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Securities Financing and Asset Markets: New Evidence

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Abstract

This paper presents new evidence on bilateral securities financing based on the Federal Reserve's Senior Credit Officer Opinion Survey, which was launched in the wake of the financial crisis to provide a window into this otherwise opaque market. The survey asks large broker-dealers about terms at which they fund client positions, and the demand for such funding, across several different collateral types. Within asset classes, reported changes in spreads, haircuts, and other financing terms move closely together, and we show that they also covary with the state of the underlying cash securities markets. Funding conditions are particularly highly correlated with measures of cash-market liquidity, and, by exploiting dealers' self-reported reasons for changing terms, we show that most of this correlation results from dealers responding to liquidity, rather than the other way around. Controlling for securities-market conditions, haircuts and spreads are unresponsive to shifts in funding demand; however, they do tend to tighten when measures of dealer condition deteriorate.

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1 Introduction

The financial crisis of 2007 - 2009 demonstrated the potential importance of securities-financing arrangements between dealers and their clients—including bilateral repo contracts—for market functioning, price discovery, and financial stability. Indeed, Brunnermeier (2009), Gorton and Metrick (2012a), and several others argue that this market was central to the liquidity spirals and fire sales observed among certain risky assets during the crisis. Partly with this motivation, a number of recent theoretical papers model collateralized funding arrangements, to understand both how terms in this market are set and how funding conditions relate to conditions the market for the securities that are being financed or to broader aspects of financial stability. [1]

Despite the theoretical interest in this market and its evident practical relevance, empirical facts are remarkably hard to come by. Most of what is known about bilateral securities financing is either anecdotal or derives from case studies with uncertain generalizability. For example, while there is broad consensus that financing constraints had important effects on the liquidity and pricing of certain securities during the crisis, there is no systematic evidence on their impact during normal times. The reason for this gap in the empirical literature is clear: comprehensive data simply do not exist. Adrian, Begalle, Copeland, and Martin (2014) and Baklanova, Copeland, and McCaughrin (2015), for example, discuss the opacity of bilateral securities financing and bemoan the lack of data.

In this paper, we provide new evidence on bilateral dealer-to-client securities financing and its relationship to the respective cash markets for securities by exploiting the Senior Credit Officer Opinion Survey, or "SCOOS." This survey was launched by the Federal Reserve in 2010 precisely out of a recognition that systematic information about this market was lacking. Every quarter, the SCOOS surveys the roughly twenty broker-dealers with the largest presence in bilateral securities financing. According to the Fed, these institutions "account for almost all of the dealer financing of dollar-denominated securities to nondealers." The survey asks about the various terms on financing transactions across several different asset classes and client types. It also asks related questions on demand for securities financing, the reasons that

[1]See Gromb and Vayanos (2002); Brunnermeier and Pedersen (2009); Geanakoplos (2010); Ashcraft, Garleanu, and Pedersen (2011); Fostel and Geanakoplos (2015); and Barsky, Bogusz, and Easton (2016).

dealers are changing their terms, and liquidity in the underlying cash-securities markets. Although the data are public, we are not aware of any previous attempt to use or analyze them in a systematic way.[2]

A simple tabulation of the survey responses reveals that dealers do not change securities-financing terms very frequently. On average, only about 15% of dealers report meaningful changes in their financing spreads each quarter, and even fewer report changes in other types of terms. When terms do change, however, they all tend to change together. Within any asset class, the "tightness" of haircuts, financing rates, maturities, and lending amounts are highly positively correlated over time. These results stand in contrast to several popular theoretical models—including Geanakoplos (2010), Garleanu and Pedersen (2011), Araujo, Kubler, and Schommer (2012), and Fostel and Geanakoplos (2015)—in which financing spreads are either constant or are negatively correlated with haircuts. Instead, our results suggest that the market is dominated by factors that move all financing terms in the same direction.

We present evidence on what these factors are by matching the SCOOS—by quarter and, where possible, by asset class—with a variety of other data on market conditions, including financing and trading volumes, asset returns, securities issuance, and various measures of risk and volatility. While many of these variables are correlated to some degree with financing terms, the single factor that emerges as most important is the liquidity of the underlying securities markets. All funding terms across all asset classes display very strong unconditional correlations with measures of market liquidity. These correlations survive a variety of controls and specifications, and indeed the inclusion of liquidity variables largely renders other measures of market conditions, such as realized and implied volatilities, insignificant in regressions.

The observation that funding terms tighten when there is a deterioration in asset-market liquidity is consistent both with the possibility that dealers pull back on funding to avoid having to dispose of collateral in illiquid markets and with the possibility that market liquidity itself could be adversely affected by more restrictive financing conditions. To distinguish the direction of causality, we make use of additional questions in the SCOOS that ask dealers about the most-important reasons

[2]The SCOOS is released quarterly at https://www.federalreserve.gov/data/scoos.htm. Eichner and Natalucci (2010) discuss the design of the survey in detail. Adrian, Begalle, Copeland, and Martin (2014) explain how the SCOOS might fit into a broader system for monitoring financial stability.

that terms on the leverage they provide to clients change from quarter to quarter. We use the answers to these questions to isolate the changes in spreads, haircuts, etc. that are due to factors other than liquidity. Changes in terms that are exogenous in this sense have only a weak statistical relationship with liquidity, and the economic significance of this relationship is also small for most asset classes in most quarters. Similarly, once other factors are controlled for, we find no robust association between financing terms and asset prices. In other words, there appears to be little causal effect of financing conditions on security market conditions over the period covered by the SCOOS. One possibility is that the relationships between funding markets and asset markets are highly nonlinear, and there have not been any severe liquidity spirals to provide extreme observations in the data since the financial crisis. Models of the effects of funding constraints on returns and liquidity, such as Gromb and Vayanos (2002), Brunnermeier and Pedersen (2009), and Garleanu and Pedersen (2011) suggest such nonlinearity.

Our results also reveal other interesting properties of the securities-financing market. First, holding market conditions fixed, we find that dealers accommodate shifts in demand for financing. Higher levels of demand are associated with increases in credit limits and maximum maturities but have no significant effect on financing spreads or haircuts. Second, dealers tend to tighten financing spreads and haircuts when measures of their own condition, such as their CDS spreads and leverage, worsen. This suggests a desire to preserve capital and is broadly consistent with the mechanisms behind models such as He and Krisnamurthy (2013) and Adrian and Shin (2014). Finally, perhaps surprisingly, we find little relationship between bilateral dealer-to-client funding conditions and measures of other types of securities-financing activity. The SCOOS series are only weakly correlated with the aggregate volumes of collateralized lending that dealers report on their balance sheets, and they are essentially uncorrelated with available data on tri-party repo. This highlights the potential for segmentation across different short-term funding markets.

As noted above, the primary motivation for our study is the lack of available evidence on securities financing arrangements between dealers and their clients. Indeed, only two other empirical papers, Auh and Landoni (forthcoming) and Baklanova, Caglio, Cipriani, and Copeland (2017), have studied this market in any detail.[3] While

[3]In their study of the tri-party market, Copeland, Martin, and Walker (2014) briefly discussed some confidential data on bilateral-repo haircuts collected by the Federal Reserve Bank of New York,

the confidential micro data used in those studies allowed for a number of interesting tests that the SCOOS data do not, their coverage was relatively narrow. In the case of Auh and Landoni, the data were obtained from a single asset manager during the pre-crisis period, and most of the transactions financed mortgage-backed CDO securities. Baklanova et al.'s data come from a sample of nine dealer banks, but they cover only a single calendar quarter and primarily reflect intra-dealer lending, securities-borrowing activity, and transactions backed by Treasury securities. Our paper is complementary to these previous studies, but it takes a broader view by covering a variety of asset classes over an eight-year post-crisis period, with data drawn from the dealers that represent the bulk of the market. Our data exclude inter-dealer financing and dealer demand for securities borrowing, as well as transactions secured by Treasuries; we thus isolate the financing of risky collateral between dealers and clients, which is the market central to theoretical papers like Brunnermeier and Pedersen (2009). Furthermore, we are the first to explore the empirical links between securities financing activity and other market conditions, including liquidity and returns in the securities markets themselves.

While the empirical literature on dealer-to-client securities financing is small, a few papers have explored related markets. In a well known study, Gorton and Metrick (2012a) documented data on financing terms for many different asset classes. Their data were obtained from a single dealer at the height of the crisis, so it is unclear whether they extend more broadly or to non-crisis periods. Furthermore, they reflect the market for inter-dealer financing, not the dealer-to-client market. This is an important distinction because dealers are often only intermediaries in securities financing, not end users, and because one would expect that the nature of relationships and counterparty risk differ between dealer-dealer and dealer-client interactions.

In contrast to the bilateral securities-financing market, the tri-party repo market has been studied in some detail because the data on haircuts, rates, and volumes there are more readily available (Bartolini, Hilton, Sundaresan, and Tonetti, 2011; Copeland, Martin, and Walker, 2014; Krishnamurthy, Nagel, and Orlav, 2014; Hu, Pan, and Wang, 2018). Importantly, however, the tri-party and bilateral markets are quite distinct. The borrowers in the tri-party repo market are almost all dealers, and the lenders are typically money-market funds and other cash investors. In the bilateral

but that was not the focus of their paper.

market, in contrast, dealers are the lenders, and the borrowers are hedge funds, asset managers, and other "buy side" market participants. This difference (along with other institutional features) gives the tri-party market a uniformity and resilience that the bilateral market lacks. Indeed, as both Copeland et al. and Krishnamurthy et al. discuss, the tri-party market largely functioned well during the 2008 financial crisis, even as the bilateral market reportedly collapsed. Our data are also consistent with substantial differences between these two markets (although we do not focus on the comparison in this paper), as we find very weak correlations between the tri-party data and the SCOOS data.

The remainder of the paper is organized as follows. Section 2 briefly reviews the institutional details of the securities-financing market. Section 3 describes the SCOOS, the main data we pull from it, and the matched data that we obtain from other sources. Section 4 presents summary statistics for these data, including raw correlations of SCOOS terms with various measures of market conditions. Section 5 runs simple regressions to examine how terms are determined. Section 6 presents our analysis of liquidity causality. Section 7 looks at asset returns. Section 8 concludes.

2 Review of securities financing

Before describing our analysis, we briefly review the details of the securities-financing market.[4] Figure 1 provides a schematic representation of a typical financing transaction. The client, which is often a hedge fund or asset manager but could be any type of financial or nonfinancial institution, wishes to purchase a security and borrow money from the dealer in order to do so. In the example here, the market value of the security is \$100. The security serves as collateral for the loan. In a repo transaction, legal ownership of the security is transferred to the dealer, while in margin lending or other types of financing arrangements the client may retain ownership provided she does not default. Two important contract terms protect the dealer against the risk associated with the loan. First, the loan is overcollateralized—that is, the security receives a haircut. Second, the interest rate can be adjusted. In the example of Figure 1, the bond is haircut by 20%, so the client must put up \$20 of her own money to fund its purchase. The interest rate is assumed to be 4% annually, and the term of

[4]The institutional minutae of these markets are voluminous. See Acharya and Oncu (2011) and Adrian, Begalle, Copeland, and Martin (2014) for more-thorough treatments.

the loan is assumed to be 3 months, so the client pays \$1 in interest.

The expected profit to dealers from financing transactions depends on their marginal cost of funds. A typical arrangement is for dealers to fund their loans by borrowing against the same collateral that they are receiving. That is, they rehypothecate the securities into repo transactions on the other side of their balance sheets. When borrowing, dealers typically face cash providers, such as money-market funds, corporate treasurers, and security lenders, in the tri-party repo market, where they are generally able to obtain somewhat better terms than they provide bilaterally to their clients. In the figure, the dealer rehypothecates the \$100 bond at a rate of 2% and a haircut of 10%, effectively passing through the cash to the client. Three months later, when the transaction unwinds, the dealer passes the security back to the client, and passes the cash from the client to the tri-party counterparty.[5]

The dealer is compensated in two ways for making this market and bearing the associated risk. First, he earns the difference between the rate he charges the client and his own cost of funds. We will refer to this difference as the "financing spread." In the example, the financing spread is 2 percentage points. Second, the dealer retains the cash associated with the difference in haircuts between the bilateral and tri-party loans, and he can earn interest on this cash in the money market. In the example, the difference in haircuts is \$10. Supposing that the dealer can invest cash at 3%, his total compensation (assuming no default) is (.04 80 + .03 10 - .02 90)/4 = \$0.425, or 0.53% of the amount of the loan.

Financing spreads and haircuts, as well as other terms on securities-financing contracts, are negotiated between dealers and their clients on an ongoing basis. They continuously adjust to market conditions, and at any point in time a given dealer's terms may differ across both clients and collateral. To some extent, clients may be able to choose from a menu of terms—trading off higher haircuts for lower financing spreads, for example. Indeed, while financing spreads and haircuts play similar roles in terms of compensating and protecting dealers, from a theoretical perspective it is unclear how they should be jointly determined. Depending on differences in model assumptions, haircuts may move more than financing rates or vice versa, and their

[5]Dealers may also rehypotheate collateral among themselves, depending on their individual financing needs and client security demand. Indeed, while rehypothecation chains typically have their endpoints in the tri-party and dealer-client funding markets, they may involve many intermediate links between different dealers. (See Krishnamurthy, Nagel, and Orlav, 2014.) This accounts for the large footprint of interdealer financing noted above.

fluctuations may be positively or negatively correlated. (See Barsky, Bogusz, and Easton, 2016, for example.)

The empirical evidence on these questions is sparse. Gorton and Metrick (2012a) show that both haircuts and financing rates moved higher during the crisis but that haircuts moved much more. (However, their data were for interdealer transactions, not dealer-client transactions. The large interdealer financing market is not pictured in the figure.) Auh and Landoni (forthcoming) use micro data from an asset manager to show that clients may face a choice of different haircut-financing rate pairs for particular collateral at any point in time. Baklanova, Caglio, Cipriani, and Copeland (2017) use data provided from several banks to document the patterns of terms across asset classes, but many of their results focus on the Treasury market. A 2010 study published by the Committee on the Global Financial System (CGFS, 2010) reported the results of interviews with several funding-market participants. That study noted several different methodologies for how terms were set. (The study focused primarily on the setting of haircuts.) However, respondents frequently emphasized the importance of market liquidity, which is consistent with our main findings below.

While financing spreads and haircuts often attract the most attention, securities-financing contracts also include other terms that may be important. In particular, dealers may not be willing to lend beyond certain maturities, and they may also place limits on the amounts they are willing to lend to a particular counterparty at a point in time. Such position limits have received very little attention in the literature, but they may nonetheless be important. In the CGFS study, for example, interviewees often indicated that credit limits were the first margin of adjustment to be used in times of market stress. The SCOOS provides additional evidence on the behavior of these terms.

A separate question is how the bilateral market relates to the tri-party market. Given the transactions shown in Figure 1, one might expect the two to be closely linked. Yet Krishnamurthy, Nagel, and Orlav (2014) and Copeland, Martin, and Walker (2014) show that tri-party haircuts were largely unchanged during the crisis, even as anecdotal accounts (and the Gorton and Metrick (2012a) evidence) suggested significant tightening in the bilateral market. Our results below also suggest segmentation between these markets during the post-crisis period.

Finally, as mentioned in the introduction, there is a substantial theoretical literature that relates conditions in secured funding markets to conditions in the cash markets for the collateral securities and, by extension, to overall financial stability. (Brunnermeier and Pedersen, 2009; Garleanu and Pedersen, 2011, and others cited in the introduction.) Because of the lack of data, there is so far no empirical evidence from the bilateral funding market that can speak to these theories outside of the recent financial crisis. Below, we present such evidence using the SCOOS.

3 Data

3.1 The SCOOS

In recognition of the lack of data on bilateral securities financing relative to its potential importance, the Federal Reserve launched the Senior Credit Officer Opinion Survey in the second quarter of 2010. The survey design is described in Eichner and Natalucci (2010). A revision that added some questions to the survey took place in Q3 2011, so a few of our data series begin only on that date. Our sample ends in Q4 2017. In addition to securities financing, the SCOOS covers several other topics having to do with dealer-client interactions. In particular, a large section of the survey asks about aspects of the market for over-the-counter derivatives. We largely ignore this other information for the purposes of this paper.

The SCOOS is administered quarterly to "the financial institutions that account for almost all of the dealer financing of dollar-denominated securities to nondealers and that are the most active intermediaries in OTC derivatives markets." Over our sample period the number of respondents to the survey ranged from 20 to 23. Nearly all of the respondent pool consists of primary dealers—the large banks that are the Fed's counterparties in open-market operations. Thus, for some purposes, we will match available information about the primary dealers with the SCOOS data under the assumption that it reflects information about largely the same set of entities.[6]

The main survey questions of interest for us have to do with securities financing. The SCOOS defines this activity as "lending to clients collateralized by securities."

[6] Primary dealers include the largest broker-dealers operating in the United States. One requirement of primary dealers is that they "provide insight into developments in the markets in which they transact with the New York Fed, on an ongoing basis." Over our sample, the number of primary dealers ranged from 18 to 22. The remaining SCOOS respondents are other financial institutions that, though not primary dealers, have a large presence in the securities-financing or OTC derivatives market.

It goes on to explain that "such activities may be conducted on a 'repo' desk, on a trading desk engaged in facilitation for institutional clients and/or proprietary transactions, on a funding desk, or on a prime brokerage platform." Thus, the SCOOS takes a broad, institution-wide view of the bilateral funding market. Importantly, however, the definition used here excludes securities-borrowing activity (i.e., situations in which dealers source specific securities to facilitate short selling or delivery), and it excludes financing arrangements with other dealers.

Most of the questions we use are asked individually for each of seven different asset classes (i.e., collateral types): agency mortgage-backed securities, high-yield corporate bonds, equities, high-grade corporate bonds, commercial mortgage-backed securities, consumer asset-backed securities, and non-agency residential MBS. (The questions on the last four categories begin only after the 2011 survey revision.) In each case, respondents are asked to consider only dollar-denominated instruments. The most important questions for us are those that have to do with changes in financing terms. The SCOOS asks specifically about four different types of terms, for each asset class: financing spreads, haircuts, maximum maturities, and maximum amounts (i.e., credit limits). It also asks separately about the terms offered to "average" clients and to clients who are "most favored ... as a consequence of breadth, duration, and/or extent of relationship."

A representative question on terms is the following:[7]

> *Over the past three months, how have the terms under which agency RMBS are funded changed?*
>
> *Terms for average clients:*
>
> *Haircuts:*
>
> __ *Increased considerably*
> __ *Increased somewhat*
> __ *Remained basically unchanged*
> __ *Decreased somewhat*
> __ *Decreased considerably*

[7] The use of the passive voice in this question is not meant to indicate that the respondents should assess the direction of terms in the market as a whole. In the introduction to this section of the survey, the instructions specifically note that the questions are about "securities funding at your institution."

The SCOOS questions were modeled after those in the Senior Loan Officer Opinion Survey (SLOOS), which the Federal Reserve has conducted since the 1960s. In both surveys most questions have the sort of qualitative format shown above. There are some obvious drawbacks to dealing with data of this nature—for example, economic significance would be much easier to assess if changes in haircuts were simply expressed in percentage points. On the other hand, there are at least two advantages to the qualitative responses. First, they allow us to draw on the established empirical literature that has adapted to this sort of data in the SLOOS and found it useful.[8] Second, although most of the terms could have been quantified in principle, other variables that the SCOOS asks about, such as liquidity and demand, are multifaceted and somewhat vaguely defined. In these cases, precise quantitative measurement might not be possible or even desirable.

In any case, we take the SCOOS data as given and, following previous work using the SLOOS, we create diffusion indices for each type of term in each asset class in each quarter:

$$\tau_{i,j,t} = \frac{\#_{\mathrm{t}} \text{ tightening term } i_j - \#_{\mathrm{t}} \text{ easing term } i_j}{\text{total respondents}_{jt}} \tag{1}$$

where i indexes the four types of terms asked about in the SCOOS (haircuts, spreads, maximum maturities, and maximum amounts), j indexes asset class, and t indexes calendar quarters. The total number of respondents is indexed by j because a few dealers do not finance certain types of securities at all and thus do not respond to questions about those asset classes. Note that the indices are signed such that positive values always indicate tighter terms. We also constructed weighted indices, giving a response like "tightened considerably" twice as much weight as "tightened somewhat." However, as we show below, there was very little difference in results between the weighted and unweighted indices. We therefore use the unweighted series in most of our analysis for ease of interpretation.

The SCOOS also asks about demand for securities financing and cash-market liquidity for each of the same seven asset classes. Sample questions of each type are as follows:

Over the past three months, how has demand for funding of agency RMBS by

[8] E.g.., Gorton and Pennacchi (1995); Lown and Morgan (2006); Ivashina and Scharfstein (2010); Gilchrist and Zakrajsek (2012).

your institution's clients changed?

__ *Increased considerably*

__ *Increased somewhat*

__ *Remained basically unchanged*

__ *Decreased somewhat*

__ *Decreased considerably*

Over the past three months, how have liquidity and functioning in the agency RMBS market changed?

__ *Improved considerably*

__ *Improved somewhat*

__ *Remained basically unchanged*

__ *Deteriorated somewhat*

__ *Deteriorated considerably*

We collect the responses to each of the financing-demand and market-liquidity questions and create diffusion indices in the same manner that we do for the terms questions. In particular, we denote by $\lambda_{j,t}$ the net fraction of dealers reporting improving liquidity and functioning in asset class j at time t. We note that, unlike the other SCOOS questions used here, the "liquidity and functioning" question does not refer to the securities-financing market, but rather to the cash market for the underlying collateral. Indeed, respondents are specifically instructed to take account of a broad set of indicators of that market, and not just financing conditions themselves, when answering this question. That will be important for us later, because we will use the responses to this question as our primary measure of market liquidity. The liquidity question is not asked for the equity market, presumably because equities are exchange-traded and do not face potential illiquidity in the same sense that OTC-traded instruments do.

Finally, in a separate section, the SCOOS asks dealers about the reasons that they tightened or eased their terms in each quarter. These questions do not align directly with the terms questions discussed above, for several reasons. Nevertheless, we exploit these data in some of our analysis in Section 6. We defer the discussion of the details of these questions until then.

3.2 Other data

We match the SCOOS data by date and asset class to a variety of potentially relevant data from other sources. First, we collect data on aggregate security returns. The particular indices we use to measure returns are listed in Table 1. Each edition of the SCOOS reports the dates during which it was conducted (typically, the last week of the second month of each calendar quarter), and all of its questions refer to changes in conditions over the preceding three months. We calculate the return on each index between the same sets of dates. The price indices also allow us to calculate asset-class-specific measures of realized volatility. Specifically, we do this by computing the standard deviation of daily changes in index levels during the month that ends on the SCOOS reporting date. We then difference these series across quarters to obtain a measure of the change in volatility for each asset class that approximately lines up with the timing of the changes in conditions reported in the SCOOS.

A second source of asset-specific information we use is the FR-2004 report produced weekly by the Federal Reserve Bank of New York. This report collects information on the aggregate value of securities that primary dealers receive through operations other than outright purchases ("securities in"), a category that includes bilateral securities financing. As noted above, the SCOOS respondent panel closely matches the set of primary dealers. Since the SCOOS asks about quarterly changes, we compute the percentage differences in the FR-2004 quantities, matched as nearly as possible to SCOOS reporting weeks, relative to three months prior. The FR-2004 also reports the amount of fails-to-deliver in repo transactions and the volumes of secondary-market trading conducted through the primary dealers. Again, they are reported weekly for different asset types (though not for every asset type in every period), and we do the matching to the SCOOS data in the same way as above. To adjust for changes in the amount of financing, we calculate the ratio of the value of fails-to-deliver to the amount of financing occurring that week. We note that the FR-2004 data do not exist separately for every asset class covered by the SCOOS (and the set of asset classes reported changes over time). We therefore must drop some observations when using these data.

To further connect SCOOS responses to activity in asset markets, we use data from SIFMA to match SCOOS responses with quarterly asset-specific gross issuance amounts and (within quarter) percentage changes in monthly trading volumes for structured finance and corporate debt assets. For equities, we take issuance and trading volume data from the Financial Accounts and the NYSE.[9] For corporate bonds we also construct Amihud (2002) liquidity statistics from a large sample of transactions in TRACE.

Since previous work has emphasized differences between the bilteral and tri-party repo markets (Copeland et al., 2014; Krishnamurthy et al., 2014), we investigate these differences further by matching our survey responses to the New York Fed's publicly available tri-party repo data. These data track volumes, market concentration, and percentiles of the distribution of haircut values in the tri-party repo market for each of the asset classes we consider except CMBS, starting in the third quarter of 2010.

We calculate several aggregate measures of dealer health. First, we compute the average credit default swap spread of the primary dealers, using data from Markit, and we take the ratio to the investment-grade CDX index to obtain a dealer "excess" CDS spread. We compute the first difference of this series across SCOOS reporting dates. Second, we follow Adrian, Etula, and Muir (2014) and compute quarterly percentage changes in (book value) dealer leverage using data from the Financial Accounts of the United States. We also use the Financial Accounts to compute percentage changes in dealer equity levels and changes in the fraction of liquid assets at dealers. We interpolate the quarterly values to compute changes matched to the SCOOS dates.

Finally, we make use of a variety of other sources of time-series data. To measure market perceptions of risk and risk aversion, we collect the VIX index of stock-market implied volatility, the MOVE index of Treasury-market volatility, and the swaption-implied volatility of one- and ten-year swaps. To capture broad changes in interest rates, we use 3-month and 10-year Treasury yields. As additional measures of broad financial market conditions, we collect the TED spread, the spread between on- and off-the-run five-year Treasury yields, the Gilchrist-Zakrajsek (2012) excess bond premium, the investment-grade and high-yield non-financial CDX indices, the Citi Macro Risk Index, and the Chicago Fed Financial Conditions Index. As above, we difference (or log-difference) all of these series by quarter, matching as closely as possible to the SCOOS reporting dates.

[9] The Financial Accounts data are reported as of quarter-end. We interpolate to obtain measures that line up with the SCOOS reporting dates.

4 Stylized facts about securities financing terms

Panel A of Table 2 shows various measures of the volatility of securities-financing terms, as measured by the SCOOS. The first measure is the standard deviation of our diffusion index. The second measure is the root mean squares of these indices. The reason for computing this statistic is that the indices capture *changes* in terms, and therefore their standard deviations could in principle be zero even if the terms are changing a lot each quarter. The RMS effectively takes account of both the average change in each term and the variation in that change. Third, we report the average number of dealers changing their terms in either direction in each quarter. This number does not net out negative and positive changes, as our diffusion index does. We compute each of these three volatility measures within each asset class, and we report the averages of each volatility measure across all asset classes in the table. We do this separately for average and most-favored clients, and using both the unweighted and weighted indices. It turns out that dealers tend to change terms in the same direction as each other in any given quarter and that positive and negative changes occur with roughly equal frequency over time. Consequently, all three volatility measures give very similar results.

Regardless of how volatility is measured, terms are rather stable. Only about 15% of dealers change their financing rates in each quarter, on average, while even fewer change their other terms. Even so, the changes in the other terms are not zero. Maximum amounts move the least, but still about 8% of dealers per quarter change them. Haircuts adjust only slightly less often than financing rates do.[10]

It is also apparent from the table that the choice of weighted versus unweighted index does not matter much, and that volatilities are similar for average and most-favored clients. Those results are further reinforced in Panel B, which shows the correlations between terms by client status and between the unweighted and weighted indices. For any given term, the two client types and the two indices are very highly correlated. Since they appear to behave in very similar ways, we ignore these distinctions for the remainder of the paper. Henceforth, we use only the unweighted indices to measure changes in terms, and we average these indices across average and

[10]The CGFS (2010) study reported that dealers only modestly adjusted their haircuts in response to high-frequency market volatility. Instead, haircuts were reportedly set largely based on Value-at-Risk models based on historical data, with a typical look-back period of ten years. This could explain the lack of volatility, especially during non-crisis periods.

most-favored clients.

Table 3 breaks out volatility by asset class (measuring volatility as the RMS). The basic patterns just described hold across most asset classes—although none of the terms is very volatile, financing rates almost always move a bit more than other terms do, and maximum amounts move a bit less. Terms are most volatile for corporate bonds, CMBS, and private-label RMBS, and they are least volatile for ABS and equities. Yet, there is no obvious association between which terms move most and the general riskiness or other properties of the security classes.

For a visual representation, Figure 2 plots the data. Panel A shows the indices for each of the four terms, averaging across asset classes in each quarter. In panel B, we average across all four terms within each asset class, to give a general sense of how aggregate funding conditions have changed over time. Terms generally eased during the first year of the SCOOS's existence, as markets continued to recover from the financial crisis. They tightened sharply in the second half of 2011, around the time of the downgrade of U.S. credit rating and the onset of the European sovereign debt crisis. Then, after a period of relative stability, terms tightened again in 2015 and 2016. This episode was associated with a number of stressful market events, including a sharp selloff in Chinese stocks, a collapse of oil prices, and the U.K.'s "brexit" vote. Finally, toward the end of our sample, terms eased a bit again, as markets generally performed well in 2017.

Stepping back, we note two general properties of these graphs. First, although the brief narrative above emphasized the common movements in terms (and we will see shortly that the correlations among them are indeed high), there is also a substantial amount of dispersion across term types and asset classes. This means that there are potentially interesting things to explain in the cross-sectional dimensions of the data. Second, there is very little serial correlation in the series. We would expect this, since the SCOOS asks about *changes* in terms each quarter. It implies that spurious correlation between SCOOS series and other data is unlikely to be a problem.

Table 4 shows how terms are correlated with each other and with other market data. In panel A, we pool across all asset classes for each type of term. In panel B, we pool across all terms for each asset class. Shaded columns indicate data on which we have only time-series observations, while all other columns are matched both by time and by asset class.

The first four columns of Panel A show how terms correlate with each other. As was evident from Figure 2, all terms move fairly closely together. Changes in financing rates and haircuts are particularly highly correlated. This result is interesting in light of previous work. Within the portfolio of securities that they examine, Auh and Landoni (forthcoming) find that transactions with higher rates have lower haircuts, and Baklanova et al. (2017) find a similar result for U.S. Treasury securities. Our results are not directly comparable, because they are with respect to different asset classes over time, rather than for particular collateral at a point in time. Still, the correlations suggests that spreads, haircuts, and the other terms generally move together in the aggregate. This motivates our search for common factors driving funding-market tightness. On the other hand, the correlations between terms are not perfect, and another question will be whether there are identifiable factors that affect different terms differently.

Columns [5] through [8] show how SCOOS terms correlate with measures of securities-market liquidity. These correlations are quite high, both for the liquidity indicators that are matched by asset class and for the time-series data. They hold across all four terms and (where the measurement is possible) across all seven asset classes. The next four columns show correlations between terms and measures of volatility. The correlations with realized volatility, which are measured for each asset class, are rather weak.[11] The correlations with implied volatilities are somewhat stronger, especially for haircuts. Terms also have a modestly negative unconditional relationship with asset returns, though this is driven mainly by the corporate bond categories.[12] They have little correlation with trading volumes, though they do show a negative relationship with issuance for some of the less-liquid asset classes. (The positive correlation between terms and equity issuance is a puzzle.)

Funding demand (column 16) is negatively correlated with all types of terms; that is, terms tend to loosen in periods when demand increases. Since, all else equal, we would typically expect outward shifts in demand to result in tighter terms, this result likely indicates that supply of and demand for securities financing are positively correlated and both driven by the same underlying factors. The strong negative

[11] Our measure of realized volatility is backward-looking. Following Gorton and Metrick (2012a), we also tried using *future* realized volatility but also found little relationship with terms.

[12] The apparently strong positive correlation between terms and returns for ABS securities is due to an outlier—in Q3 2011, dealers reported a tightening of most terms in this asset class, even as our return index shows a large increase in prices. Excluding this quarter, the correlation becomes small and insignificant.

association between terms and demand shows up in all of the asset classes except ABS and high-yield bonds.

Perhaps surprisingly, we do not find strong correlations between terms and the securities-financing volumes reported in the FR-2004. One reason is that the FR-2004 data include certain types of funding activity that the SCOOS excludes. In particular, they include securities borrowing and transactions with other dealers. Evidence in Gorton and Metrick (2012b) and Baklanova et al. (2017) suggests that these two categories in fact constitute the majority of dealer activity.[13] Even so, the data do not suggest that financing volumes are very sensitive to changes in terms (or vice versa). Correlations of financing volumes with SCOOS-reported demand (not shown in the table) are somewhat stronger, averaging 31% across all asset classes.

The correlations of SCOOS terms with measures of activity in the tri-party market are also weak. This again highlights the fact that these markets can behave much differently.

The next set of columns contains correlations with measures of dealer condition. These correlations all point to a negative relationship between the health of dealers and the tightness of terms—wider excess CDS spreads, higher leverage, and decreases in equity levels are all associated with tighter funding conditions. Dealers also increase their holdings of liquid asset during quarters when they tighten their terms.

Finally, the last several columns show the correlation of financing terms with other measures of broad market conditions. Terms are tighter in environments with higher credit risk (as measured by the CDX indices). Spreads and haircuts are also modestly correlated with the Gilchrist-Zakrajzek (2012) excess bond premium, which is often interpreted as a measure of risk-bearing capacity, and with the Citi MRI, which is often interpreted as a measure of risk aversion. They have a fairly strong negative correlation with the Chicago Fed Financial Conditions Index, which is not surprising given that that index subsumes many of the other measures of condition just mentioned. Financing terms have little relationship with short- or long-term interest rates.

[13] After 2015, the FR-2004 breaks out repo volumes from other types of securities-financing contracts for certain asset classes, but the mingling of interdealer and client financing remains.

5 Determinants of terms

5.1 Baseline regressions

It is clear from the preceding simple correlations that the terms on securities financing change together with market conditions. In particular, terms tend to tighten during periods of market stress. However, measures of market stress are highly correlated with each other, making it difficult to discern which are most connected to securities-financing conditions.

To understand better which variables matter most, we run multivariate regressions of terms on subsets of the other variables. Because of the relatively small sample, we restrict ourselves to parsimonious specifications. The variables we include in our baseline models are those that appeared unconditionally important in Table 4, those for which we have data across most of the SCOOS sample, and those that seem likely important on *a priori* grounds. Specifically, we include the SCOOS measures of asset-specific financing demand and liquidity; realized volatility of the security-price index; excess CDS spreads for dealers; the investment-grade CDX; and the VIX and MOVE indices of implied volatility. However, we ran a number of other specifications (available upon request) and obtained similar results.

We run these regressions both for each asset class individually and pooling the data across asset classes. When pooling, we consider a sample that excludes both private MBS, for which we do not have realized volatilities, and equities, for which we do not have liquidity measures, as well as a sample that excludes only the equities. We also consider specifications that include quarterly time dummies, where of course we have to drop the pure time-series data. We include asset-class fixed effects in all of the pooled models.

Table 5 presents the results. The interpretation of the coefficients in this table is the net percentage of dealers that tighten each term type when there is a one-unit change in the independent variable. To get a better sense of the economic significance of these results, Table 6 reports standardized versions of the coefficients—that is, the number of standard deviations of each dependent variable associated with a one-standard-deviation change in each independent variable—using the pooled specification with five asset classes and time-series control variables.

Regardless of specification, liquidity appears as the most statistically and economically significant variable for all four terms. For haircuts, financing spreads, and maximum maturities, it is statistically significant (at least at the 10 % level) in the pooled regressions and in five of the six disaggregated asset-class regressions where this measure is available. For maximum amounts, the significance is less consistent, but it remains for at least the corporate bond and private RMBS categories. The liquidity coefficients are also economically significant—a one-standard-deviation change in liquidity is associated with a change in terms of between one-third and two-thirds of a standard deviation, depending on the model. Changes in liquidity are somewhat more strongly associated with changes in financing spreads than with the other terms.

The statistical and economic significance of liquidity is weaker in the pooled model with time dummies than in the pooled model with the time-series controls. However, there is reason to think that the model with the time dummies understates the importance of liquidity. Namely, the coefficients in that model reflect only the liquidity effect *within* asset classes, even though it is likely that there is a common component to liquidity across markets (e.g., Chordia, Sarkar, and Subrahmanyam, 2005). The effects of any such component will not be reflected in the liquidity coefficient estimates and would instead be swept into the coefficients on the time dummies themselves. To provide some rough evidence of this, we extract the coefficients on the dummy variables in each of the models of Table 5, and we examine their time-series correlations with other time-series variables. Table 7 shows the results. Their highest univariate correlations are indeed with broad measures of market liquidity.

Returning to Tables 5 and 6, we note two further significance patterns. First, demand for financing is insignificant for haircuts and financing spreads but negatively significant for maximum maturities and amounts. The interpretation of these results is that dealers respond to increased demand by lending more and at longer maturities without significantly increasing their margins on this lending. In other words, funding supply appears to be relatively elastic. However, the economic significance of all of these coefficients is fairly small.

Second, in the models that include time-series controls, higher excess CDS spreads for dealers are significantly associated with tighter haircuts and financing spreads (though not consistently with the other terms). The coefficients are also economically significant—a one-standard-deviation change in the excess CDS spread is associated with about half a standard deviation change in financing spreads or haircuts. These results suggest that dealers tighten terms to protect capital in times when their balance sheets become riskier. Additional results using Flow of Funds measures of dealer equity (not shown) are also consistent with this interpretation.

Volatility measures—including asset-specific realized volatility—do not appear as consistently significant or large in these regressions. Evidently, given liquidity conditions, dealers are relatively unconcerned with market volatility when setting terms. With respect to haircuts, the lack of a consistent relationship is particularly striking, as most theoretical models predict that haircuts should depend strongly on the tails of the distribution of the collateral value (e.g., Geanakoplos, 2010; Gromb and Vayanos, 2002). This absence of relationship between haircuts and volatilities in our data is, however, consistent with the findings of Baklanova et al. (2017).

5.2 Justifying the SCOOS liquidity measure

In the regressions above, we have used the liquidity indices λ_{jt} created from the SCOOS as our measure of securities-market liquidity. These indices have the advantages that they are available and measured consistently for six of the seven SCOOS asset classes and that they are matched exactly to the SCOOS terms across both time and asset classes. However, because they are unfamiliar and somewhat difficult to interpret quantitatively, it is important for us to show that they do in fact capture measurable aspects of liquidity.

Table 8 reports regressions of the SCOOS liquidity indices on other measures of liquidity that are available for the two corporate bond series. These are the only asset classes for which we have asset-specific Amihud liquidity measures. The regressions fit well, with adjusted R^2s of 61% and 70%, and all four of the included liquidity measures are significant with the expected sign in both regressions. Thus, at least within these two asset classes, the indices do indeed appear to be accurately summarizing liquidity conditions in their respective markets.

6 Causality between Funding Conditions and Market Liquidity

6.1 Self-reported reasons for changing terms

Although the regressions in Table 5 isolate partial correlations, the direction of causality between securities-financing terms and the right-hand-side variables may go in both directions. In particular, one might think that the tightness of funding conditions has an adverse effect on securities-market liquidity.

One way of ascertaining why dealers change their securities-financing terms is simply to ask them. Indeed, the SCOOS does exactly this, soliciting the most-important reasons for tightening and easing terms in each quarter. Specifically, for dealers who report tightening of either price or nonprice terms, the SCOOS asks questions like the following, by counterparty type:

> *To the extent that the price or nonprice terms applied to hedge funds have tightened or eased over the past three months ... what are the most important reasons for the change?*
>
> *Possible reasons for tightening:*
>
> __ *Deterioration in current or expected financial strength of counterparties.*
> __ *Reduced willingness of your institution to take on risk*
> __ *Adoption of more-stringent market conventions*
> __ *Higher internal treasury charges for funding*
> __ *Diminished availability of balance sheet or capital at your institution*
> __ *Worsening in general market liquidity and functioning*
> __ *Less-aggressive competition from other institutions.*
>
> *Possible reasons for easing:*
>
> __ *Improvement in current or expected financial strength of counterparties.*
> __ *Increased willingness of your institution to take on risk*
> __ *Adoption of less-stringent market conventions*
> __ *Lower internal treasury charges for funding*
> __ *Increased availability of balance sheet or capital at your institution*
> __ *Improvement in general market liquidity and functioning*

__ *More-aggressive competition from other institutions.*

Only dealers who report a change in their terms answer these questions. Since 2012, they have been asked to select the first, second, and third most-important reasons from the above lists of seven. (There is also an "other" option available, but it is rarely used and we disregard it.) Prior to 2011 Q3, rather than selecting a top three, dealers were asked to rate each possible reason for changing terms as "very important," "somewhat important," or "not important." However, it turns out that the number of reasons that dealers listed as "very important" always averaged about three. Thus, for our purposes, we take "top-three reason" and "very important reason" to be synonymous, and we splice the series together.

Dealers provide this information for each of several different counterparty types, including hedge funds, non financial companies, and insurance companies since the survey began and several others since it was revised in 2011.[14] We note that the "terms" being asked about in these questions cover those on both securities financing and OTC derivative activity.

Table 9 shows how often each reason is listed as a top-three (or "very important") reason for changing terms. The frequencies of reasons for changing terms are fairly consistent across counterparty types. For all counterparties, "competition from other institutions" is the most-frequently cited reason for changing terms. While this rationale may make perfect sense from the perspective of an individual dealer, it is not a satisfying explanation for aggregate fluctuations in terms, given that there are not large changes in the market structure of the broker-dealer industry from quarter to quarter. Changes in "competition" likely reflect dealers observing each other tightening and easing terms, the ultimate cause of which is one of the other reasons listed.

Apart from competition, dealers generally cite market liquidity as the most common reason for changing terms. This is consistent with the strong correlation shown above between terms and liquidity, as measured both by the SCOOS and by external market measures.

To measure the importance of the various motivations for changing terms across time, we construct the variables

[14]Prior to the revision, the hedge fund category also included "other asset managers."

$$x_{k,l,t} = \frac{\#_{\mathrm{t}} \text{ tightening to counterparty } l \text{ for reason } k - \#_{\mathrm{t}} \text{ easing to counterparty } l \text{ for reason } k}{\text{total respondents}_t} \quad (2)$$

for each of the seven reasons and six counterparty types listed in the SCOOS. To conserve degrees of freedom in the exercises below, we create an aggregate index of the importance of each reason by averaging the $x_{k,l,t}$ series across the three counterparty types that have existed over the entire life of the SCOOS. We denote these indices as $\bar{x}_{k,t}$.

We then run the regressions

$$\tau_{i,j,t} = a_{i,j} + \sum_k \beta_{i,j,k} \bar{x}_{k,t} + e_{i,j,t} \quad (3)$$

for each (i, j) pair, where, as before, i indexes the type of term (spread, haircut, etc.) and j indexes the asset class. These regressions parse the changes in financing terms that we observe into their causes. In particular, the coefficients $\beta_{i,j,k}$ indicate how often dealers change each term on each asset class when they change terms in general for each particular reason.[15]

While these regressions are primarily an intermediate step to the next stage of our analysis, the results themselves are also of some interest. Table 10 reports the t statistics on the $\beta_{i,j,k}$ coefficients. The regressions generally fit well—across the 24 models, the average R^2 is 63%—suggesting that the list of reasons for changing terms covers most of what dealers find important. Although mutlicollinearity makes it difficult to discern the precise patterns, the variable that turns out to be statistically significant most often across terms and asset classes is the fraction of dealers reporting that market liquidity is important. When more dealers report that liquidity was an important reason for changing terms, more dealers also report actual changes in terms. This is not necessarily so for the other possible "reasons." For example, competition, which was the most frequently cited reason for changing terms overall, is rarely significant in these regressions. (This supports our argument above that "competition" cannot really be the ultimate cause of fluctuations in terms.) Liquidity is also generally the most economically significant of the $\bar{x}_{k,t}$ indices. Across all 24 regressions, the

[15] We also ran these regressions using only the important reasons series $x_{k,l,t}$ for hedge funds, instead of our aggregated series $\bar{x}_{k,t}$, and obtained similar results.

coefficient on liquidity importance (not shown in the table) averages 1.00, while the coefficients on the other six reasons average just 0.09. The liquidity coefficients are more consistently significant for spreads and haircuts than for maximum maturities and maximum amounts, which is consistent with the results reported in Table 5.

These results suggest that at least some of the partial correlation between liquidity and financing terms that was demonstrated above reflects dealers changing their terms in response to market liquidity. Of course, it is still possible that the causality could run the other way too. We turn to this question next.

6.2 Do funding conditions affect liquidity?

To examine the reverse direction of causality, we try to answer the question: "When dealers change terms for reasons *other* than liquidity, how is liquidity affected?" To do this, we use the results in Table 10 to construct "liquidity controlled" versions of each of the securities-financing terms series. Specifically, we generate predicted values for each term, for each asset class, in each quarter, counterfactually supposing that liquidity was never an important reason for changing terms. We construct these variables in two ways:

$$\tilde{\tau}^1_{i,j,t} = \hat{a}_{i,j} + \sum_{k \neq \text{liq.}} \hat{\beta}_{i,j,k} x_{k,t} \tag{4}$$

$$\tilde{\tau}^2_{i,j,t} = \hat{a}_{i,j} + \sum_{k \neq \text{liq.}} \hat{\beta}_{i,j,k} x_{k,t} + \hat{e}_{i,j,t} \tag{5}$$

where "hats" denote the OLS estimates from equation (3). These series represent the changes in financing terms that would have occurred if dealers had never considered liquidity to be an important factor. The difference between (4) and (5) is whether the the counterfactual series includes the residual $\hat{e}_{i,j,t}$ from the first stage. It makes sense to include this term if there are important reasons for changing terms that are omitted from the SCOOS list. On the other hand, if the residual simply reflects noise in the series one would want to exclude it from the counterfactual. Since it is not clear which interpretation is correct, we do it both ways.

We then regress the SCOOS liquidity variable on the liquidity-controlled financing terms:

$$\lambda_{j,t} = \gamma_j + \sum_i \delta_{i,j} \tilde{\tau}^1_{i,j,t} + \boldsymbol{\zeta}' \mathbf{z}_{j,t} + u_{i,j,t} \tag{6}$$

and similarly for the $\tilde{\tau}^2_{i,j,t}$, where $\mathbf{z}_{j,t}$ is a vector of control variables. We run the regressions pooling across all six asset classes where the liquidity terms exist. We use the same time-series control variables as in the previous regressions.[16]

Table 11 presents the results. At first glance, there is some evidence that terms matter for liquidity—at least some of the liquidity-controlled terms show up as negative and significant. However, the statistical significance patterns are not robust across models, and the economic significance is generally small. To see this more clearly, we construct counterfactual liquidity series, showing what our estimates imply liquidity in each asset market would have been in the absence of changes in terms. That is, we compute

$$\tilde{\lambda}^1_{j,t} = \lambda_{j,t} - \sum_i \delta_{i,j} \tilde{\tau}^1_{i,j,t} \tag{7}$$

and

$$\tilde{\lambda}^2_{j,t} = \lambda_{j,t} - \sum_i \delta_{i,j} \tilde{\tau}^2_{i,j,t} \tag{8}$$

These series are plotted against the aggregate observed SCOOS liquidity indices in Figure 3. The dashed lines show two-standard-error bands around the counterfactual estimates.

It is clear from these figures that, in almost every period and for almost every asset class, there is no meaningful difference between the actual and counterfactual liquidity series, whether or not the difference is statistically significant. The only exception to this is the behavior of the investment-grade corporate bond series in 2010. For that period, the model suggests that the easing of terms may have played an important role in the improvement of liquidity conditions in the corporate bond market. Unfortunately, however, this is the only risky asset class for which the SCOOS provided liquidity data over this period, so the number of observations is very small. In any case, outside of that episode, these results suggest that securities financing has

[16] We also ran the models using quarterly time dummies and obtained similar results. In addition, we ran these regressions for each asset class individually. Not surprisingly, given the small sample size, the coefficients were always insignificant.

not played a large role in supporting or hampering market liquidity over the post-crisis period. The strong associations between funding terms and liquidity that were evident in Tables 4 and 5 can be explained almost entirely by dealers' reactions to liquidity conditions, rather than the other way around.

6.3 Do funding conditions affect asset prices?

Finally, we ask whether there is any relationship between financing conditions and asset prices. Table 4 illustrated moderate unconditional correlations between terms and security returns in general, and these correlations were particularly strong for the corporate-bond asset classes.

Table 12 shows that these correlations do not survive controls for other factors. We regress asset returns, by individual asset class and in pooled models, on financing terms and control variables. In the pooled models we standardize returns such that, within each asset class, they have mean 0 and standard deviation 1. We find virtually no statistically significant relationship between funding terms and asset returns in any specification. Moreover, the economic significance is weak. For example, the coefficient on financing spreads in column [7] (the only statistically significant coefficient on terms in the pooled models) suggests that a one-standard-deviation tightening of spreads (a change in the index of 0.15) reduces returns by 0.24 quarterly standard deviations. For investment-grade corporate bonds, for example, this would translate to about a 0.5% change in prices.[17]

Although there is less *a priori* reason to suspect reverse causality between asset returns and financing terms than there was between liquidity and financing terms, we also ran the regressions in Table 12 using our "liquidity-controlled" terms, constructed as described above. These results too showed no statistical or economic significance. We conclude that securities financing conditions have not been an important driver of asset-price fluctuations over the post-crisis period.

[17] As noted in footnote 12, the correlation between ABS returns and terms are affected by the presence of a single outlier observation. However, the removal of this observation does not substantively alter the results presented in Table 12.

7 Conclusion

This paper has presented new evidence on the workings of the bilateral, dealer-to-client securities-financing market. By exploiting information from the Senior Credit Officer Opinion Survey, we demonstrate several facts about this market that have not previously been systematically documented. Although the SCOOS data have certain limitations, they are the only source of data to cover dealer-to-client financing across a variety of asset classes and encompassing the bulk of the activity in the market.

Our main findings are that, while terms were not very volatile during the 2010 - 2017 period, they generally moved together with other measures of market conditions. In particular, the liquidity of the underlying securities markets appears to be the most important determinant of how terms are set. In contrast, we do not find much evidence that changes in financing terms have been important for liquidity or asset returns during the post-crisis period. Although securities-financing terms are positively correlated with each other, they do not move together perfectly. Spreads and haircuts are sensitive to measures of dealer condition, while maximum maturities and maximum amounts are sensitive to client demand.

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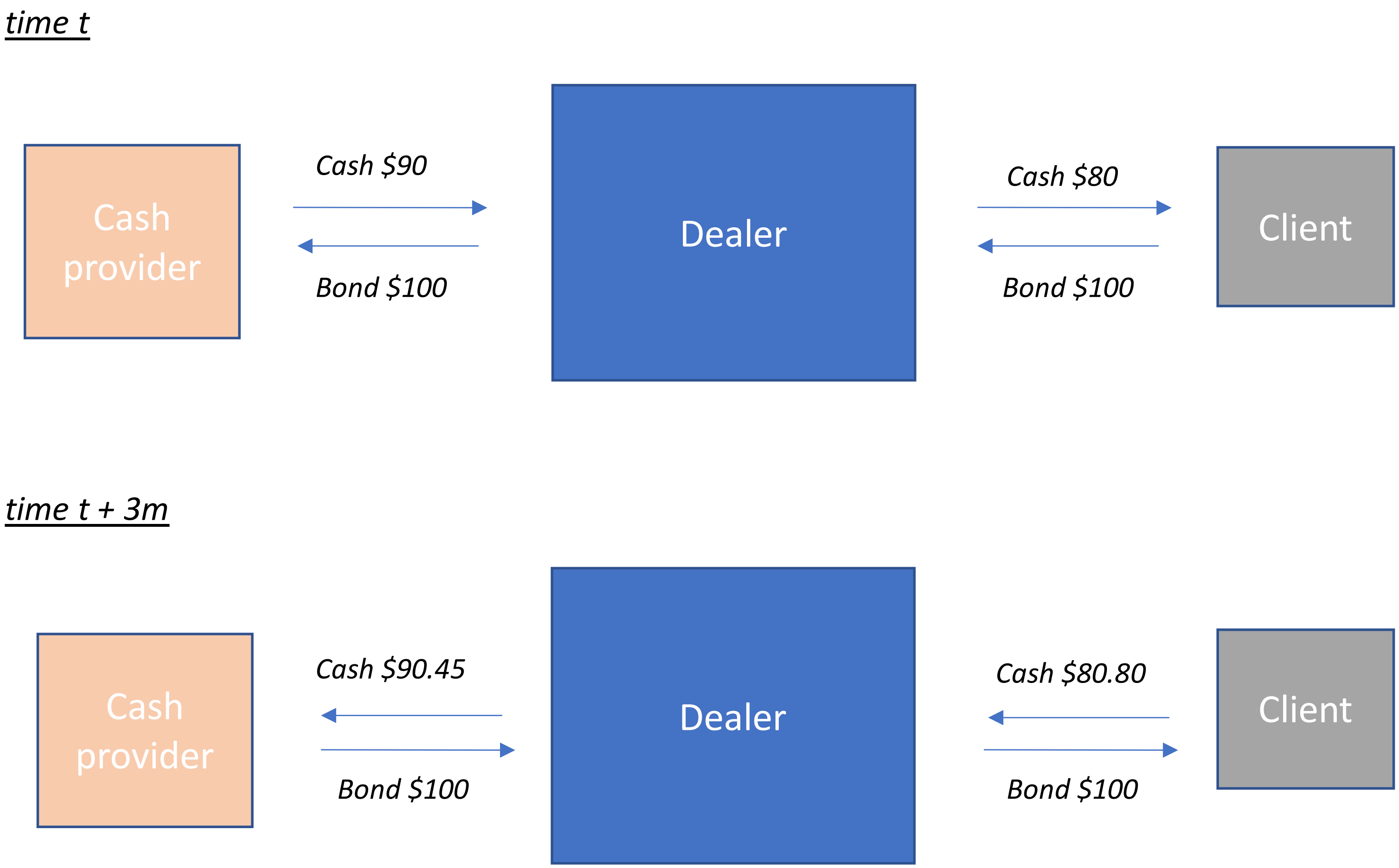
Figure 1. Example of a Securities Financing Transaction

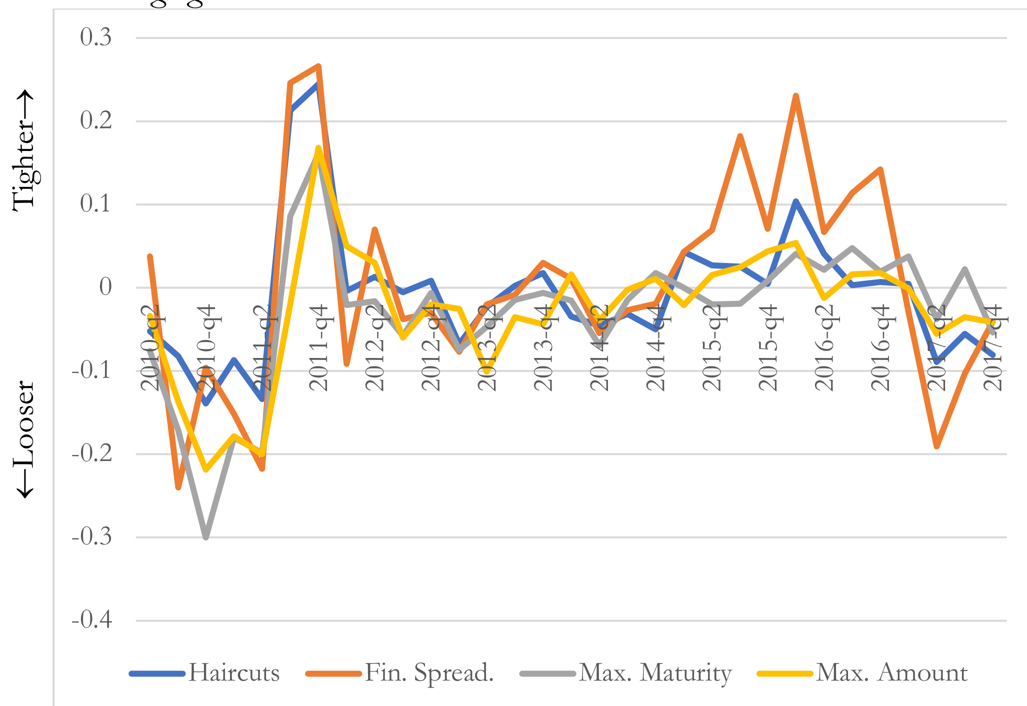


Tri-party Terms
- Financing rate: 2.0%
- Haircut: 10%
- Maturity: *3m*
- Amount: $90

Bilateral Terms
- Financing rate: 4.0%
- Haircut: 20%
- Maturity: *3m*
- Amount: $80

Figure 2. Changes in SCOOS terms

A. Averaging across all asset classes



B. By asset class, averaging across terms

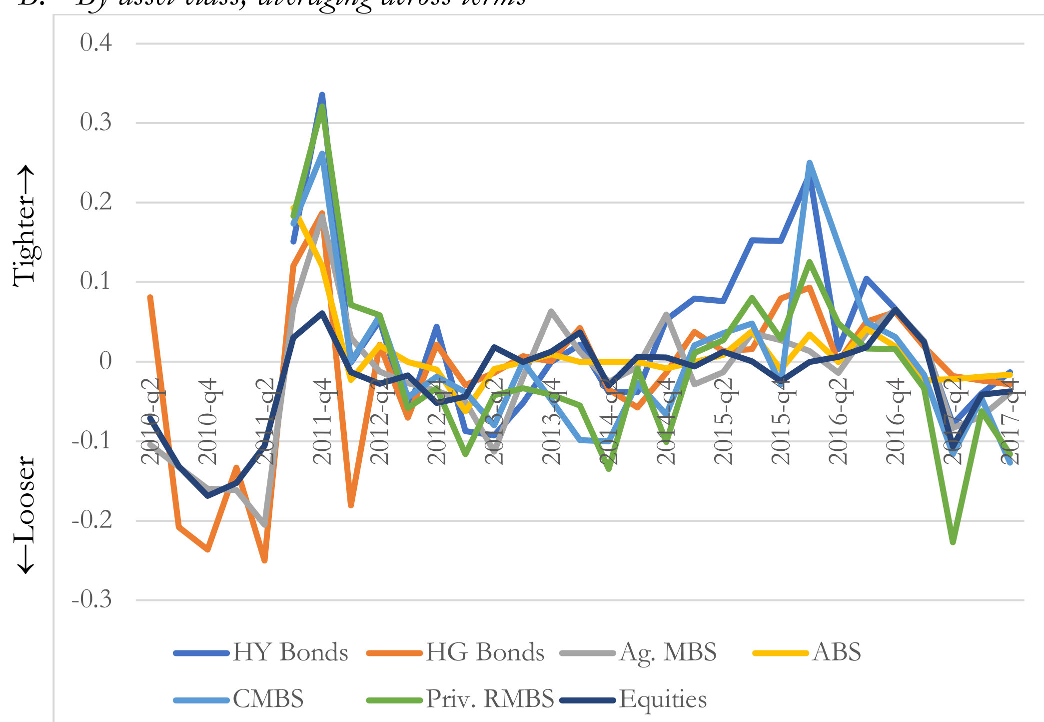
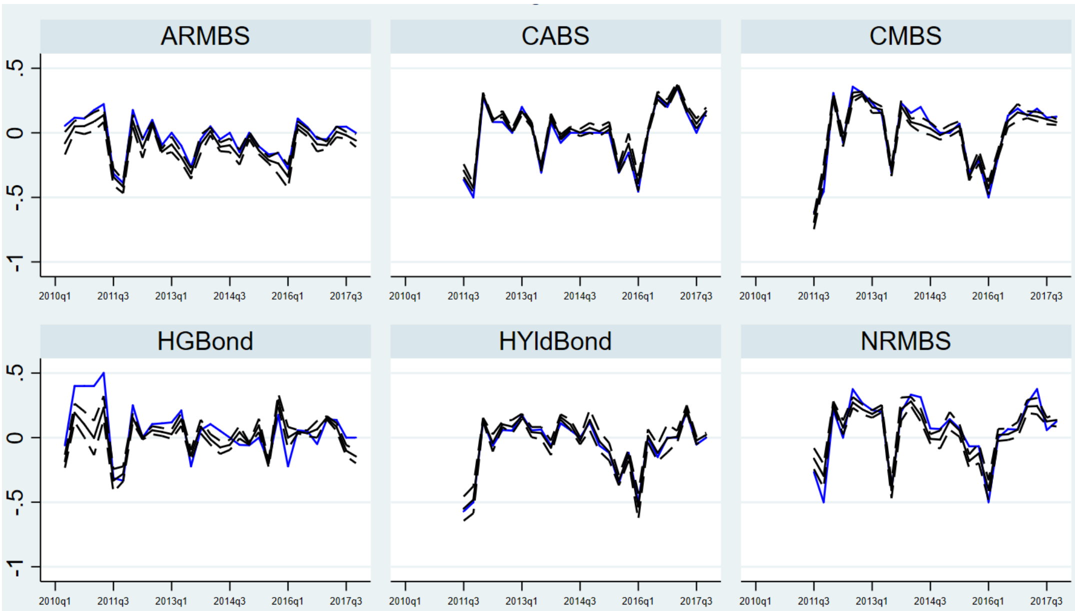
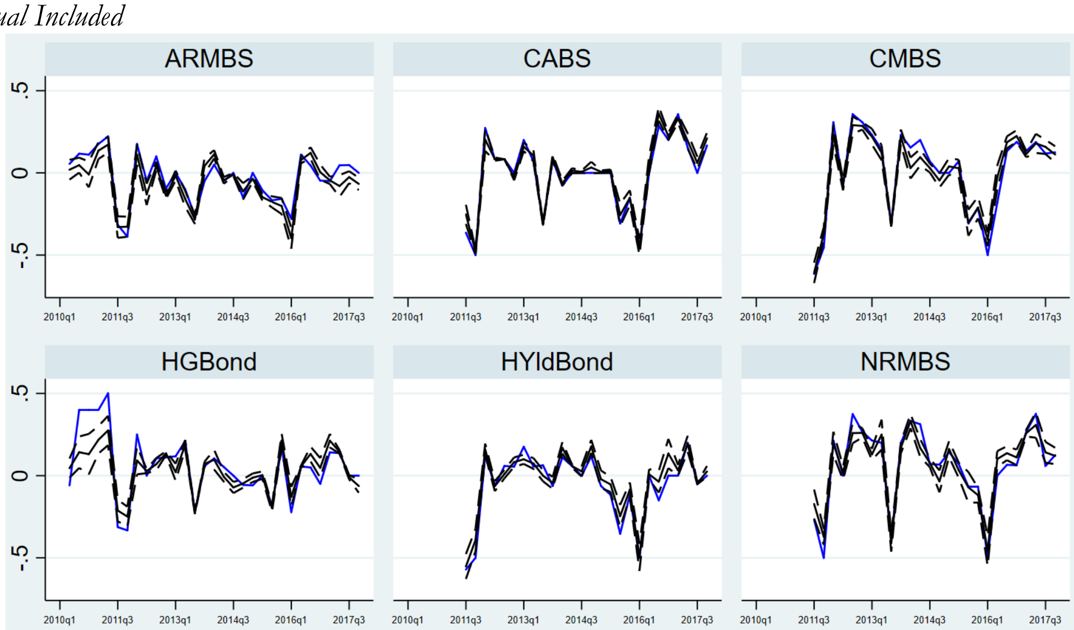


Figure 3. Actual vs. counterfactual SCOOS liquidity series

Residual Excluded



Residual Included



Notes: The blue lines in the figures show the SCOOS liquidity series (net fraction of dealers reporting improvements in liquidity and market functioning), by asset class. The solid black lines show the predicted values of these series based on an exercise using equations (7) and (8), in which we counterfactually impose that securities financing terms did not change. Dashed lines show 95% confidence bands around the counterfactual estimates.

Table 1. Asset-specific data sources

	Agency MBS	IG Corporate	HY Corporate	Consumer ABS	CMBS	Private MBS	Equities
Returns & realized vol.	Bloomberg Barclays US MBS Index[a]	Bloomberg Barclays US IG Corp. Bond Index[a]	Bloomberg Barclays US Corp. HY Bond Index[a]	Bloomberg Barclays US Agg ABS Index[a]	Bloomberg Barclays US CMBS IG Index[a]	--	S&P 500
Issuance	SIFMA	SIFMA	SIFMA	SIFMA	SIFMA	SIFMA	FOF
Trading volume	SIFMA	SIFMA	SIFMA	SIFMA	SIFMA	SIFMA	NYSE
Financing volume	FR-2004	FR-2004[b]	FR-2004[b]	FR-2004[c] (2015Q1)	FR-2004[c] (2013Q2)	FR-2004[c] (2013Q2)	FR-2004 (2013Q2)
Fails to deliv.	FR-2004	FR-2004[b]	FR-2004[b]	--	--	--	--
Amihud liquidity	--	TRACE	TRACE	--	--	--	--
Tri-party data	FRBNY (2010Q3)	FRBNY (2010Q3)	FRBNY (2010Q3)	FRBNY (2010Q3)	--	FRBNY (2010Q3)	FRBNY (2010Q3)

Notes: The table reports sources of for the asset-class-specific data series that we match to the SCOOS. Dates in parentheses indicate the first date at which the data are available, if the first date is later than 2010Q2. "--" indicates that no data series exists.

[a] Used with permission of Bloomberg.
[b] FR-2004 data is available for corporate bonds as a whole, but is not separated by credit rating.
[c] Beginning in 2013Q2, the FR-2004 reports an "other" category of securities financing that includes structured-finance products. Beginning in 2015Q1, ABS are split out separately.

Table 2. Alternative measures of terms volatility

		Financing spread	Haircut	Max. maturity	Max. amount
Stdev – Unweighted Index	Ave.	0.15	0.11	0.09	0.09
	MF	0.14	0.10	0.10	0.10
Stdev – Weighted Index	Ave.	0.16	0.11	0.10	0.10
	MF	0.15	0.11	0.10	0.10
RMS – Unweighted Index	Ave.	0.15	0.11	0.09	0.09
	MF	0.14	0.10	0.10	0.10
RMS – Weighted Index	Ave.	0.16	0.11	0.10	0.09
	MF	0.15	0.11	0.11	0.10
% dealers changing terms	Ave.	0.16	0.08	0.08	0.10
	MF	0.14	0.08	0.09	0.11
Corr: Ave vs MF (unweighted)		0.92	0.89	0.85	0.78
Corr: Ave vs MF (weighted)		0.91	0.90	0.86	0.78
Corr: weighted vs. unweighted (ave.)		0.99	0.99	0.99	0.99
Corr: weighted vs. unweighted (MF.)		0.99	0.99	0.99	0.98

Notes: The top portion of the table reports various measures of the volatility of securities-financing terms, as constructed from SCOOS responses. The bottom portion shows the correlation between the various measures. "Ave." and "MF" refers to terms applied to "average" and "most favored" clients. Each statistic is computed within each asset class and then averaged across asset classes. Units are percentage of dealers changing terms in each quarter.

Table 3. Term volatility across asset classes

	Financing spread	Hair cut	Max. maturity	Max. amount
Agency MBS	0.11	0.08	0.11	0.09
IG corporate bonds#	0.14	0.07	0.12	0.10
HY corporate bonds	0.17	0.13	0.10	0.08
ABS#	0.12	0.07	0.04	0.04
CMBS#	0.16	0.13	0.09	0.09
Private MBS#	0.17	0.14	0.09	0.11
Equities	0.08	0.03	0.09	0.09

Notes: Uses unweighted indices, averaged across average and most-favored clients, and measures volatility as the root mean squared. Units are percentage of dealers changing terms in each quarter. Data for asset classes with #'s begin in 2011:3; all others begin in 2010:2.

Table 4. Correlations of changes in financing terms

A. By term, aggregating across all asset classes

	SCOOS Terms				Liquidity				Volatility				Other Asset-Specific Market Conditions		
	Fin. Spr [1]	Haircut [2]	Max. mat. [3]	Max. amt. [4]	SCOOS Liquidity [5]	Amihud liquidity [6]	TED Spread [7]	5 Year On/Off [8]	Real. vol. [9]	VIX [10]	Swap IV 10Yr [11]	MOVE [12]	Returns [13]	Trading volume [14]	Issuance [15]
Fin. Rate	1				-0.74***	0.59***	0.51***	0.36***	0.12	0.08	0.09	0.06	-0.29***	-0.04	-0.05
Haircut	0.75***	1			-0.65***	0.53***	0.41***	0.27***	0.04	0.34***	0.30***	0.38***	-0.14*	-0.04	-0.04
Max. matur.	0.56***	0.65***	1		-0.56***	0.41***	0.35***	0.26***	-0.03	0.18*	0.13	0.11	-0.11	-0.03	-0.07
Max. amt.	0.53***	0.51***	0.69***	1	-0.45***	0.44***	0.23***	0.24***	-0.04	0.30***	0.13	0.22**	-0.14**	0.13*	0.01

B. By asset class, aggregating across all terms

	Liquidity				Volatility				Other Asset-Specific Market Conditions		
	SCOOS Liquidity	Amihud liquidity	TED Spread	5 Year On/Off	Real. vol.	VIX	Swap IV 10Yr	MOVE	Returns	Trading volume	Issuance
Agency MBS	-0.55***	-	0.19**	0.37***	0.02	0.08	0.09	0.06	-0.11	0.09	-0.1
IG Corp	-0.73***	0.45***	0.45***	0.33***	0.20**	0.34***	0.30***	0.38***	-0.36***	-0.06	-0.04
HY Corp	-0.72***	0.51***	0.45***	0.25**	0.14	0.18*	0.13	0.11	-0.39***	-0.01	-0.16
ABS	-0.39***	-	0.36***	0.33***	0.03	0.30***	0.13	0.22**	0.25***	-0.22**	-0.27***
CMBS	-0.62***	-	0.53***	0.20**	0.27***	0.25***	0.25**	0.22**	-0.05	-0.09	-0.27***
Priv. RMBS	-0.60***	-	0.51***	0.27***	-	0.18*	0.19*	0.16	-	0.05	-0.29***
Equities	-	-	0.29***	0.31***	-0.02	0.14	0.22**	0.20**	-0.11	-0.07	0.30***

Notes: The tables show the correlations of quarterly changes in four types of securities financing terms (financing spreads, haircuts, maximum maturities, and maximum amounts), as measured using SCOOS diffusion indices, with various other data from the SCOOS and other sources. In the top panel, correlations are calculated treating each asset class-quarter as a separate observation. In the bottom panel, correlations are calculated treating each term-quarter as a separate observation. Shaded columns are time-series data matched as closely as possible to the SCOOS reporting dates; all other columns are matched to the SCOOS by both date and asset class. Asterisks indicate statistical significance at the 10%, 5%, and 1% level.

Table 4. Correlation of changes in financing terms (continued)

A. By term, aggregating across all asset classes (continued)

	Securities Financing					Dealer Condition				Other Financial Indicators						
	Funding Demand	"Securities in"(a)	Fails to deliv.	Triparty volume	Triparty haircuts	Excess CDS	Leverage	%Δ Book Equity	Liq. Assets	3-Month Tbill	10 Year Treasury	CDX.IG	CDX.HY	GZ Bond Premium	Citi MRI	Chicago FCI
	[16]	[17]	[18]	[19]	[20]	[21]	[22]	[23]	[24]	[25]	[26]	[27]	[28]	[29]	[30]	[31]
Fin. Rate	-0.14**	-0.02	0.03	0.12	0.06	0.50***	0.23***	-0.50***	0.28***	-0.09	-0.08	0.45***	0.46***	0.28***	0.21***	0.46***
Haircut	-0.18***	0.05	-0.24*	0.19**	-0.06	0.48***	0.38***	-0.54***	0.42***	-0.16**	-0.20***	0.28***	0.34***	0.21***	0.07	0.34***
Max. matur.	-0.37***	-0.22**	-0.14	0.12	-0.11	0.28***	0.28***	-0.46***	0.36***	0.01	-0.13*	0.17**	0.26***	0.10	0.07	0.25***
Max. amt.	-0.34***	-0.10	-0.04	0.07	-0.03	0.22***	0.18**	-0.40***	0.40***	0.07	-0.09	0.20***	0.23***	0.05	0.01	0.09

B. By asset class, aggregating across all terms (continued)

	Securities Financing					Dealer Condition				Other Financial Indicators						
	Funding Demand	"Securities in"(a)	Fails to deliv.	Triparty volume	Triparty haircuts	Excess CDS	Leverage	% Δ Book Equity	Liq. Assets	3-Month Tbill	10 Year Treasury	CDX.IG	CDX.HY	GZ Bond Premium	Citi MRI	Chicago FCI
Agency MBS	-.039***	0.00	-0.30***	0.31***	-0.14	0.22**	0.15*	-0.51***	0.36***	0.09	-0.02	0.10	0.18*	0.03	-0.09	0.13
IG Corp	-0.40***	-0.22**	0.11	0.06	-	0.21**	0.19**	-0.46***	0.21**	0.13	0.00	0.43***	0.43***	0.22**	0.20**	0.48***
HY Corp	0.02	-0.18*	-	-0.09	-0.13	0.48***	0.34***	-0.54***	0.54***	-0.01	-0.28***	0.47***	0.48***	0.26***	0.15	0.35***
ABS	0.06	-0.04	-	0.06	-.009	0.44***	0.39***	-0.41***	0.23**	-0.14	-0.27***	0.34***	0.39***	0.31***	0.20**	0.43***
CMBS	-0.27***	-0.18*	-	-	-	0.57***	0.41***	-0.46***	0.49***	-0.18*	-0.24**	0.36***	0.38***	0.25**	0.19*	0.34***
Priv. RMBS	-0.28***	-0.05	-	0.39***	0.03	0.57***	0.34***	-0.50**	0.45***	-0.25***	-0.20**	0.30***	0.34***	0.19*	0.12	0.27***
Equities	-0.29***	0.10	-	-0.12	0.25***	0.22**	0.04	-0.44***	0.08	-0.06	0.07	0.07	0.13	0.00	0.00	0.18**

Notes: The tables show the correlations of quarterly changes in four types of securities financing terms (financing spreads, haircuts, maximum maturities, and maximum amounts), as measured using SCOOS diffusion indices, with various other data from the SCOOS and other sources. In the top panel, correlations are calculated treating each asset class-quarter as a separate observation. In the bottom panel, correlations are calculated treating each term-quarter as a separate observation. Shaded columns are time-series data matched as closely as possible to the SCOOS reporting dates; all other columns are matched to the SCOOS by both date and asset class. Asterisks indicate statistical significance at the 10%, 5%, and 1% level.
(a) For the purposes of this table, the "Securities in" data from the FR-2004 report, which measures the gross amount of funding provided by primary dealers by asset class, is matched to the SCOOS asset class categories as follows. "Corporate bonds" from the FR-2004 are matched to both the IG and HY corporate bond SCOOS categories; "Asset-backed securities" and "Other" from the FR-2004, which are only reported together after 2013 and only separately reported after 2015, are combined and matched to the consumer ABS, CMBS, and private RMBS categories in the SCOOS. Agency MBS and equities from the FR-2004 are matched to their respective SCOOS categories.

Table 5. Regressions of financing terms on market conditions

A. Dependent variable: Haircuts

	By Asset Class							Pooled			
	Agency MBS	IG Corp	HY Corp	ABS	CMBS	Priv. RMBS	Equities	5 asset classes	6 asset classes	5 asset classes	6 asset classes
Demand	-0.09 (0.06)	0.20 (0.14)	0.19 (0.17)	-0.05 (0.19)	0.11 (0.15)	0.01 (0.14)	-0.04 (0.04)	-0.04 (0.05)	-0.03 (0.05)	-0.07 (.06)	-0.07 (.05)
Liquidity	-0.51*** (0.09)	-0.45** (0.11)	-0.55*** (0.10)	-0.05 (0.09)	-030** (0.12)	-0.31* (0.16)	--	-0.30*** (0.05)	-0.30*** (0.04)	-0.13* (.06)	-0.11* (.06)
Realized vol.	0.44* (0.22)	0.002 (0.16)	-0.17* (0.09)	0.14 (0.47)	0.86** (0.40)	--	-0.01 (0.01)	0.01 (0.08)	--	-0.02 (.09)	--
Dealer excess CDS	0.04 (0.05)	0.07 (0.06)	0.04 (0.08)	0.21*** (0.08)	0.19 (0.12)	0.27* (0.14)	0.008 (0.03)	0.14*** (0.04)	0.16*** (0.04)	--	--
CDX	-0.002** (0.001)	0.001 (0.001)	0.003** (0.001)	-0.0004 (0.0015)	-0.001 (0.002)	-0.002 (0.003)	0.00 (0.001)	-0.000 (0.001)	-0.001 (0.001)	--	--
VIX	0.005** (0.002)	-0.005 (0.003)	-0.007* (0.003)	0.002 (0.003)	0.001 (0.004)	0.004 (0.005)	-0.000 (0.002)	-0.000 (0.002)	0.000 (0.001)	--	--
MOVE	-0.003*** (0.001)	0.000 (0.001)	-0.002* (0.001)	0.000 (0.001)	-0.002 (0.002)	-0.001 (0.002)	0.000 0.000	-0.000 (0.001)	-0.001 (0.001)	--	--
Asset Class F.E.	--	--	--	--	--	--	--	Yes	Yes	Yes	Yes
Time F.E.	--	--	--	--	--	--	--	No	No	Yes	Yes
Adj R^2	0.67	0.58	0.79	0.26	0.55	0.35	-0.10	0.49	0.48	0.59	0.62
Obs	31	31	26	26	26	26	31	140	166	140	166

Notes: The table shows regression results of indices of changes in haircuts from the SCOOS on various explanatory variables. The first set of columns show separate regressions for each asset class, while the second set of columns shows various pooled specifications. The "6 asset classes" columns exclude data on private RMBS, while the "5 asset classes" columns exclude both private RMBS and equities. Variable construction is described in the text. Constant terms not shown. Standard errors in parentheses. Asterisks indicate statistical significance at the 10%, 5%, and 1% confidence levels.

B. Dependent variable: financing spreads

	By Asset Class							Pooled			
	Agency MBS	**IG Corp**	**HY Corp**	**ABS**	**CMBS**	**Priv. RMBS**	**Equities**	**5 asset classes**	**6 asset classes**	**5 asset classes**	**6 asset classes**
Demand	0.02 (0.12)	0.04 (0.23)	0.29 (0.24)	0.23 (0.22)	0.30* (0.16)	0.11 (0.14)	-0.22* (0.10)	0.06 (0.07)	0.07 (0.06)	.07 (.06)	.05 (.05)
Liquidity	-0.58*** (0.17)	-0.52*** (0.18)	-0.62*** (0.15)	-0.20 (0.10)	-0.37** (0.13)	-0.42** (0.15)	--	-0.43*** (0.05)	-0.43*** (0.05)	-.29*** (.06)	-.28*** (.06)
Realized vol.	0.33 (0.41)	0.38 (0.26)	-0.04 (0.14)	-0.52 (0.55)	0.57 (0.44)	--	-0.02 (0.03)	0.09 (0.09)	--	.02 (.09)	--
Dealer excess CDS	0.09 (0.09)	0.02 (0.11)	-0.03 (0.12)	0.22** (0.09)	0.22 (0.13)	0.31** (0.14)	0.13* (0.07)	0.11* (0.05)	0.15*** (0.05)	--	--
CDX	-0.002 (0.002)	0.003 (0.002)	0.002 (0.002)	0.001 (0.002)	0.002 (0.002)	-0.001 (0.003)	-0.002 (0.001)	0.000 (0.001)	0.000 (0.001)	--	--
VIX	0.006 (0.004)	-0.004 (0.005)	-0.002 (0.005)	0.006* (0.004)	0.004 (0.005)	0.005 (0.005)	0.008* (0.004)	0.002 (0.001)	0.003* (0.002)	--	--
MOVE	-0.002 (0.002)	-0.001 (0.002)	0.000 (0.002)	-0.001 (0.001)	-0.003* (0.002)	-0.002 (0.002)	0.000 (0.001)	-0.001 (0.001)	-0.001 (0.001)	--	--
Asset Class F.E.	--	--	--	--	--	--	--	Yes	Yes	Yes	Yes
Time F.E.	--	--	--	--	--	--	--	No	No	Yes	Yes
Adj R^2	0.35	0.51	0.70	0.63	0.65	0.55	0.21	0.59	0.60	.78	.78
Obs	31	31	26	26	26	26	31	140	166	140	166

Notes: The table shows regression results of indices of changes in financing spreads from the SCOOS on various explanatory variables. The first set of columns show separate regressions for each asset class, while the second set of columns shows various pooled specifications. The "6 asset classes" columns exclude data on private RMBS, while the "5 asset classes" columns exclude both private RMBS and equities. Variable construction is described in the text. Constant terms not shown. Standard errors in parentheses. Asterisks indicate statistical significance at the 10%, 5%, and 1% confidence levels.

C. Dependent variable: maximum maturities

	By Asset Class							Pooled			
	Agency MBS	**IG Corp**	**HY Corp**	**ABS**	**CMBS**	**Priv. RMBS**	**Equities**	**5 asset classes**	**6 asset classes**	**5 asset classes**	**6 asset classes**
Demand	-0.07 (0.09)	-0.04 (0.18)	-0.08 (0.20)	-0.10 (0.11)	-0.18 (0.13)	-0.21*** (0.07)	-0.22* (0.12)	-0.16*** (0.05)	-0.17*** (0.04)	-0.13** (0.06)	-.14*** (.05)
Liquidity	-0.51*** (0.14)	-0.50*** (0.14)	-0.28** (0.12)	0.03 (0.05)	-0.23** (0.11)	-0.11* (0.08)	--	-0.25*** (0.04)	-0.22*** (0.04)	-0.13** (.06)	-.14*** (.05)
Realized vol.	-0.12 (0.32)	0.29 (0.20)	-0.03 (0.11)	-0.18 (0.05)	-0.10 (0.36)	--	-0.07* (0.04)	0.05 (0.08)	--	.10 (.08)	--
Dealer excess CDS	0.09 (0.07)	-011 (0.08)	0.11 (0.10)	0.09* (0.05)	0.06 (0.11)	0.14* (0.07)	-0.01 (0.08)	0.04 (0.04)	0.06* (0.03)	--	--
CDX	-0.003 (0.002)	0.002 (0.001)	0.001 (0.001)	0.001 (0.01)	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.002)	-0.000 (0.001)	-0.000 (0.001)	--	--
VIX	0.001 (0.003)	-0.006 (0.004)	-0.004 (0.003)	0.001 (0.002)	-0.003 (0.004)	0.003 (0.003)	0.008* (0.005)	-0.001 (0.002)	-0.001 (0.001)	--	--
MOVE	-0.002 (0.001)	-0.001 (0.001)	-0.001 (0.03)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.001 (0.001)	-0.000 (0.001)	-0.001 (0.000)	--	--
Asset Class F.E.	--	--	--	--	--	--	--	Yes	Yes	Yes	Yes
Time F.E.	--	--	--	--	--	--	--	No	No	Yes	Yes
Adj R^2	0.43	0.55	0.46	0.28	0.30	0.60	0.09	0.42	0.43	.59	.60
Obs	31	31	26	26	26	26	31	140	166	140	166

Notes: The table shows regression results of indices of changes in maximum maturities from the SCOOS on various explanatory variables. The first set of columns show separate regressions for each asset class, while the second set of columns shows various pooled specifications. The “6 asset classes” columns exclude data on private RMBS, while the “5 asset classes” columns exclude both private RMBS and equities. Variable construction is described in the text. Constant terms not shown. Standard errors in parentheses. Asterisks indicate statistical significance at the 10%, 5%, and 1% confidence levels.

D. Dependent variable: maximum amounts

	By Asset Class							Pooled			
	Agency MBS	**IG Corp**	**HY Corp**	**ABS**	**CMBS**	**Priv. RMBS**	**Equities**	**5 asset classes**	**6 asset classes**	**5 asset classes**	**6 asset classes**
Demand	-0.18 (0.11)	-0.23 (0.16)	-0.14 (0.19)	-0.13 (0.13)	-0.08 (0.14)	0.04 (0.10)	-0.17 (0.11)	-0.18*** (0.05)	-0.14*** (0.05)	-.15*** (.06)	-.14*** (.05)
Liquidity	-0.17 (0.15)	-0.30** (0.12)	-0.19* (0.11)	0.02 (0.06)	-0.07 (0.11)	-0.21* (0.11)	--	-0.15*** (0.04)	-0.17*** (0.04)	-.04 (.06)	-.07 (.05)
Realized vol.	-0.29 (0.35)	-0.05 (0.17)	-0.14 (0.10)	-0.07 (0.31)	-0.39 (0.38)	--	-0.06 (0.04)	-0.08 (0.07)	--	-.007 (.08)	--
Dealer excess CDS	0.005 (0.08)	-0.04 (0.07)	0.06 (0.09)	0.005 (0.05)	0.16 (0.11)	0.19* (0.10)	0.10 (0.07)	0.01 (0.04)	0.03 (0.03)	--	--
CDX	0.000 (0.002)	0.001 (0.001)	0.002 (0.001)	0.001 (0.001)	0.003 (0.002)	0.003 (0.002)	-0.001 (0.08)	0.001 (0.001)	0.001 (0.001)	--	--
VIX	-0.002 (0.003)	-0.003 (0.003)	-0.003 (0.004)	-0.001 (0.002)	0.000 (0.004)	-0.004* (0.004)	0.007 (0.005)	-0.002 (0.001)	-0.003* (0.001)	--	--
MOVE	-0.001 (0.001)	0.000 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.002 (0.001)	-0.004** (0.001)	0.001 (0.001)	-0.001 (0.0005)	-0.001** (0.0005)	--	--
Asset Class F.E.	--	--	--	--	--	--	--	Yes	Yes	Yes	Yes
Time F.E.	--	--	--	--	--	--	--	No	No	Yes	Yes
Adj R^2	0.16	0.51	0.36	-0.20	0.05	0.45	0.14	0.26	0.29	.50	.53
Obs	31	31	26	26	26	26	31	140	166	140	166

Notes: The table shows regression results of indices of changes in maximum amounts from the SCOOS on various explanatory variables. The first set of columns show separate regressions for each asset class, while the second set of columns shows various pooled specifications. The "six asset classes" columns exclude data on private RMBS, while the "five asset classes" columns exclude both private RMBS and equities. Variable construction is described in the text. Constant terms not shown. Standard errors in parentheses. Asterisks indicate statistical significance at the 10%, 5%, and 1% confidence levels.

Table 6. Economic significance of regression coefficients

	Haircuts	Fin. Spreads	Max. Maturity	Max. Amt.
Demand	-0.05	0.06	-0.22***	-0.29***
Liquidity	-0.60***	-0.64***	-0.54***	-0.39***
Real. Vol.	0.01	0.06	0.04	-0.09
Dealer Excess CDS	0.27***	0.16**	0.09	0.03
CDX	-0.04	0.05	-0.02	0.12
VIX	-0.02	0.10	-0.11	-0.14
MOVE	-0.11	-0.08	-0.08	-0.12

Notes: The table reports standardized coefficients from the regressions in Table 5, using the pooled specification with five asset classes and time-series control variables. Standardized coefficients indicate the number of standard deviations that the dependent variable (the four financing terms indicated) changes in response to a one-standard-deviation change in the independent variable. Asterisks indicate statistical significance at the 10%, 5%, and 1% confidence levels.

Table 7. Correlation of the regression time effects with other time series

	Haircuts Time Dummies	Fin Spread Time Dummies	Max Mat Time Dummies	Max Amt. Time Dummies
SCOOS Liquidity (Avg)	-0.39**	-0.29	-0.44***	-0.61***
Excess CDS Mean	0.45***	0.21	0.27	0.23
Move	0.14	-0.07	0.06	0.07
CDX	0.30*	0.02	0.11	0.14
Rvol (Avg)	0.14	-0.19	0.14	0.23
Demand (Avg)	-0.18	-0.36**	-0.48***	-0.61***
TED spread	0.19	-0.06	0.24	0.23

Notes: The table shows the univariate correlations between the coefficients on the time dummies in each of the regressions of Table 5 with various other time series. "Avg" indicates data that are averaged across asset classes to construct a single series. Asterisks indicate statistical significance at the 10%, 5%, and 1% confidence levels.

Table 8. Relationship of the SCOOS market-liquidity index to other measures

	IG Corp. Bonds	HY Corp. Bonds
Amihud liquidity	-0.90***	-0.59***
	(0.20)	(0.13)
TED spread	-0.43*	-1.10***
	(0.23)	(0.23)
5y on/off spread	-4.15***	-2.45**
	(1.28)	(1.21)
Realized vol.	-0.34***	-0.33***
	(0.24)	(0.12)
R^2	0.66	0.76
Adj. R^2	0.61	0.70
Obs	31	22

Notes: The table shows regressions of the SCOOS-based indices of market liquidity on various other measures. Constant terms not shown. Standard errors in parentheses. Asterisks indicate statistical significance at the 10%, 5%, and 1% confidence levels.

Table 9. Self-reported reasons for changing terms to various counterparties

	Counterparty risk	Market liquidity	Risk willingness	Int. treas chrges	Capital avail	Competition	Market conventions
Hedge funds	0.14	0.20	0.09	0.06	0.13	0.29	0.10
Insurance cos.	0.17	0.16	0.05	0.11	0.11	0.27	0.14
Nonfin. corps.	0.13	0.16	0.16	0.11	0.09	0.24	0.12
Mutual funds	0.08	0.20	0.12	0.08	0.14	0.27	0.11
REITs	0.21	0.23	0.13	0.02	0.11	0.24	0.05
Sep'ly mangd accts	0.04	0.18	0.10	0.05	0.13	0.37	0.13
Average:	0.13	0.19	0.11	0.07	0.12	0.28	0.11

Notes: The table shows the relative frequencies with which dealers report each reason for tightening or easing terms either as "very important" or as among the three most-important reasons, for each counterparty type. Each row sums to 1.0. Responses reflect changes in terms for both OTC derivatives and securities financing.

Table 10. Significance of self-reported reasons for changing funding terms

Haircuts

	Ag. MBS	IG Corp	HY Corp	ABS	CMBS	Priv. MBS
CnterPrty	0.55	1.44	0.27	0.44	1.40	0.90
MktLiq	3.06***	0.84	2.49***	3.52***	3.02***	2.58***
RiskWill	-2.53**	-1.27	-0.09	0.49	-0.84	0.21
TreasChrges	1.50	0.25	0.35	-0.79	1.00	0.88
Capital	0.17	1.32	0.07	0.55	-0.71	-1.14
Comp	1.16	0.45	2.89	0.83	1.67	0.69
MtkConv	-0.96	-1.20	-1.53	-0.83	-0.86	0.15
R^2	0.70	0.45	0.71	0.66	0.71	0.63
Adj. R^2	0.61	0.28	0.60	0.53	0.60	0.49

Spreads

	Ag. MBS	IG Corp	HY Corp	ABS	CMBS	Priv. MBS
CnterPrty	4.63***	1.76*	1.14	0.37	1.43	0.96
MktLiq	6.08***	2.22**	3.86***	3.10***	2.90***	3.28***
RiskWill	-0.86	-0.35	1.02	1.14	0.47	1.04
TreasChrges	-2.96***	1.28	-0.04	-0.29	0.95	0.13
Capital	-0.00	-0.56	-0.70	-0.93	-1.08	-1.31
Comp	-1.59	-1.42	0.54	0.06	0.77	-0.84
MtkConv	-1.95*	0.21	1.23	-2.26**	-1.09	0.05
R^2	0.89	0.57	0.80	0.69	0.73	0.67
Adj. R^2	0.86	0.44	0.72	0.57	0.63	0.55

Maximum Maturities

	Ag. MBS	IG Corp	HY Corp	ABS	CMBS	Priv. MBS
CnterPrty	1.07	2.10	-0.41	-0.15	1.56	1.77
MktLiq	1.90*	0.03	3.48***	0.38	1.51	0.88
RiskWill	0.51	-2.22**	2.33**	1.49	0.15	0.95
TreasChrges	-1.10	1.03	-0.89	-1.04	1.84*	3.17***
Capital	0.18	1.15	-0.90	1.13	-1.51	-2.04*
Comp	0.35	1.06	0.48	-1.07	0.36	-1.57
MtkConv	-0.49	-0.11	1.22	-1.83*	0.34	-0.64
R^2	0.53	0.61	0.73	0.43	0.61	0.70
Adj. R^2	0.39	0.50	0.62	0.20	0.46	0.58

Maximum Amounts

	Ag. MBS	IG Corp	HY Corp	ABS	CMBS	Priv. MBS
CnterPrty	-0.16	0.74	-1.83*	-0.49	-0.45	-1.57
MktLiq	0.24	1.76*	3.26***	0.55	2.08*	2.67**
RiskWill	0.16	-1.61	3.42***	1.00	0.24	0.34
TreasChrges	0.53	0.17	-1.23	-0.98	1.52	1.99**
Capital	0.08	0.45	-1.69	-0.17	-1.90*	-0.84
Comp	1.81*	0.11	1.44	-1.59	0.85	0.60
MtkConv	1.01	1.67	2.61**	0.53	0.66	0.97
R^2	0.50	0.59	0.73	0.21	0.48	0.68
Adj. R^2	0.35	0.47	0.63	-0.10	0.28	0.56

Notes: The table reports *t* statistics in regressions of changes in four different securities financing terms, by asset class, on the fraction of dealers listing various reasons as "very important" in their decisions to change terms on leverage provided to clients. Asterisks indicate statistical significance at the 10%, 5%, and 1% level.

Table 11. Effects of terms on market liquidity

	Residual from first stage excluded [1]	Residual from first stage included [2]
Fin. spreads	-0.29**	-0.09
	(0.15)	(0.27)
Haircuts	0.14	0.78**
	(0.20)	(0.36)
Max. maturity	-0.80***	-1.68***
	(0.19)	(0.35)
Max. amounts	0.19	0.37
	(0.20)	(0.31)
Dealer excess CDS	-0.29***	-0.29***
	(0.06)	(0.06)
CDX	-0.006***	-0.006***
	(0.001)	(0.001)
VIX	0.003	-0.000
	(0.003)	(0.003)
MOVE	-0.001	-0.001
	(0.001)	(0.001)
Asset class F.E.	Yes	Yes
Adj. R^2	0.55	0.57
Obs.	166	166

Notes: The table shows the results of regressions of the SCOOS liquidity index on "liquidity controlled" securities-financing terms and various control variables. Liquidity-controlled terms are constructed by removing the changes in terms that are due to deteriorations or improvements in market liquidity and functioning, as reported by dealers, using the results reported in Table 11. In column [1] the liquidity-controlled terms are predicted values from the first-stage regressions (equation (4)); in column [2] the liquidity-controlled terms also include the residuals from the first stage (equation (5)). The regressions pool data across asset classes and exclude equities, which have no liquidity index. Constant terms not shown. Standard errors in parentheses. Asterisks indicate statistical significance at the 10%, 5%, and 1% level.

Table 12. Relationship between asset returns and funding conditions

	By Asset Class						Standardized and Pooled	
	Agency MBS	IG Corp	HY Corp	ABS	CMBS	Equities		
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Fin. spreads	-4.40 (2.89)	-7.79* (4.35)	-1.64 (4.22)	0.39 (1.72)	-4.60 (3.85)	14.9 (8.70)	-1.58* (0.82)	-0.47 (1.01)
Haircuts	5.15 (4.33)	-0.50 (7.30)	1.17 (5.79)	2.94 (2.53)	9.57 (5.43)	-116.78*** (28.5)	0.71 (1.14)	-0.79 (1.21)
Max. Maturity	-0.60 (3.42)	5.87 (6.91)	-0.99 (8.82)	4.91 (3.95)	-4.23 (5.12)	16.67 (9.91)	1.20 (1.22)	0.10 (1.29)
Max. Amounts	1.22 (3.55)	3.31 (7.75)	-0.05 (8.70)	-0.71 (2.93)	5.39 (4.30)	15.23 (11.59)	-0.56 (1.20)	0.76 (1.31)
Demand	1.83 (1.45)	5.47 (3.94)	6.38 (5.01)	0.30 (1.57)	-0.66 (2.50)	11.25** (4.10)	1.17** (0.54)	0.70 (0.57)
Realized vol.	-3.12 (4.74)	10.13* (5.31)	-6.15* (2.91)	5.60 (3.81)	-4.00 (7.19)	2.69* (1.31)	-0.52* (0.27)	-0.76*** (0.27)
Dealer excess CDS	0.87 (1.04)	0.18 (2.21)	2.33 (2.35)	-0.26 (0.78)	-1.43 (1.84)	0.19 (2.76)	0.60 (0.38)	--
CDX	0.02 (0.02)	0.00 (0.04)	-0.19*** (0.04)	-0.01 (0.01)	-0.02 (0.03)	-0.12** (0.05)	-0.014** (0.006)	--
VIX	0.008 (0.005)	-0.086 (0.090)	0.20* (0.10)	0.019 (0.026)	-0.048 (0.066)	-0.634*** (0.173)	0.018 (0.016)	--
MOVE	-0.020 (0.020)	-0.066** (0.030)	-0.073* (0.035)	-0.026*** (0.008)	-0.032 (0.024)	0.006 (0.036)	-0.021*** (0.005)	--
Asset Class F.E.	--	--	--	--	--	--	Yes	Yes
Time F.E.	--	--	--	--	--	--	No	Yes
R^2	0.35	0.51	0.85	0.56	0.61	0.86	0.33	0.55
Adj R^2	0.03	0.27	0.75	0.24	0.36	0.79	0.26	0.40
Obs.	31	31	22	22	22	31	171	171

Notes: The table shows regressions of quarterly asset returns on security financing terms and control variables. The first set of columns runs the regression for each asset class separately. The last two columns pool across all asset classes, standardizing the returns within each asset class to have a mean of 0 and standard deviation of 1. Constant terms not shown. Standard errors in parentheses. Asterisks indicate statistical significance at the 10%, 5%, and 1% level.