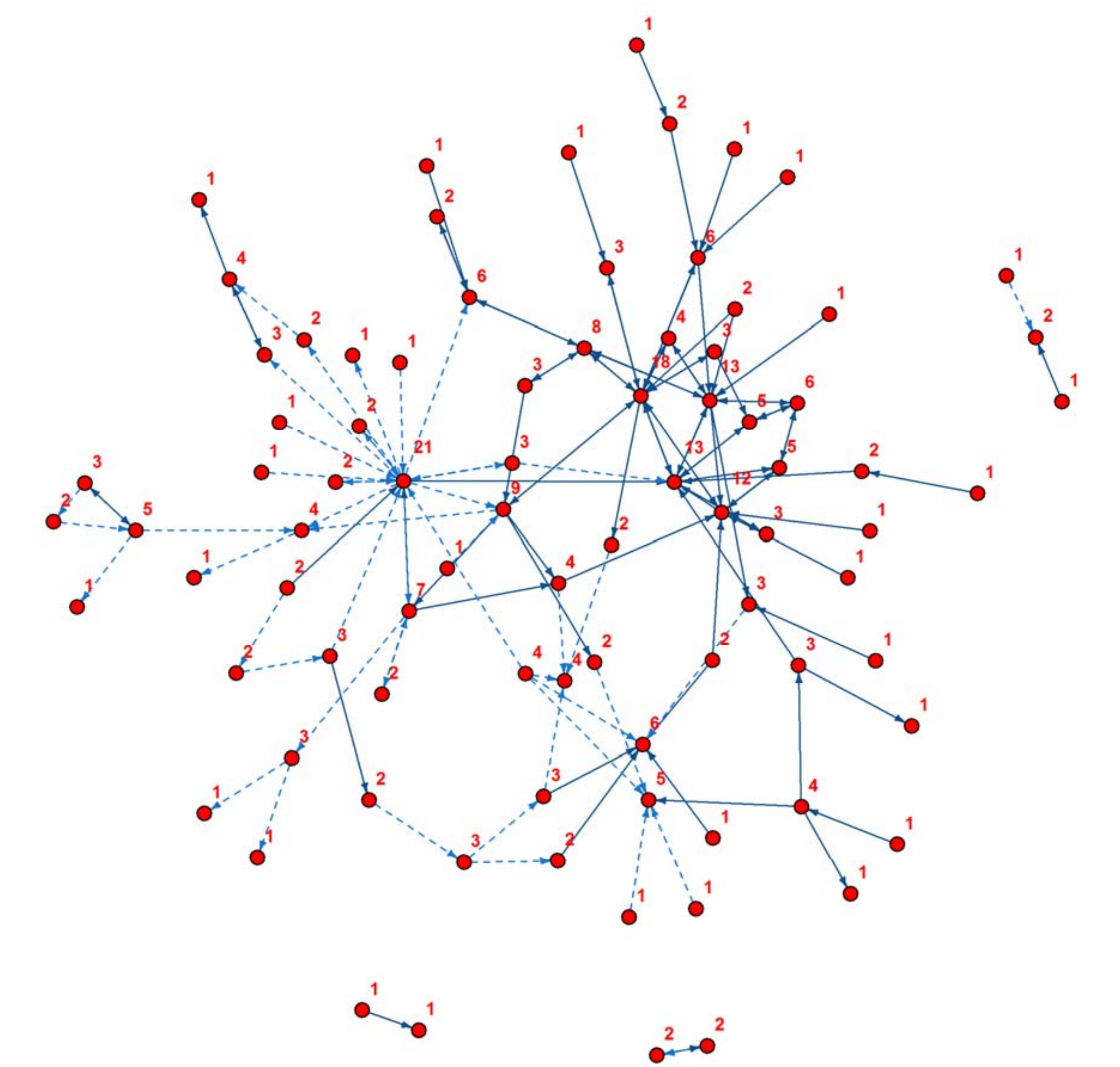
Legend: The total volume transacted on interdealer market by 580 active dealers in the pre-release subsample, 542 active dealers in the post-release subsample (441 dealers participated in both subsamples) shown by product types and type of security placement (Registered and Rule 144a). The Pre-Release Sample is from May 16, 2011 to October 17, 2011, and the Post-Release Sample is from October 18, 2011 to February 29, 2012.

Figure 7: Dealers' Shares in Original Balance with Customers (Lorenz Curves by Market)



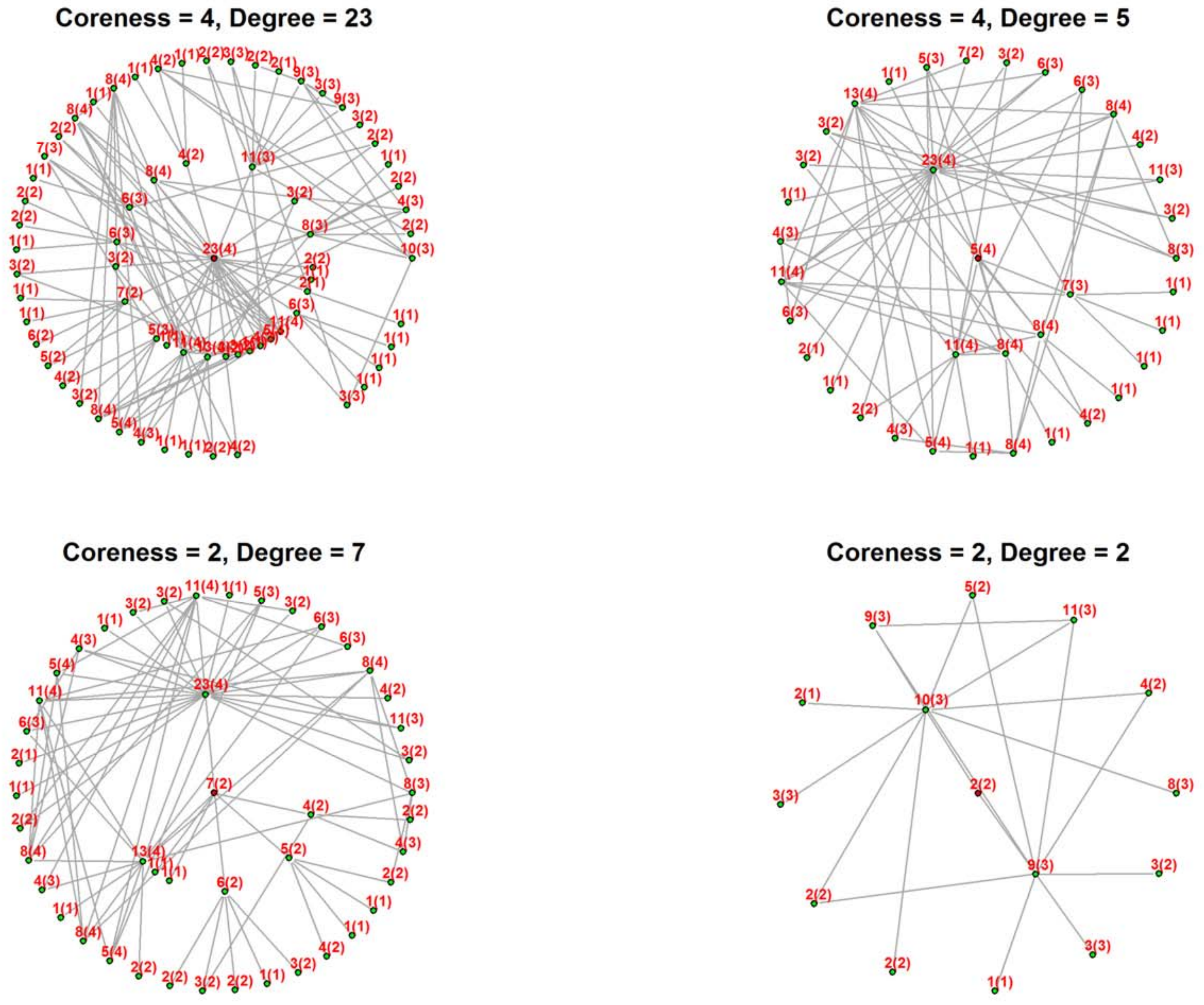
Legend: The 25% of dealers with largest volumes of original balance traded with customers are shown for each market. Numbers of Dealers in brackets correspond to dash Lorenz curves. All customer trades in instruments with at least two opposite trades at most two weeks apart in the sample period from October 17, 2011 to February 29, 2012 are used to construct Lorenz curves.

Figure 8: The Most Active Links of the Interdealer Network



Legend: Each node represents a dealer; each arrow represents the direction of order flow from one dealer to the other. Dealers are labeled by the number of trading partners (both buy and sell directed orders) in the sample from May 16, 2011 to February 29, 2012. Only trading relationships (links) with at least 50 trade reports and at least $10 million of original balance transacted are shown in the graph; links with more than $100 million transacted are shown as solid lines.

Figure 9: Examples of Dealers Coreness and Degree Centrality

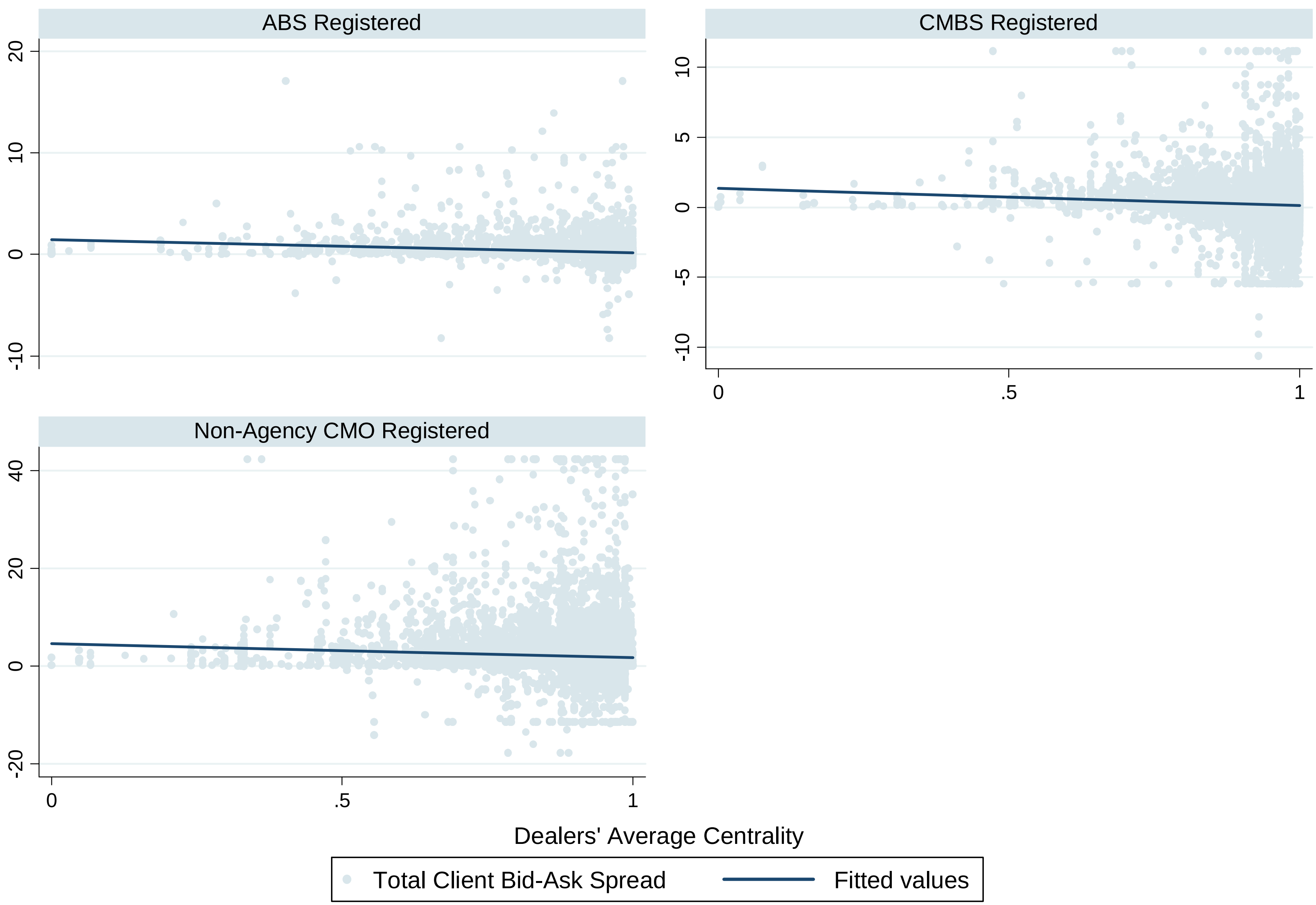


Legend: Degree centrality (undirected) shown for each dealer and coreness shown in brackets. The local neighborhoods up to the second degree (neighbors of neighbors) are presented for 4 combinations of degree and coreness of dealer in the middle (root). These neighborhoods correspond to the graph of interdealer market in Figure 6 with restriction on the volume of original balance transacted removed (each link restricted only to at least 50 transactions).

Figure 10: Weekly Moving Averages of Total Client Bid-Ask Spreads (Non-Retail Matches)

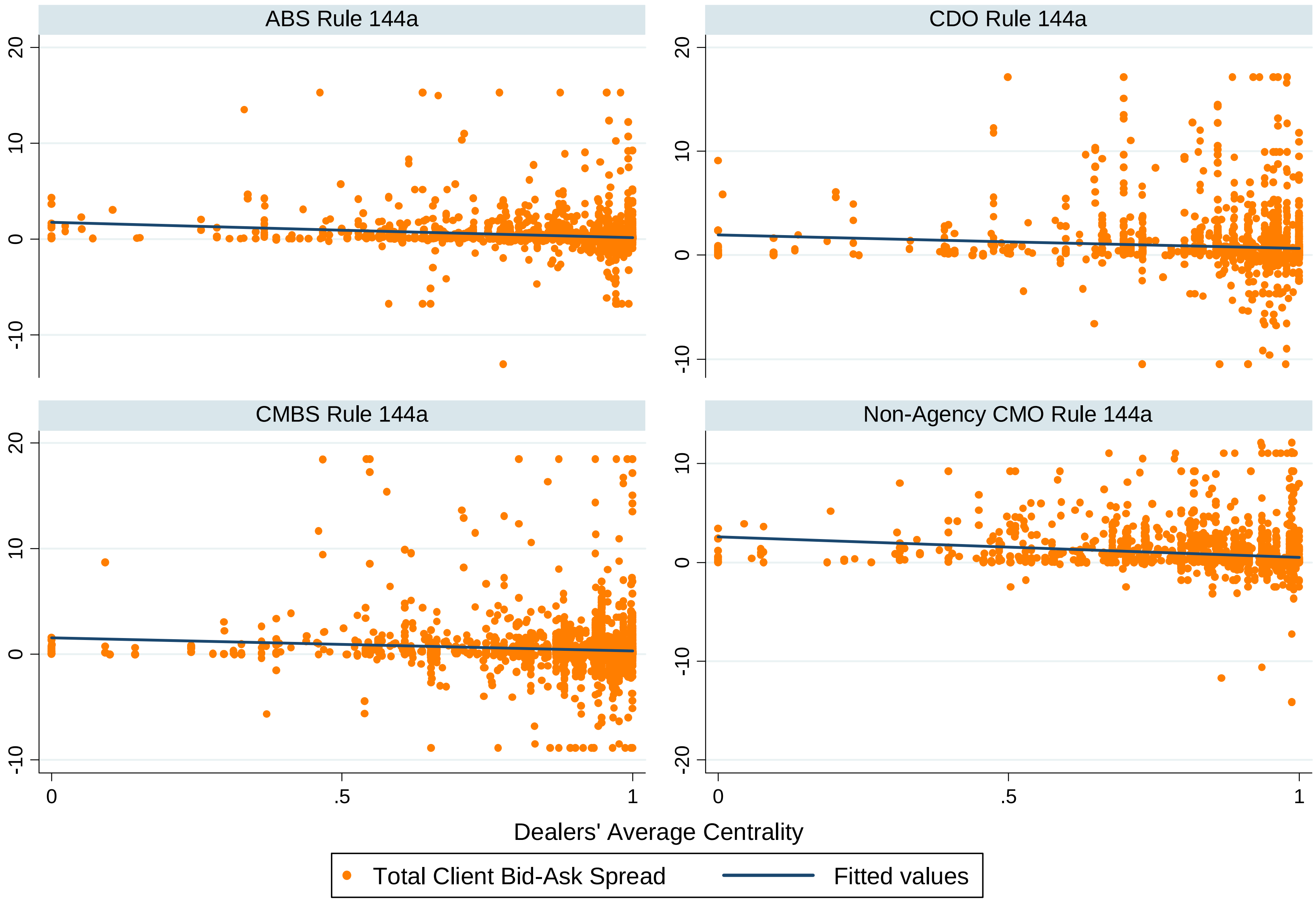
Legend: The daily moving-average client bid-ask spreads are presented with a rolling window of 7 trading days (includes 3 days forward and 3 days backward). Larger size spreads are total client bid-ask spreads resulting from a chain with both buy from customer and sell to customer having volume greater than $100,000 of original balance.

Figure 11a: Total Client Non-Retail Bid-Ask Spreads and Dealers' Centrality (Registered)



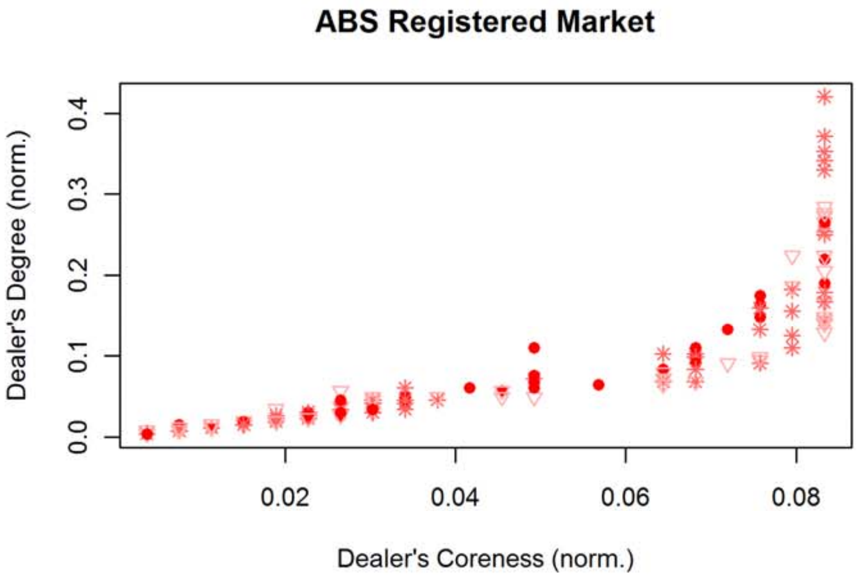
Legend: Average Dealers Centrality is the average betweenness centrality measure of all dealers that intermediated within a particular chain underlying a spread observation. Larger size spreads are total client bid-ask spreads resulting from a chain with both buy from customer and sell to customer having volume greater than $100,000 of original balance. Spreads are adjusted for coupon and factor payments.

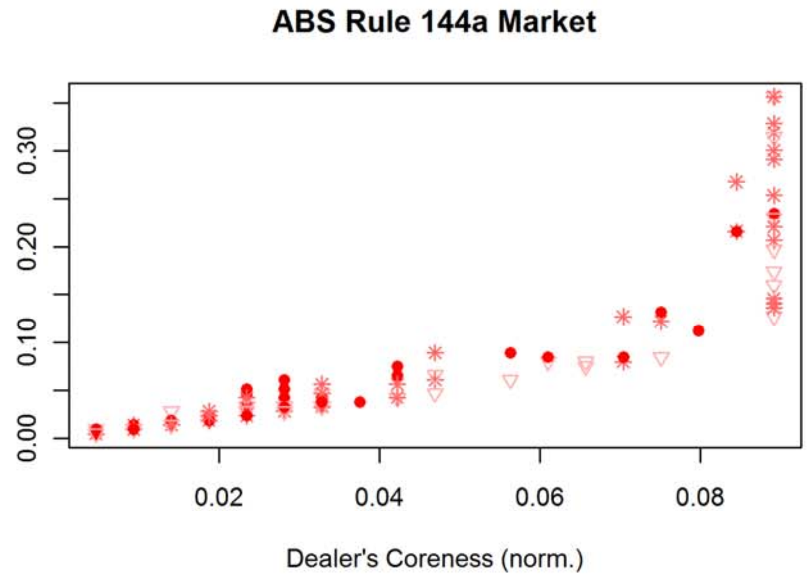
Figure 11b: Total Client Non-Retail Bid-Ask Spreads and Dealers' Centrality (Rule 144a)

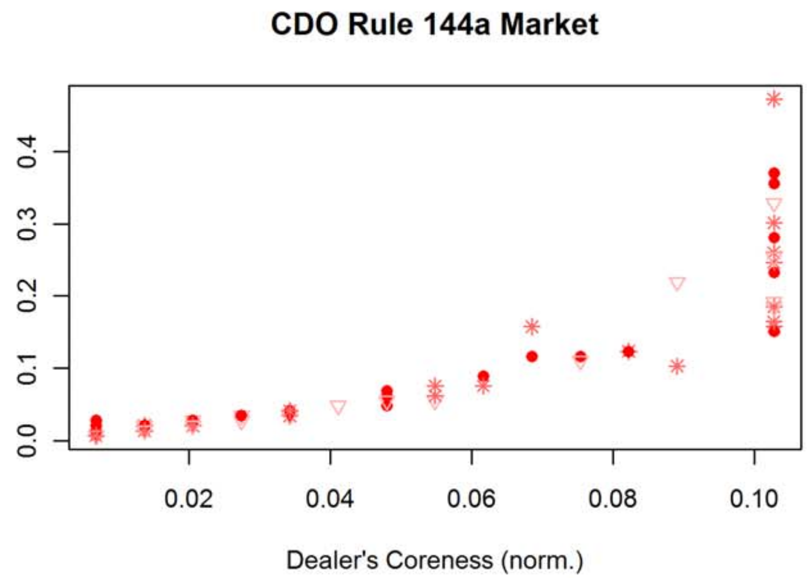


Legend: Average Dealers Centrality is the average betweenness centrality measure of all dealers that intermediated within a particular chain underlying a spread observation. Since most of transaction chains in Rule 144a issues have volume larger than $100,000 of original balance, we do not differentiate trades by size on this graph. Spreads are adjusted for coupon and factor payments.

Figure 12a: Non-Retail Dealer Bid-Ask Spreads and Dealers' Degree-Coreness

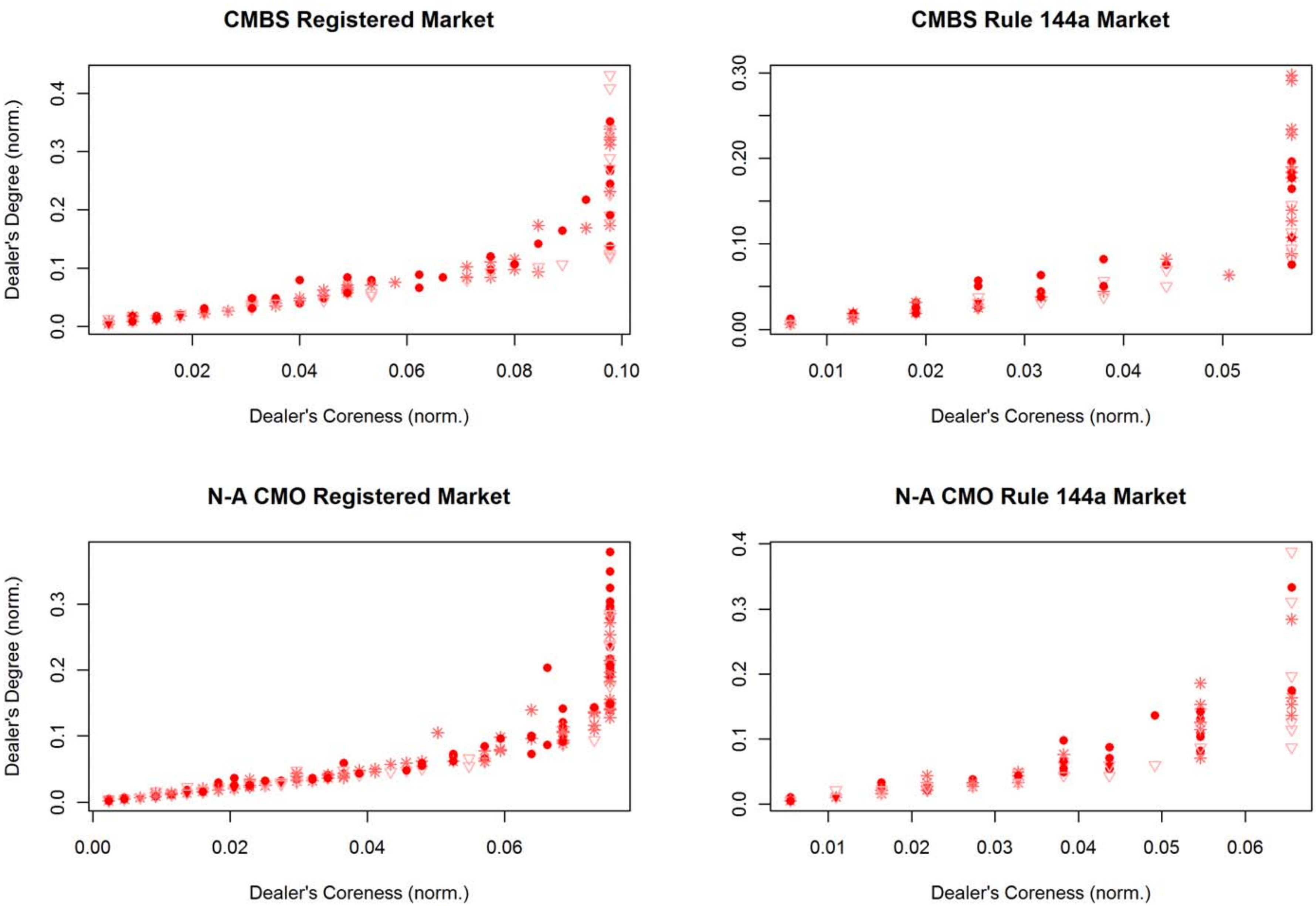






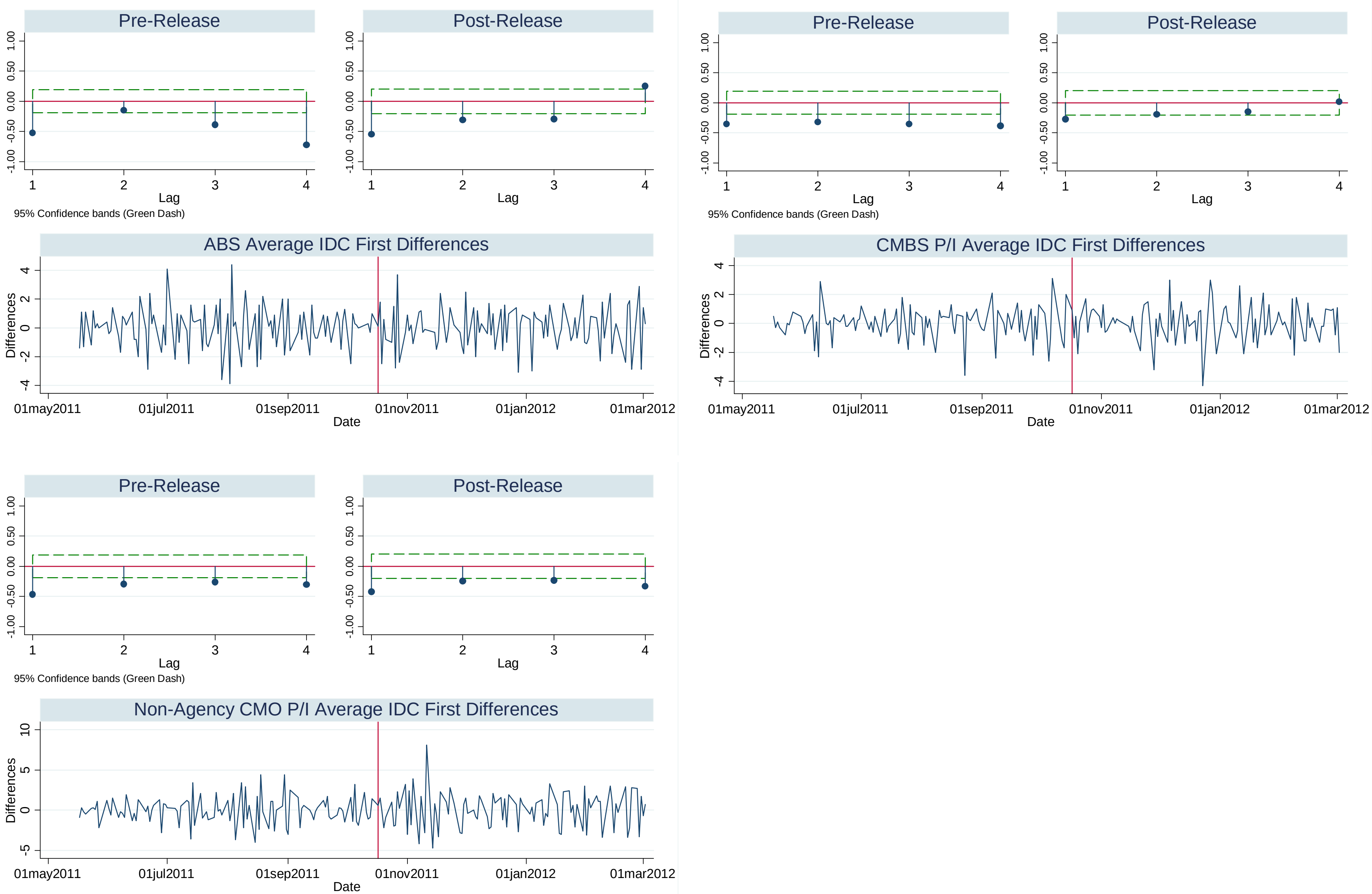
Legend: Each dot is a dealer with particular degree centrality and coreness in a given class of instruments. Three shades of each dot correspond to the level of average bid-ask spread charged by dealer (lighter shade means lower average bid-ask spread). Degree centrality is the number of trading partners of a dealer in the sample. Dealer's coreness is the number of trading partners in the k-core sub-network that includes that dealer (k-core is the largest sub-network where all dealers have at least k number of trading partners). Higher dealer's degree relative to his coreness means higher importance of this dealer as an intermediary between different groups of other dealers.

Figure 12b: Non-Retail Dealer Bid-Ask Spreads and Dealers' Degree-Coreness



<u>Legend:</u> Each dot is a dealer with particular degree centrality and coreness in a given class of instruments. Three shades of each dot correspond to the level of average bid-ask spread charged by dealer (lighter shade means lower average bid-ask spread). Degree centrality is the number of trading partners of a dealer in the sample. Dealer's coreness is the number of trading partners in the k-core sub-network that includes that dealer (k-core is the largest sub-network where all dealers have at least k number of trading partners). Higher dealer's degree relative to his coreness means higher importance of this dealer as an intermediary between different groups of other dealers.

Figure 13: Partial Autocorrelations of IDC Average Indexes



Legend: IDC Index is from the Structured Products Tables provided by FINRA and IDC publicly. The Average version of the index stands for the average (arithmetic mean) price of transactions for a particular group of instruments. The Figure presents partial autocorrelations of first differences of the index with 4 lags included in the estimation, together with the time-series plot of the index first differences.

Table 1: The Number of Instruments Traded

Category:	ABS							CDOs			
	Overall	Auto	Card	ManH	SBA	Stud	Other	Overall	CBO	CLO	CDO
Population	12,661	1,193	410	661	350	1,223	8,824	7,543	392	2,993	4,158
Registered	4,567	750	356	616	329	957	1,559	55	44	3	8
Rule 144a	8,094	443	54	45	21	266	7,265	7,488	348	2,990	4,150
Traded Pre-Release	1,994	485	227	152	172	304	654	731	53	398	280
Registered	1,425	361	211	147	169	237	300	23	22	---	1
Rule 144a	569	124	16	5	3	67	354	708	31	398	279
Traded Post-Release	1,989	513	196	113	198	290	679	718	46	474	198
Registered	1,359	371	183	109	188	224	284	24	22	---	2
Rule 144a	630	142	13	4	10	66	395	694	24	474	196
Traded Overall	2,807	645	261	213	237	417	1,034	1,251	71	749	431
Registered	1,905	466	243	206	227	328	435	29	26	---	3
Rule 144a	902	179	18	7	10	89	599	1,222	45	749	428

Category:	CMBS			Non-agency CMO						
	Overall	IO/PO	Other	Overall	IO/PO	PAC/TN	SEQ/PT	SUP/Z	Other Senior	Other
Population	13,720	1,421	12,299	78,350	8,798	4,520	29,366	1,456	15,998	18,212
Registered	5,765	628	5,137	61,687	7,906	4,487	24,505	1,280	13,432	10,077
Rule 144a	7,955	793	7,162	16,663	892	33	4,861	176	2,566	8,135
Traded Pre-Release	2,096	136	1,960	8,819	159	559	4,662	225	2,603	611
Registered	1,488	54	1,434	8,203	144	555	4,393	221	2,505	385
Rule 144a	608	82	526	616	15	4	269	4	98	226
Traded Post-Release	2,086	148	1,938	8,461	187	486	4,396	211	2,506	675
Registered	1,489	49	1,440	7,815	176	481	4,158	210	2,398	392
Rule 144a	597	99	498	646	11	5	238	1	108	283
Traded Overall	2,967	249	2,718	13,396	326	839	7,129	300	3,687	1,115
Registered	1,997	94	1,903	12,355	304	832	6,712	295	3,534	678
Rule 144a	970	155	815	1,041	22	7	417	5	153	437

Legend: The population of instruments is all issues in the FINRA database up to February 29, 2012. We define traded instruments as having at least two opposite trades with customers at most two weeks apart over the relevant sample period. The pre-release sample period is from May 16, 2011 to October 17, 2011, the post-release sample period is from October 18, 2011 to February 29, 2012, and the overall sample period is from May 16, 2011 to February 29, 2012.

Table 2a: ABS and CDOs Security Characteristics

Category:	ABS							CDOs			
	Overall	Auto	Card	ManH	SBA	Stud	Other	Overall	CBO	CLO	CDO
Traded Instruments	2,807	645	261	213	237	417	1,034	1,222	45	749	428
Registered	1,905	466	243	206	227	328	435	---	---	---	---
Inv. Grade	1,231	330	213	66	227	301	94	---	---	---	---
% floaters:	42%	11%	78%	11%	0%	100%	1%	---	---	---	---
High Yield	674	136	30	140	---	27	341	---	---	---	---
% floaters:	56%	5%	67%	9%	---	96%	92%	---	---	---	---
Rule 144a	902	179	18	7	10	89	599	1,222	45	749	428
Inv. Grade	291	115	12	4	10	78	72	655	21	529	105
% floaters:	46%	21%	75%	25%	10%	99%	29%	98%	76%	99%	95%
High Yield	611	64	6	3	---	11	527	567	24	220	323
% floaters:	82%	6%	50%	33%	---	100%	91%	95%	83%	98%	93%
Avg. Maturity	Jan-23	Feb-15	Jun-16	Feb-28	Apr-22	Dec-28	Apr-26	Oct-25	Jan-30	Jun-19	Jun-36
Registered	Aug-21	Dec-14	Jun-16	Dec-27	Apr-22	Feb-28	Apr-23	---	---	---	---
Rule 144a	Dec-25	Jul-15	Jan-17	Mar-31	Mar-22	Feb-32	Jun-28	Oct-25	Jan-30	Jun-19	Jun-36
Vintage% <4;4-6;>6	38/14/48	93/6/1	35/38/27	1/4/95	32/16/52	22/27/51	20/8/72	9/54/37	16/22/62	9/61/30	6/47/47
Registered	38/16/46	92/7/1	34/38/28	0/3/97	32/17/51	22/29/49	18/7/75	---	---	---	---
Inv. Grade	43/22/35	90/10/0	31/39/30	0/2/98	32/17/51	18/31/51	44/21/35	---	---	---	---
High Yield	30/5/65	96/2/2	53/30/17	0/4/96	---	66/12/22	11/3/86	---	---	---	---
Rule 144a	38/10/52	96/4/0	56/40/4	43/14/43	30/0/70	24/20/56	22/9/69	9/54/37	16/22/62	9/61/30	6/47/47
Inv. Grade	56/15/29	95/4/1	42/52/6	25/25/50	30/0/70	18/20/62	43/24/33	6/53/41	24/19/57	7/59/34	1/27/72
High Yield	29/7/64	98/2/0	83/17/0	67/0/33	---	64/18/18	19/7/74	11/56/33	8/25/67	16/64/20	8/53/39
Avg. Coupon Rate	3.09	2.52	1.61	6.83	5.42	1.11	3.97	1.81	2.36	1.66	2.00
Registered	3.08	2.34	1.58	6.86	5.43	0.99	3.77	---	---	---	---
Rule 144a	3.11	2.98	1.99	5.82	5.28	1.53	4.14	1.81	2.36	1.66	2.00
Avg. Factor	54.67	77.60	97.68	49.91	45.48	78.10	23.15	87.76	74.03	90.50	84.40
Registered	61.11	77.20	97.90	49.68	45.89	78.42	23.64	---	---	---	---
Rule 144a	41.06	78.64	94.74	56.81	36.17	76.93	22.79	87.76	74.03	90.50	84.40

Legend: We define traded instruments as having at least two opposite trades with customers at most two weeks apart in the sample period. For each instrument we take average of each characteristic within each instrument group. Vintage percentages represent relative percentage of instruments with less than 4 years in between first Moody's rating date and the trade execution date, in between 4 and 6 years, and more than 6 years, respectively.

Table 2b: ABS and CDO Trading Characteristics

Category:	ABS Overall	Auto	Card	ManH	SBA	Stud	Other	CDOs Overall	CBO	CLO	CDO
Avg. Trades per Day	0.097	0.132	0.215	0.033	0.091	0.069	0.072	0.026	0.056	0.025	0.025
Registered	0.108	0.139	0.194	0.033	0.089	0.067	0.103	---	---	---	---
Inv. Grade	0.117	0.140	0.202	0.032	0.089	0.069	0.124	---	---	---	---
High Yield	0.092	0.137	0.136	0.033	---	0.047	0.098	---	---	---	---
Rule 144a	0.074	0.113	0.499	0.030	0.139	0.078	0.048	0.026	0.056	0.025	0.025
Inv. Grade	0.118	0.121	0.562	0.024	0.139	0.079	0.083	0.028	0.079	0.024	0.039
High Yield	0.053	0.099	0.375	0.037	---	0.074	0.044	0.024	0.035	0.027	0.021
# of Dealers	6.03	8.25	9.94	3.02	5.27	5.71	4.59	2.38	3.44	2.34	2.33
Registered	6.74	8.51	9.90	3.06	5.26	5.67	6.40	---	---	---	---
Rule 144a	4.54	7.56	10.56	1.86	5.40	5.84	3.28	2.38	3.44	2.34	2.33
% Interdealer Trades	13.20%	11.50%	13.81%	10.91%	18.91%	17.48%	11.53%	8.57%	7.38%	8.59%	8.66%
Registered	13.62%	10.02%	13.78%	11.21%	18.79%	16.96%	13.30%	---	---	---	---
Rule 144a	12.31%	15.36%	14.24%	2.12%	21.68%	19.40%	10.25%	8.57%	7.38%	8.59%	8.66%
Trade Sizes% R/M/I	14/29/57	11/35/54	12/27/61	32/26/42	4/32/64	9/27/64	21/24/55	2/8/90	20/17/63	0/6/94	1/10/89
Registered	17/31/52	14/37/49	14/30/56	33/25/42	5/34/61	10/25/65	32/26/42	---	---	---	---
Inv. Grade	13/33/54	13/38/49	14/30/56	21/42/37	5/34/61	10/25/65	28/34/38	---	---	---	---
High Yield	27/26/47	15/33/52	20/27/53	38/18/44	---	5/27/68	33/23/44	---	---	---	---
Rule 144a	3/24/73	2/31/67	0/13/87	0/35/65	1/10/89	7/34/59	3/20/77	2/8/90	20/17/63	0/6/94	1/10/89
Inv. Grade	3/27/70	2/31/67	0/14/86	0/40/60	1/10/89	7/36/57	5/26/69	1/8/91	5/26/69	0/5/95	1/10/89
High Yield	2/21/77	2/31/67	1/11/88	0/30/70	---	2/17/81	3/19/78	4/9/87	50//48	1/9/90	1/10/89

Legend: We define traded instruments as having at least two opposite trades with customers at most two weeks apart in the sample period. For each instrument we take average of each characteristic within each instrument group. Trade sizes percentages represent proportion of retail-size trades (R) less than $100,000 of original par volume, medium-size trades (M) between $100,000 and $1,000,000 of original par volume, and institutional-size trades (I) more than $1,000,000 of original par volume.

Table 3a: CMBS and Non-Agency CMO Security Characteristics

Category:	CMBS			Non-agency CMO						
	Overall	IO/PO	Other	Overall	IO/PO	PAC/TN	SEQ/PT	SUP/Z	Other Senior	Other
Traded Instruments	2,967	249	2,718	13,396	326	839	7,129	300	3,687	1,115
Registered	1,997	94	1,903	12,355	304	832	6,712	295	3,534	678
Inv. Grade	928	42	886	2,024	34	108	1,137	23	681	41
% floaters:	32%	100%	29%	65%	76%	12%	72%	22%	60%	93%
High Yield	1,069	52	1,017	10,331	270	724	5,575	272	2,853	637
% floaters:	39%	100%	36%	71%	79%	25%	78%	31%	67%	90%
Rule 144a	970	155	815	1,041	22	7	417	5	153	437
Inv. Grade	411	104	307	110	3	2	86	---	19	---
% floaters:	71%	100%	61%	80%	67%	50%	81%	---	79%	---
High Yield	559	51	508	931	19	5	331	5	134	437
% floaters:	63%	100%	59%	85%	74%	40%	77%	40%	69%	97%
Avg. Maturity	Mar-39	Jun-40	Jan-39	Mar-35	Jan-36	Mar-35	Jul-35	Dec-34	Feb-35	Jun-33
Registered	Apr-40	Nov-40	Mar-40	Mar-35	Oct-35	Mar-35	Jun-35	Dec-34	Jan-35	Dec-32
Rule 144a	Dec-36	Mar-40	Apr-36	Dec-35	Jun-39	Dec-32	Mar-37	Jul-36	Dec-36	Mar-34
Vintage% <4;4-6;>6	34/33/33	48/22/30	33/34/33	10/42/48	17/49/34	2/54/44	9/49/42	5/43/52	12/36/52	14/10/76
Registered	31/34/36	54/21/25	30/34/36	8/44/48	15/51/34	2/54/44	7/50/43	4/43/53	11/36/53	15/12/73
Inv. Grade	6/43/51	4/41/55	6/43/51	1/17/82	0/26/74	0/19/81	1/24/75	0/15/85	1/7/92	0/3/97
High Yield	53/25/22	94/4/2	51/26/23	10/49/41	17/54/29	3/59/38	8/55/37	4/45/51	13/43/44	16/13/71
Rule 144a	39/32/29	45/22/33	38/34/28	29/23/48	45/26/29	0/67/33	41/39/20	60/40/0	44/25/31	12/6/82
Inv. Grade	32/33/35	23/31/46	35/33/32	12/45/43	0/33/67	0/50/50	14/51/35	---	6/18/76	---
High Yield	45/32/23	90/4/6	40/35/25	31/20/49	53/25/22	0/74/26	48/35/17	60/40/0	50/26/24	12/6/82
Avg. Coupon Rate	4.54	0.88	4.87	8.74	219.75	5.77	2.35	6.40	4.28	3.15
Registered	4.91	0.99	5.10	9.05	234.00	5.77	2.33	6.43	4.32	3.08
Rule 144a	3.76	0.81	4.32	2.98	3.14	5.81	2.71	4.71	3.23	3.85
Avg. Factor	85.12	67.57	86.73	52.63	41.20	69.19	58.22	72.47	43.71	31.91
Registered	85.65	60.38	86.90	53.71	39.99	69.21	58.20	71.96	43.33	42.61
Rule 144a	84.05	71.93	86.35	39.76	57.89	67.61	58.54	102.47	52.48	15.30

Legend: We define traded instruments as having at least two opposite trades with customers at most two weeks apart in the sample period. For each instrument we take average of each characteristic within each instrument group. Vintage percentages represent relative percentage of instruments with less than 4 years in between first Moody's rating date and the trade execution date, in between 4 and 6 years, and more than 6 years, respectively.

Table 3b: CMBS and Non-Agency CMO Trading Characteristics

Category:	CMBS			Non-agency CMO						
	Overall	IO/PO	Other	Overall	IO/PO	PAC/TN	SEQ/PT	SUP/Z	Other Senior	Other
Avg. Trades per Day	0.093	0.032	0.099	0.067	0.028	0.078	0.050	0.125	0.104	0.037
Registered	0.115	0.030	0.119	0.069	0.027	0.079	0.051	0.127	0.106	0.040
Inv. Grade	0.149	0.024	0.155	0.070	0.038	0.052	0.056	0.116	0.099	0.041
High Yield	0.085	0.034	0.088	0.069	0.025	0.083	0.050	0.128	0.107	0.040
Rule 144a	0.048	0.034	0.050	0.036	0.041	0.048	0.033	0.021	0.051	0.032
Inv. Grade	0.067	0.030	0.079	0.036	0.021	0.058	0.034	---	0.049	---
High Yield	0.033	0.043	0.033	0.036	0.045	0.044	0.033	0.021	0.051	0.032
# of Dealers	5.59	2.48	5.88	3.87	2.28	3.38	3.51	7.90	4.86	2.68
Registered	6.79	2.10	7.02	3.97	2.20	3.38	3.55	8.00	4.93	2.82
Rule 144a	3.13	2.72	3.21	2.70	3.36	3.43	2.74	2.00	3.14	2.47
% Interdealer Trades	9.82%	8.11%	9.98%	13.65%	14.35%	11.61%	12.66%	24.97%	15.17%	13.24%
Registered	11.10%	4.36%	11.43%	14.02%	14.27%	11.59%	12.80%	24.98%	15.51%	16.40%
Rule 144a	7.20%	10.39%	6.59%	9.28%	15.51%	14.21%	10.39%	24.67%	7.35%	8.34%
Trade Sizes% R/M/I	12/25/63	0/6/94	13/26/61	55/17/28	4/18/78	63/22/15	41/18/39	88/8/4	67/15/18	21/23/56
Registered	14/26/60	0/14/86	14/27/59	57/17/26	4/18/78	63/22/15	43/17/40	88/8/4	68/15/17	31/25/44
Inv. Grade	13/27/60	0/3/97	13/27/60	59/15/26	4/16/80	56/20/24	45/19/36	93/4/3	72/11/17	38/26/36
High Yield	16/25/59	0/20/80	16/25/59	56/17/27	4/19/77	64/22/14	42/17/41	88/8/4	68/16/16	31/25/44
Rule 144a	4/20/76	0/2/98	4/23/73	5/21/74	0/16/84	29/14/57	2/19/79	5/23/72	14/25/61	3/21/76
Inv. Grade	4/20/76	0/2/98	5/23/72	1/17/82	0/0/100	0/0/100	1/16/83	---	0/22/78	---
High Yield	2/20/78	0/2/98	3/22/75	6/21/73	0/17/83	43/22/35	3/20/77	5/23/72	16/26/58	3/21/76

Legend: We define traded instruments as having at least two opposite trades with customers at most two weeks apart in the sample period. For each instrument we take average of each characteristic within each instrument group. Trade sizes percentages represent proportion of retail-size trades (R) less than $100,000 of original par volume, medium-size trades (M) between $100,000 and $1,000,000 of original par volume, and institutional-size trades (I) more than $1,000,000 of original par volume.

Table 4: Mean Client Spreads by Transaction Sizes

	Investment Grade				High Yield			
	ABS	CDOs	CMBS	N-A CMO	ABS	CDOs	CMBS	N-A CMO
Overall	0.378	0.397	0.271	2.871	0.846	1.512	0.746	3.463
	(0.009)	(0.036)	(0.012)	(0.027)	(0.029)	(0.128)	(0.028)	(0.018)
Retail	1.400	1.197	1.023	3.828	2.066	3.711	2.868	4.333
	(0.056)	(0.614)	(0.049)	(0.034)	(0.075)	(1.482)	(0.113)	(0.021)
	1763	11	1651	6896	901	15	1099	33432
Non-Retail	0.233	0.390	0.163	1.566	0.546	1.472	0.389	2.180
	(0.006)	(0.036)	(0.011)	(0.036)	(0.029)	(0.127)	(0.023)	(0.029)
	12475	1278	11446	5052	3660	814	6532	22667
Difference	F = 433.3	F = 1.9	F = 294.3	F = 2121.2	F = 361.4	F = 2.4	F = 458.9	F = 3541.4
	p=0.000	p=0.169	p=0.000	p=0.000	p=0.000	p=0.120)	p=0.000	p=0.000
Registered	0.418		0.275	3.011	1.016		0.684	3.546
	(0.011)		(0.012)	(0.027)	(0.034)		(0.027)	(0.018)
Retail	1.423		0.995	3.829	2.116		2.761	4.337
	(0.057)		(0.048)	(0.034)	(0.075)		(0.106)	(0.021)
	1701		1554	6890	857		1062	33339
Non-Retail	0.246		0.157	1.734	0.568		0.275	2.284
	(0.007)		(0.011)	(0.040)	(0.032)		(0.020)	(0.031)
	9946		9549	4411	2099		5395	20904
Difference	F = 418.4		F = 284.6	F = 1618.7	F = 358.9		F = 530.9	F = 2942.9
	p=0.000		p=0.000	p=0.000	p=0.000		p=0.000	p=0.000
Rule 144a	0.196	0.397	0.253	0.425	0.532	1.512	1.091	1.057
	(0.016)	(0.036)	(0.035)	(0.049)	(0.053)	(0.128)	(0.101)	(0.056)
Retail	0.751	1.197	1.470	2.423	1.098	3.711	5.925	3.023
	(0.207)	(0.614)	(0.305)	(1.205)	(0.404)	(1.482)	(1.365)	(0.364)
	62	11	97	6	44	15	37	93
Non-Retail	0.182	0.390	0.190	0.407	0.516	1.472	0.933	0.953
	(0.015)	(0.036)	(0.033)	(0.048)	(0.053)	(0.127)	(0.091)	(0.054)
	2529	1278	1897	641	1561	814	1137	1763
Difference	F = 7.6	F = 1.9	F = 17.6	F = 3.3	F = 2.1	F = 2.4	F = 13.7	F = 32.0
	p=0.006	p=0.169	p=0.000	p=0.068	p=0.149	p=0.120	p=0.000	p=0.000
Reg-Rule Diff.	F = 137.0		F = 0.3	F = 2133.2	F = 59.9		F = 15.1	F = 1813.3
	p=0.000		p=0.555	p=0.000	p=0.000		p=0.000	p=0.000

Legend: A retail trade corresponds to less than $100,000 of original par traded on either side of transactions with customers in each matched pair. P-values correspond to the null hypothesis that spreads are equal to zero. The sample is from May 16, 2011 to February 29, 2012. Standard errors are shown in parentheses.

Table 5a: Mean Client Spreads by Transaction Sizes (Part 1)

ABS	Sell Size															
	Investment Grade								High Yield							
	Registered				Rule 144a				Registered				Rule 144a			
Buy Size	Retail	Med.	Large	Overall	Retail	Med.	Large	Overall	Retail	Med.	Large	Overall	Retail	Med.	Large	Overall
Retail	1.339	1.322	1.616	1.361	0.597	2.411	0.029	0.790	2.170	1.956	3.168	2.242	0.917	1.865	2.337	1.190
	(0.059)	(0.259)	(0.321)	(0.060)	(0.165)	(0.880)	(0.362)	(0.210)	(0.116)	(0.148)	(0.351)	(0.095)	(0.505)	(0.843)	(1.527)	(0.460)
	1167	125	119	1411	31	7	7	45	421	117	69	607	26	2	5	33
Med.	1.711	0.276	0.287	0.330	0.923	0.386	0.258	0.352	1.640	0.563	0.788	0.749	0.773	0.593	1.281	0.731
	(0.238)	(0.013)	(0.036)	(0.015)	(0.993)	(0.062)	(0.043)	(0.045)	(0.149)	(0.054)	(0.145)	(0.051)	(0.415)	(0.087)	(0.364)	(0.100)
	138	2993	718	3849	8	488	228	724	122	613	144	879	4	286	71	361
Large	1.741	0.328	0.209	0.263	0.400	0.190	0.107	0.119	1.971	0.835	0.488	0.670	0.852	0.662	0.437	0.455
	(0.227)	(0.024)	(0.008)	(0.010)	(0.513)	(0.038)	(0.011)	(0.011)	(0.166)	(0.118)	(0.042)	(0.041)	(1.402)	(0.279)	(0.063)	(0.062)
	152	935	5300	6387	9	236	1577	1822	128	224	1118	1470	7	85	1119	1211
Overall	1.416	0.321	0.245	0.418	0.614	0.342	0.126	0.196	2.035	0.797	0.660	1.016	0.890	0.616	0.495	0.532
	(0.057)	(0.014)	(0.010)	(0.011)	(0.211)	(0.045)	(0.011)	(0.016)	(0.084)	(0.050)	(0.046)	(0.034)	(0.434)	(0.092)	(0.063)	(0.053)
	1457	4053	6137	11647	48	731	1812	2591	671	954	1331	2956	37	373	1195	1605

Rule 144a CDOs	Sell Size															
	Investment Grade								High Yield							
	CDO				CBO/CLO				CDO				CBO/CLO			
Buy Size	Retail	Med.	Large	Overall	Retail	Med.	Large	Overall	Retail	Med.	Large	Overall	Retail	Med.	Large	Overall
Retail					4.010		0.062	2.036	11.429			11.429	1.782			1.782
					(0.000)		(0.000)	(1.974)	(5.714)			(5.714)	(0.562)			(0.562)
					1		1	2	3			3	12			12
Med.	4.241	0.506	0.452	0.779	0.472	0.360	0.731	0.464		3.298	1.268	2.868		0.007	-0.634	-0.124
	(0.000)	(0.250)	(0.294)	(0.287)	(0.235)	(0.121)	(0.402)	(0.139)		(0.751)	(1.634)	(0.688)		(0.520)	(1.494)	(0.508)
	2	23	2	27	2	91	35	128		41	11	52		47	12	59
Large		0.326	0.623	0.608	-0.066	0.719	0.308	0.314		4.870	2.422	2.476		1.985	0.431	0.463
		(0.412)	(0.113)	(0.109)	(0.479)	(0.367)	(0.037)	(0.037)		(2.169)	(0.208)	(0.210)		(0.690)	(0.126)	(0.125)
		12	229	241	5	18	868	891		8	355	363		7	333	340
Overall	4.241	0.444	0.621	0.625	0.578	0.420	0.324	0.337	11.429	3.555	2.387	2.589	1.782	0.263	0.394	0.417
	(0.000)	(0.214)	(0.112)	(0.102)	(0.576)	(0.117)	(0.039)	(0.037)	(5.714)	(0.716)	(0.208)	(0.207)	(0.562)	(0.468)	(0.132)	(0.128)
	2	35	231	268	8	109	904	1021	3	49	366	418	12	54	345	411

Legend: A retail trade corresponds to less than $100,000 of original par traded. An institutional trade corresponds to more than $1,000,000 of original par traded. In each cell the mean spread is shown with its standard errors in parentheses and number of observations in each category. The sample is from May 16, 2011 to February 29, 2012.

Table 5b: Mean Client Spreads by Transaction Sizes (Part 2)

CMBS

Buy Size	Sell Size															
	Investment Grade								High Yield							
	Registered				Rule 144a				Registered				Rule 144a			
	Retail	Med.	Large	Overall	Retail	Med.	Large	Overall	Retail	Med.	Large	Overall	Retail	Med.	Large	Overall
Retail	1.129	0.678	0.861	1.038	0.978	3.248	0.328	1.379	2.825	2.406	2.667	2.776	3.569	0.070	-0.100	2.953
	(0.059)	(0.152)	(0.138)	(0.052)	(0.477)	(0.770)	(0.224)	(0.322)	(0.122)	(0.463)	(0.403)	(0.114)	(1.533)	(0.070)	(0.000)	(1.292)
	904	114	232	1250	33	20	23	76	718	68	90	876	19	3	1	23
Med.	0.880	0.290	0.257	0.300	2.721	0.360	0.324	0.377	2.106	0.319	0.420	0.431	0.957	0.843	0.366	0.772
	(0.244)	(0.018)	(0.046)	(0.019)	(1.091)	(0.089)	(0.202)	(0.089)	(0.379)	(0.037)	(0.085)	(0.039)	(0.559)	(0.184)	(0.269)	(0.159)
	97	2115	811	3023	5	279	130	414	81	1180	321	1582	4	212	39	255
Large	0.785	0.158	0.095	0.124	1.513	0.037	0.158	0.162	3.142	0.347	0.238	0.326	14.748	1.245	0.960	1.134
	(0.141)	(0.040)	(0.015)	(0.015)	(1.002)	(0.091)	(0.036)	(0.035)	(0.405)	(0.080)	(0.025)	(0.027)	(2.476)	(0.594)	(0.107)	(0.120)
	207	835	5788	6830	16	135	1353	1504	105	405	3489	3999	10	63	823	896
Overall	1.050	0.268	0.140	0.275	1.298	0.392	0.175	0.253	2.797	0.412	0.309	0.684	6.640	0.926	0.932	1.091
	(0.054)	(0.018)	(0.015)	(0.012)	(0.426)	(0.079)	(0.037)	(0.035)	(0.113)	(0.040)	(0.026)	(0.027)	(1.484)	(0.194)	(0.103)	(0.101)
	1208	3064	6831	11103	54	434	1506	1994	904	1653	3900	6457	33	278	863	1174

Non-Agency CMO

Buy Size	Sell Size															
	Investment Grade								High Yield							
	Registered				Rule 144a				Registered				Rule 144a			
	Retail	Med.	Large	Overall	Retail	Med.	Large	Overall	Retail	Med.	Large	Overall	Retail	Med.	Large	Overall
Retail	3.736	5.578	3.831	3.799	2.423			2.423	4.211	3.953	3.171	4.162	3.265	5.141	1.670	3.427
	(0.039)	(0.238)	(0.356)	(0.038)	(1.205)			(1.205)	(0.023)	(0.061)	(0.164)	(0.022)	(0.534)	(2.122)	(0.335)	(0.531)
	5419	191	101	5711	6			6	20573	2325	528	23426	41	9	5	55
Med.	3.682	2.112	2.279	2.572		0.459	0.430	0.454	4.045	2.609	3.704	3.317	2.009	1.037	1.494	1.136
	(0.123)	(0.102)	(0.280)	(0.079)		(0.108)	(0.383)	(0.115)	(0.042)	(0.054)	(0.268)	(0.037)	(0.546)	(0.103)	(0.391)	(0.100)
	448	1015	106	1569		128	32	160	4968	5467	653	11088	27	363	34	424
Large	4.152	3.918	1.051	2.064		0.130	0.400	0.391	5.460	4.289	1.546	2.943	3.489	1.745	0.872	0.938
	(0.077)	(0.105)	(0.038)	(0.040)		(0.206)	(0.052)	(0.051)	(0.090)	(0.091)	(0.039)	(0.037)	(0.648)	(0.262)	(0.065)	(0.064)
	731	630	2660	4021		15	466	481	4945	2990	11794	19729	11	70	1296	1377
Overall	3.778	3.092	1.194	3.011	2.423	0.425	0.402	0.425	4.386	3.365	1.721	3.546	2.867	1.233	0.891	1.057
	(0.034)	(0.076)	(0.040)	(0.027)	(1.205)	(0.099)	(0.054)	(0.049)	(0.023)	(0.040)	(0.039)	(0.018)	(0.350)	(0.107)	(0.064)	(0.056)
	6598	1836	2867	11301	6	143	498	647	30486	10782	12975	54243	79	442	1335	1856

<u>Legend:</u> A retail trade corresponds to less than $100,000 of original par traded. An institutional trade corresponds to more than $1,000,000 of original par traded. In each cell the mean spread is shown with its standard errors in parentheses and number of observations in each category. The sample is from May 16, 2011 to February 29, 2012.

Table 6a: Distribution of Total Client Non-Retail Bid-Ask Spreads

Roundtrip Spreads:	Obs.	Mean	St. Dev.	10th Perc.	25th Perc.	Median	75th Perc.	90th Perc.
ABS	16,135	0.304	1.041	-0.024	0.006	0.057	0.303	0.894
Registered	12,045	0.302	0.871	-0.014	0.008	0.058	0.326	0.895
Rule 144a	4,090	0.310	1.427	-0.085	0.000	0.052	0.251	0.888
Investment Grade	12,475	0.233	0.691	-0.025	0.006	0.047	0.243	0.770
Registered	9,946	0.246	0.672	-0.015	0.008	0.048	0.262	0.802
Rule 144a	2,529	0.182	0.756	-0.094	0.000	0.043	0.193	0.590
High Yield	3,660	0.546	1.753	-0.016	0.004	0.115	0.531	1.548
Registered	2,099	0.568	1.459	-0.004	0.016	0.155	0.622	1.523
Rule 144a	1,561	0.516	2.084	-0.035	0.000	0.072	0.398	1.587
Overall CDO (R144a)	2,092	0.811	2.531	0.000	0.000	0.158	0.740	2.586
CDO	681	1.772	3.505	-0.003	0.066	0.535	1.965	5.556
CBO/CLO	1,411	0.347	1.708	0.000	0.000	0.121	0.424	1.339
Investment Grade	1,278	0.390	1.296	0.000	0.021	0.136	0.494	1.391
CDO	266	0.598	1.648	-0.573	0.071	0.302	0.879	2.163
CBO/CLO	1,012	0.335	1.182	0.000	0.008	0.127	0.372	1.058
High Yield	814	1.472	3.623	-0.020	0.000	0.321	1.791	5.556
CDO	415	2.525	4.121	0.000	0.000	0.829	3.293	9.201
CBO/CLO	399	0.376	2.604	-0.660	0.000	0.061	0.678	2.678
CMBS	17,978	0.245	1.470	-0.609	0.000	0.110	0.454	1.180
Registered	14,944	0.200	1.258	-0.607	0.000	0.104	0.430	1.096
Rule 144a	3,034	0.469	2.226	-0.612	0.000	0.145	0.625	1.663
Investment Grade	11,446	0.163	1.177	-0.653	-0.029	0.097	0.410	1.059
Registered	9,549	0.157	1.120	-0.644	-0.023	0.095	0.395	1.020
Rule 144a	1,897	0.190	1.428	-0.738	-0.068	0.112	0.485	1.250
High Yield	6,532	0.389	1.868	-0.518	0.000	0.133	0.535	1.418
Registered	5,395	0.275	1.468	-0.541	0.000	0.122	0.476	1.218
Rule 144a	1,137	0.933	3.079	-0.450	0.000	0.223	0.930	2.599
Non-Agency CMO	27,719	2.068	4.121	0.000	0.172	0.882	3.113	5.076
Registered	25,315	2.188	4.246	0.000	0.199	0.995	3.252	5.191
Rule 144a	2,404	0.807	2.057	0.000	0.000	0.193	1.000	2.716
Investment Grade	5,052	1.566	2.535	0.004	0.126	0.518	2.444	4.609
Registered	4,411	1.734	2.631	0.061	0.144	0.683	2.736	4.823
Rule 144a	641	0.407	1.204	0.000	0.000	0.070	0.326	1.241
High Yield	22,667	2.180	4.389	0.000	0.194	0.985	3.266	5.144
Registered	20,904	2.284	4.507	0.000	0.217	1.049	3.328	5.247
Rule 144a	1,763	0.953	2.272	0.000	0.016	0.271	1.302	3.175

Legend: Total client bid-ask spreads are computed using buy from a customer and sell to a customer at most two weeks apart in the sample. The sample is from May 16, 2011 to February 29, 2012. Bid-ask spreads are winsorized within each product sub-type, placement type and investment grade.

Table 6b: Total Client Non-Retail Bid-Ask Spreads for Pre- and Post-Release Samples

	Pre-Release				Post-Release				Difference	
	Obs.	Mean	St. Dev.	Median	Obs.	Mean	St. Dev.	Median	Mean Equality	Median Equality
ABS	8,228	0.294	0.979	0.056	7,907	0.314	1.100	0.057	F = 1.48 (p=0.22)	F = 0.16 (p=0.69)
Registered	6,337	0.302	0.808	0.061	5,708	0.302	0.936	0.054	F = 0.00 (p=0.99)	F = 4.48 (p=0.03)
Rule 144a	1,891	0.268	1.410	0.039	2,199	0.345	1.441	0.063	F = 2.96 (p=0.09)	F = 28.07 (p=0.00)
Investment Grade	6,324	0.222	0.640	0.047	6,151	0.245	0.738	0.048	F = 3.30 (p=0.07)	F = 0.37 (p=0.54)
Registered	5,152	0.238	0.632	0.050	4,794	0.254	0.713	0.047	F = 1.42 (p=0.23)	F = 1.20 (p=0.27)
Rule 144a	1,172	0.151	0.671	0.033	1,357	0.210	0.822	0.056	F = 3.95 (p=0.05)	F = 15.47 (p=0.00)
High Yield	1,904	0.534	1.646	0.117	1,756	0.558	1.862	0.112	F = 0.17 (p=0.68)	F = 0.14 (p=0.71)
Registered	1,185	0.579	1.288	0.178	914	0.553	1.655	0.127	F = 0.15 (p=0.70)	F = 4.09 (p=0.04)
Rule 144a	719	0.460	2.106	0.056	842	0.564	2.065	0.094	F = 0.95 (p=0.33)	F = 5.60 (p=0.02)
Overall CDO	1,073	0.920	2.849	0.141	1,019	0.696	2.142	0.173	F = 4.15 (p=0.04)	F = 3.03 (p=0.08)
CDO	419	1.963	3.732	0.554	262	1.466	3.089	0.475	F = 3.55 (p=0.06)	F = 0.59 (p=0.44)
CBO/CLO	654	0.251	1.806	0.093	757	0.429	1.614	0.137	F = 3.77 (p=0.05)	F = 10.26 (p=0.00)
Investment Grade	649	0.333	1.331	0.131	629	0.448	1.258	0.151	F = 2.55 (p=0.11)	F = 4.02 (p=0.05)
CDO	162	0.617	1.615	0.318	104	0.568	1.706	0.287	F = 0.05 (p=0.82)	F = 0.48 (p=0.49)
CBO/CLO	487	0.238	1.209	0.102	525	0.425	1.150	0.137	F = 6.31 (p=0.01)	F = 6.88 (p=0.01)
High Yield	424	1.818	4.065	0.321	390	1.095	3.031	0.322	F = 8.36 (p=0.00)	F = 0.00 (p=0.98)
CDO	257	2.812	4.386	0.893	158	2.057	3.614	0.757	F = 3.62 (p=0.06)	F = 0.12 (p=0.73)
CBO/CLO	167	0.288	2.924	0.000	232	0.440	2.352	0.122	F = 0.30 (p=0.58)	F = 15.20 (p=0.00)
CMBS	9,159	0.172	1.521	0.084	8,819	0.322	1.412	0.138	F = 47.17 (p=0.00)	F = 91.89 (p=0.00)
Registered	7,488	0.110	1.268	0.079	7,456	0.290	1.242	0.131	F = 76.21 (p=0.00)	F = 70.76 (p=0.00)
Rule 144a	1,671	0.445	2.321	0.120	1,363	0.498	2.103	0.191	F = 0.42 (p=0.52)	F = 12.07 (p=0.00)
Investment Grade	5,821	0.095	1.188	0.075	5,625	0.233	1.162	0.124	F = 39.25 (p=0.00)	F = 54.17 (p=0.00)
Registered	4,783	0.090	1.137	0.075	4,766	0.226	1.099	0.119	F = 35.25 (p=0.00)	F = 34.99 (p=0.00)
Rule 144a	1,038	0.122	1.397	0.075	859	0.274	1.462	0.141	F = 5.31 (p=0.02)	F = 15.48 (p=0.00)
High Yield	3,338	0.304	1.965	0.100	3,194	0.478	1.757	0.179	F = 14.24 (p=0.00)	F = 54.90 (p=0.00)
Registered	2,705	0.147	1.470	0.088	2,690	0.403	1.454	0.163	F = 41.37 (p=0.00)	F = 34.05 (p=0.00)
Rule 144a	633	0.977	3.253	0.178	504	0.879	2.846	0.265	F = 0.29 (p=0.59)	F = 4.79 (p=0.03)
Non-Agency CMO	13,832	2.192	4.678	0.894	13,887	1.945	3.474	0.873	F = 25.05 (p=0.00)	F = 0.38 (p=0.54)
Registered	12,680	2.317	4.834	1.005	12,635	2.059	3.554	0.995	F = 23.50 (p=0.00)	F = 0.25 (p=0.62)
Rule 144a	1,152	0.821	1.864	0.169	1,252	0.795	2.220	0.236	F = 0.10 (p=0.75)	F = 13.86 (p=0.00)
Investment Grade	2,617	1.766	2.815	0.550	2,435	1.350	2.174	0.486	F = 34.80 (p=0.00)	F = 1.81 (p=0.18)
Registered	2,283	1.971	2.932	0.755	2,128	1.480	2.238	0.634	F = 39.49 (p=0.00)	F = 3.11 (p=0.08)
Rule 144a	334	0.364	1.033	0.063	307	0.454	1.366	0.078	F = 0.87 (p=0.35)	F = 0.37 (p=0.54)
High Yield	11,215	2.292	5.009	0.994	11,452	2.071	3.679	0.979	F = 14.27 (p=0.00)	F = 0.32 (p=0.57)
Registered	10,397	2.393	5.156	1.060	10,507	2.176	3.754	1.042	F = 12.10 (p=0.00)	F = 0.21 (p=0.65)
Rule 144a	818	1.008	2.083	0.245	945	0.906	2.425	0.300	F = 0.90 (p=0.34)	F = 2.54 (p=0.11)

Legend: The Pre-Release Sample is from May 16, 2011 to October 17, 2011 and the Post-Release Sample is from October 18, 2011 to February 29, 2012. Total client bid-ask spreads are computed using buy from a customer and sell to a customer at most two weeks apart in the sample. The sample is from May 16, 2011 to February 29, 2012. Bid-ask spreads are winsorized within each product sub-type, placement type and investment grade.

Table 7a: Total Client Non-Retail Bid-Ask Spreads (Part 1)

Category:	ABS Overall	ABS Auto	ABS Card	ABS ManH	ABS SBA	ABS Stud	ABS Other	CDOs Overall	CDOs CBO	CDOs CLO	CDOs CDO
Overall	0.304	0.075	0.062	1.224	0.713	0.467	0.558	0.811	0.251	0.358	1.772
	(0.008)	(0.003)	(0.006)	(0.129)	(0.014)	(0.038)	(0.027)	(0.055)	(0.055)	(0.051)	(0.134)
Registered	0.302	0.072	0.078	1.294	0.714	0.511	0.553	---	---	---	---
	(0.008)	(0.003)	(0.007)	(0.124)	(0.014)	(0.050)	(0.026)	---	---	---	---
	12045	4001	3143	268	1522	1127	1984	---	---	---	---
Rule 144a	0.310	0.087	-0.011	-0.211	0.668	0.342	0.563	0.811	0.251	0.358	1.772
	(0.022)	(0.008)	(0.009)	(1.115)	(0.075)	(0.034)	(0.049)	(0.055)	(0.055)	(0.051)	(0.134)
	4090	1193	659	13	56	392	1777	2092	155	1256	681
Difference	F = 0.1	F = 3.0	F = 62.5	F = 1.9	F = 0.4	F = 7.8	F = 0.0	---	---	---	---
	(p=0.747)	(p=0.083)	(p=0.000)	(p=0.165)	(p=0.543)	(p=0.005)	(p=0.859)	---	---	---	---
Investment Grade	0.233	0.072	0.057	0.960	0.713	0.443	0.344	0.390	0.220	0.352	0.598
	(0.006)	(0.003)	(0.006)	(0.160)	(0.014)	(0.033)	(0.025)	(0.036)	(0.032)	(0.042)	(0.101)
Registered	0.246	0.068	0.072	0.985	0.714	0.468	0.323	---	---	---	---
	(0.007)	(0.003)	(0.007)	(0.169)	(0.014)	(0.043)	(0.022)	---	---	---	---
	9946	3287	2982	111	1522	1063	981	---	---	---	---
Rule 144a	0.182	0.088	-0.012	0.560	0.668	0.367	0.378	0.390	0.220	0.352	0.598
	(0.015)	(0.010)	(0.009)	(0.221)	(0.075)	(0.037)	(0.055)	(0.036)	(0.032)	(0.042)	(0.101)
	2529	885	645	7	56	342	594	1278	131	881	266
Difference	F = 15.0	F = 3.8	F = 55.7	F = 2.5	F = 0.4	F = 3.2	F = 0.8	---	---	---	---
	(p=0.000)	(p=0.052)	(p=0.000)	(p=0.114)	(p=0.543)	(p=0.072)	(p=0.362)	---	---	---	---
High Yield	0.546	0.088	0.179	1.415	---	0.766	0.712	1.472	0.420	0.374	2.525
	(0.029)	(0.008)	(0.030)	(0.190)	---	(0.301)	(0.042)	(0.127)	(0.315)	(0.137)	(0.202)
Registered	0.568	0.090	0.189	1.512	---	1.226	0.778	---	---	---	---
	(0.032)	(0.009)	(0.031)	(0.172)	---	(0.527)	(0.046)	---	---	---	---
	2099	714	161	157	---	64	1003	---	---	---	---
Rule 144a	0.516	0.085	0.063	-1.111	---	0.176	0.657	1.472	0.420	0.374	2.525
	(0.053)	(0.015)	(0.090)	(2.468)	---	(0.078)	(0.068)	(0.127)	(0.315)	(0.137)	(0.202)
	1561	308	14	6	---	50	1183	814	24	375	415
Difference	F = 0.7	F = 0.1	F = 1.9	F = 1.3	---	F = 3.9	F = 2.2	---	---	---	---
	(p=0.405)	(p=0.764)	(p=0.174)	(p=0.250)	---	(p=0.052)	(p=0.138)	---	---	---	---
Grade Difference	F = 111.2	F = 3.6	F = 16.6	F = 3.4	---	F = 1.1	F = 56.1	F = 67.2	F = 0.4	F = 0.0	F = 72.6
	(p=0.000)	(p=0.059)	(p=0.000)	(p=0.067)	---	(p=0.286)	(p=0.000)	(p=0.000)	(p=0.523)	(p=0.881)	(p=0.000)
Registered	F = 97.5	F = 5.0	F = 13.7	F = 4.8	---	F = 2.1	F = 79.2	---	---	---	---
	(p=0.000)	(p=0.025)	(p=0.000)	(p=0.030)	---	(p=0.149)	(p=0.000)	---	---	---	---
Rule 144a	F = 37.1	F = 0.0	F = 0.8	F = 0.5	---	F = 4.9	F = 10.2	F = 67.2	F = 0.4	F = 0.0	F = 72.6
	(p=0.000)	(p=0.847)	(p=0.384)	(p=0.511)	---	(p=0.027)	(p=0.001)	(p=0.000)	(p=0.523)	(p=0.881)	(p=0.000)

Legend: Total client bid-ask spreads are computed using buy from a customer and sell to a customer at most two weeks apart in the sample. The sample is from May 16, 2011 to February 29, 2012. Bid-ask spreads are winsorized within each product sub-type, placement type and investment grade. Standard errors are shown in parentheses.

Table 7b: Total Client Non-Retail Bid-Ask Spreads (Part 2)

Category:	CMBS			Non-Agency CMO						
	Overall	IO/PO	Other	Overall	IO/PO	PAC/TN	SEQ/PT	SUP/Z	Other Senior	Other
Overall	0.245	0.351	0.243	2.068	3.130	2.760	2.075	2.679	1.857	1.919
	(0.011)	(0.114)	(0.011)	(0.025)	(0.196)	(0.060)	(0.041)	(0.175)	(0.028)	(0.103)
Registered	0.200	0.156	0.200	2.188	3.346	2.768	2.137	2.675	1.942	2.853
	(0.010)	(0.248)	(0.010)	(0.027)	(0.214)	(0.060)	(0.043)	(0.179)	(0.029)	(0.165)
	14944	116	14828	25315	466	1939	13198	267	8130	1315
Rule 144a	0.469	0.478	0.468	0.807	1.110	1.006	1.174	2.849	0.479	0.591
	(0.040)	(0.097)	(0.043)	(0.042)	(0.216)	(0.495)	(0.062)	(0.698)	(0.115)	(0.061)
	3034	179	2855	2404	50	9	914	6	500	925
Difference	F = 41.6	F = 1.5	F = 37.6	F = 771.4	F = 54.5	F = 14.0	F = 160.8	F = 0.1	F = 152.7	F = 165.6
	(p=0.000)	(p=0.227)	(p=0.000)	(p=0.000)	(p=0.000)	(p=0.000)	(p=0.000)	(p=0.794)	(p=0.000)	(p=0.000)
Inv Grade	0.163	0.464	0.159	1.566	3.783	1.777	1.707	1.436	1.632	0.498
	(0.011)	(0.127)	(0.011)	(0.036)	(0.580)	(0.165)	(0.051)	(0.587)	(0.062)	(0.054)
Registered	0.157	0.407	0.156	1.734	4.345	1.811	1.771	1.436	1.693	1.109
	(0.011)	(0.331)	(0.011)	(0.040)	(0.641)	(0.168)	(0.054)	(0.587)	(0.065)	(0.115)
	9549	37	9512	4411	38	160	2671	8	1286	248
Rule 144a	0.190	0.482	0.171	0.407	0.737	0.387	0.888	---	0.630	0.056
	(0.033)	(0.131)	(0.034)	(0.048)	(0.509)	(0.219)	(0.114)	---	(0.183)	(0.021)
	1897	117	1780	641	7	4	209	---	78	343
Difference	F = 0.9	F = 0.0	F = 0.2	F = 460.0	F = 20.0	F = 31.3	F = 48.7	---	F = 30.4	F = 80.6
	(p=0.342)	(p=0.832)	(p=0.678)	(p=0.000)	(p=0.000)	(p=0.000)	(p=0.000)	---	(p=0.000)	(p=0.000)
High Yield	0.389	0.228	0.393	2.180	3.067	2.851	2.169	2.717	1.900	2.429
	(0.023)	(0.194)	(0.023)	(0.029)	(0.208)	(0.063)	(0.050)	(0.179)	(0.031)	(0.136)
Registered	0.275	0.038	0.278	2.284	3.258	2.854	2.230	2.713	1.989	3.259
	(0.020)	(0.329)	(0.020)	(0.031)	(0.225)	(0.063)	(0.053)	(0.183)	(0.032)	(0.199)
	5395	79	5316	20904	428	1779	10527	259	6844	1067
Rule 144a	0.933	0.470	0.960	0.953	1.171	1.501	1.259	2.849	0.451	0.907
	(0.091)	(0.135)	(0.096)	(0.054)	(0.238)	(0.845)	(0.073)	(0.698)	(0.132)	(0.094)
	1137	62	1075	1763	43	5	705	6	422	582
Difference	F = 49.7	F = 1.5	F = 48.2	F = 454.2	F = 40.9	F = 3.2	F = 116.3	---	F = 128.5	F = 113.9
	(p=0.000)	(p=0.228)	(p=0.000)	(p=0.000)	(p=0.000)	(p=0.075)	(p=0.000)	---	(p=0.000)	(p=0.000)
Grade Difference	F = 78.3	F = 1.0	F = 83.0	F = 178.2	F = 1.4	F = 37.2	F = 42.0	F = 4.9	F = 14.9	F = 173.9
	(p=0.000)	(p=0.309)	(p=0.000)	(p=0.000)	(p=0.242)	(p=0.000)	(p=0.000)	(p=0.028)	(p=0.000)	(p=0.000)
Registered	F = 26.0	F = 0.6	F = 28.7	F = 119.0	F = 2.6	F = 33.9	F = 36.9	F = 4.8	F = 17.0	F = 87.2
	(p=0.000)	(p=0.430)	(p=0.000)	(p=0.000)	(p=0.107)	(p=0.000)	(p=0.000)	(p=0.029)	(p=0.000)	(p=0.000)
Rule 144a	F = 58.6	F = 0.0	F = 59.8	F = 57.5	F = 0.7	F = 1.6	F = 7.5	---	F = 0.6	F = 77.4
	(p=0.000)	(p=0.947)	(p=0.000)	(p=0.000)	(p=0.423)	(p=0.248)	(p=0.006)	---	(p=0.425)	(p=0.000)

Legend: Total client bid-ask spreads are computed using buy from a customer and sell to a customer at most two weeks apart in the sample. The sample is from May 16, 2011 to February 29, 2012. Bid-ask spreads are winsorized within each product sub-type, placement type and investment grade. Standard errors are shown in parentheses.

Table 8: Definitions of Control Variables used in Regressions

4-6 Years Vintage Dummy	The number of years between the first coupon or first Moody's rating date and the trade execution date
> 6 Years Vintage Dummy	The number of years between the first coupon or first Moody's rating date and the trade execution date
Investment Grade Dummy	Dummy variable which is equal to one if the instrument is rated as investment grade
Security Specific Match Volume	The average of matched trade log(volume) for the instrument standardized by subtracting the instrument category average and dividing by the instrument category standard deviation
Deviation of Particular Match	The standardized matched log(volume) for the transaction less the average standardized matched log(volume) for the particular instrument
Floating Coupon Dummy	Dummy variable equal to one if the instrument has a floating coupon rate
Number of Trades in Sample	The total number of opposite matches found for this particular security during the sample period
Gap in Execution Time	The number of days between the two matched buy and sell transactions
Number of Dealers	The number of dealers active in the instrument
Dealers' Importance Dummy	The 5%-top most important dealer dummy based on the centrality measure: The measure of dealers' activity and participation in interdealer trades in particular product is averaged across all dealers who participated in a chain of transactions underlying each total client spread observation.
Dealer's Coreness	The dealer-specific coreness value, normalized by the size of the interdealer market within each product subcategory, demeaned and standardized within each subcategory
Dealer's Degree Residual	The difference between dealer-specific degree centrality and coreness, normalized by the size of the interdealer market within each product sub-type, demeaned and standardized within each submarket
Multi Round Trade	Dummy variable equal to one if the chain of transactions underlying the total client spread observation has more than 1 round (C-D-D-C = 2 rounds, C-D-D-D-C = 3 etc.)
Buy from Customer Sell to Dealer	Dummy variable equal to one if the dealer spread is computed using two trades, one of which is a buy from a customer, while the other is a sell to another dealer
Buy from Dealer Sell to Customer	Dummy variable equal to one if the dealer spread is computed using two trades, one of which is a buy from another dealer, while the other is a sell to a customer

Table 9: Regression for Non-Retail Total Client Spreads

Variables:	ABS Overall	ABS Reg.	ABS R144a	CDOs CDO	CDOs CBO/L	CMBS Overall	CMBS Reg.	CMBS R144a	Non-Agency CMO Overall	Non-Agency CMO Reg.	Non-Agency CMO R144a
4-6 Years Vintage	0.162 (0.030)	0.078 (0.026)	0.393 (0.106)	-0.550 (0.759)	0.137 (0.144)	0.298 (0.041)	0.178 (0.040)	0.512 (0.118)	0.807 (0.079)	0.354 (0.098)	0.662 (0.126)
> 6 year Vintage	0.184 (0.028)	0.161 (0.026)	0.207 (0.082)	-0.609 (0.750)	0.309 (0.144)	0.098 (0.036)	-0.007 (0.034)	0.415 (0.161)	0.657 (0.075)	0.176 (0.094)	0.505 (0.130)
Investment Grade	-0.135 (0.022)	-0.190 (0.028)	-0.033 (0.040)	-1.591 (0.260)	-0.049 (0.141)	-0.157 (0.029)	-0.065 (0.028)	-0.392 (0.086)	-0.527 (0.051)	-0.506 (0.053)	-0.248 (0.136)
Security Specific Match Volume	-0.149 (0.022)	-0.143 (0.023)	-0.192 (0.046)	-0.457 (0.178)	-0.092 (0.067)	-0.050 (0.037)	-0.039 (0.029)	0.030 (0.098)	-0.578 (0.035)	-0.963 (0.045)	-0.106 (0.076)
Deviation of Particular Match	-0.058 (0.009)	-0.058 (0.009)	-0.064 (0.019)	-0.031 (0.233)	-0.012 (0.089)	-0.113 (0.014)	-0.120 (0.014)	-0.063 (0.047)	-0.359 (0.051)	-0.510 (0.057)	-0.450 (0.113)
Floating Coupon	0.058 (0.017)	0.064 (0.019)	0.079 (0.045)	-0.788 (0.663)	-0.292 (0.181)	0.116 (0.026)	0.090 (0.026)	-0.094 (0.102)	0.197 (0.047)	0.320 (0.050)	-0.216 (0.118)
Number of Trades	-0.074 (0.018)	-0.035 (0.016)	-0.137 (0.046)	-0.429 (0.278)	-0.127 (0.079)	-0.143 (0.027)	-0.108 (0.021)	-0.211 (0.077)	0.119 (0.026)	-0.009 (0.029)	-0.021 (0.062)
Gap in Execution Time	0.003 (0.002)	0.004 (0.002)	-0.002 (0.005)	-0.003 (0.057)	-0.036 (0.024)	-0.010 (0.003)	-0.009 (0.003)	-0.002 (0.012)	0.094 (0.012)	0.102 (0.013)	0.020 (0.020)
Number of Dealers	0.004 (0.002)	-0.003 (0.002)	0.014 (0.008)	0.038 (0.077)	0.035 (0.028)	-0.001 (0.005)	-0.003 (0.004)	0.005 (0.016)	-0.087 (0.007)	-0.076 (0.008)	-0.033 (0.014)
Dealers' Importance	-0.291 (0.041)	-0.251 (0.040)	-0.385 (0.106)	0.135 (0.351)	-0.827 (0.185)	-0.508 (0.064)	-0.424 (0.050)	-0.798 (0.211)	-0.318 (0.064)	-0.127 (0.067)	-0.584 (0.132)
Multi Round Trade	0.217 (0.025)	0.204 (0.024)	0.256 (0.066)	0.117 (0.467)	-0.489 (0.245)	0.099 (0.035)	0.067 (0.032)	0.301 (0.151)	1.943 (0.073)	1.895 (0.078)	0.746 (0.134)
Subcategory Fixed Effects: Yes. Number of observations: 63924. R-squared: 0.268											

Legend: The regression includes fixed-effects for each of the subcategories and placement types (Registered or Rule 144a). Standard errors are reported in parentheses.

Table 10: Regression for Non-Retail Dealer Spreads

	ABS			CDOs		CMBS			Non-Agency CMO		
Variables:	Overall	Reg.	R144a	CDO	CBO/L	Overall	Reg.	R144a	Overall	Reg.	R144a
4-6 Years Vintage	0.146	0.070	0.431	-0.951	0.216	0.310	0.205	0.570	0.714	0.483	0.655
	(0.023)	(0.019)	(0.083)	(0.765)	(0.092)	(0.031)	(0.029)	(0.097)	(0.044)	(0.053)	(0.105)
> 6 year Vintage	0.110	0.096	0.169	-1.173	0.196	0.090	-0.002	0.400	0.616	0.367	0.381
	(0.020)	(0.017)	(0.065)	(0.747)	(0.099)	(0.028)	(0.025)	(0.128)	(0.044)	(0.053)	(0.104)
Investment Grade	-0.162	-0.177	-0.118	-1.476	-0.163	-0.173	-0.081	-0.512	-0.549	-0.467	-0.436
	(0.022)	(0.024)	(0.050)	(0.214)	(0.090)	(0.023)	(0.020)	(0.080)	(0.028)	(0.029)	(0.076)
Security Specific Match Volume	-0.115	-0.122	-0.129	-0.309	-0.115	0.002	0.018	0.052	-0.330	-0.531	-0.068
	(0.015)	(0.014)	(0.034)	(0.144)	(0.045)	(0.026)	(0.019)	(0.068)	(0.020)	(0.024)	(0.065)
Deviation of Particular Match	-0.038	-0.046	-0.017	0.176	0.064	-0.097	-0.097	-0.056	-0.298	-0.378	-0.269
	(0.006)	(0.006)	(0.015)	(0.211)	(0.067)	(0.011)	(0.010)	(0.042)	(0.028)	(0.030)	(0.077)
Floating Coupon	0.061	0.062	0.070	-0.156	-0.141	0.171	0.134	-0.020	0.196	0.262	-0.130
	(0.013)	(0.014)	(0.034)	(0.528)	(0.168)	(0.019)	(0.018)	(0.083)	(0.027)	(0.028)	(0.088)
Number of Trades	-0.055	-0.021	-0.137	-0.677	-0.130	-0.128	-0.111	-0.165	0.120	0.050	-0.111
	(0.012)	(0.011)	(0.031)	(0.228)	(0.059)	(0.019)	(0.014)	(0.068)	(0.014)	(0.015)	(0.052)
Gap in Execution Time	0.006	0.004	0.013	0.044	0.010	-0.003	-0.003	0.006	0.106	0.113	0.068
	(0.002)	(0.002)	(0.005)	(0.063)	(0.016)	(0.003)	(0.003)	(0.010)	(0.008)	(0.009)	(0.020)
Number of Dealers	0.001	-0.005	0.016	0.058	0.002	-0.003	0.000	-0.009	-0.058	-0.053	-0.009
	(0.002)	(0.002)	(0.005)	(0.069)	(0.020)	(0.003)	(0.002)	(0.013)	(0.003)	(0.004)	(0.013)
Dealer's Coreness	-0.047	-0.035	-0.071	0.280	-0.124	-0.045	-0.019	-0.096	0.148	0.149	0.063
	(0.012)	(0.011)	(0.031)	(0.138)	(0.051)	(0.015)	(0.011)	(0.049)	(0.021)	(0.022)	(0.052)
Dealer's Degree Residual	-0.039	-0.033	-0.045	-0.512	-0.035	0.012	-0.010	0.092	-0.012	0.030	-0.316
	(0.007)	(0.007)	(0.023)	(0.139)	(0.038)	(0.011)	(0.010)	(0.045)	(0.022)	(0.023)	(0.047)
Multi Round Trade	-0.031	-0.085	0.068	0.807	0.188	0.118	0.056	0.567	0.278	0.178	0.321
	(0.024)	(0.027)	(0.056)	(0.734)	(0.107)	(0.028)	(0.026)	(0.151)	(0.058)	(0.062)	(0.188)
Buy from Customer Sell to Dealer	-0.008	0.037	-0.086	-0.772	-0.332	-0.145	-0.120	-0.337	-0.317	-0.274	-0.145
	(0.031)	(0.035)	(0.070)	(0.826)	(0.125)	(0.035)	(0.031)	(0.205)	(0.064)	(0.066)	(0.233)
Buy from Dealer Sell to Customer	0.072	0.105	0.039	-0.202	-0.098	0.084	0.085	0.142	0.251	0.309	-0.162
	(0.025)	(0.029)	(0.060)	(0.768)	(0.146)	(0.033)	(0.028)	(0.192)	(0.057)	(0.059)	(0.194)

Subcategory Fixed Effects: Yes. Number of observations: 78910. R-squared: 0.297

Legend: The regression includes fixed-effects for each of the subcategories and placement types (Registered or Rule 144a). Standard errors are reported in parentheses.