Liquidity Flows to Bank-Affiliated Broker Dealers: Insights from Volumes and Prices *

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Abstract

Using confidential transaction-level data on overnight tri-party Treasury repo, we study liquidity flows within bank holding companies (BHCs) between primary dealers and affiliated entities. Affiliates, especially depository institutions with abundant reserves, provide a large share of dealers' repo funding, yet affiliated repo borrowing is systematically more expensive: dealers pay an affiliation premium of about 4–5 bps relative to otherwise comparable unaffiliated trades, even after controlling for trade characteristics and market conditions. We interpret this premium as an internal transfer price.Because consolidated leverage regulation nets intra-BHC positions and lowers the marginal balance sheet cost of funding moved within the group, affiliated trades generate a regulatory "rent" that is shared between the dealer and the affiliate. Consistent with this mechanism, the premium widens when dealer balance sheet constraints are tighter, compresses sharply during a temporary leverage regulation exemption for reserves and Treasuries, and reappears after reinstatement. Finally, we estimate the pass-through of this internal liquidity channel to the broader financial system.

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1 Introduction

A sizable share of secured borrowing in the U.S. is conducted by primary dealers affiliated with large bank holding companies (BHCs). In this paper, we study the role of the internal lending market within BHCs using confidential transaction-level data collected by the Federal Reserve. Specifically, we examine liquidity flows between primary dealers and their affiliated counterparties within the same BHC, analyzing both quantities and prices. To the best of our knowledge, this is the first paper to examine pricing terms in the BHC internal liquidity market. Our analysis reveals a complex and persistent relationship in which internal funding prices reflect both liquidity opportunity cost and capital availability. In turn, dealers' ability to manage liquidity internally — by tapping funding from affiliated entities, and in particular by channeling funds through affiliated banks — plays a crucial role in their intermediation activities in broader short-term funding markets.

We use supervisory transaction-level data on the overnight tri-party repurchase agreement (repo) market from February 2018 to November 2025. The tri-party repo market is central to short-term funding in U.S. securities markets, where major primary dealers borrow cash to finance their market-making activities in the U.S. Treasury market.[1] In this market, cash-rich investors lend to large and creditworthy dealers through a third-party custodian that provides clearing and collateral management services.[2] For this paper, we focus exclusively on uncleared volumes, since cleared transactions can entail different economic costs and benefits. For instance, centrally cleared positions can be netted, which may reduce incremental balance sheet costs associated with expanding repo activity.[3]

We document that affiliated counterparties within the same BHC are a major source of repo funding for several of the largest primary dealers. On average, nearly 48 percent of these dealers' daily uncleared overnight tri-party Treasury borrowing is sourced from affiliates. In levels, our sample of five primary dealers borrows approximately $100 billion per day from unaffiliated cash investors and about $80 billion per day from affiliated entities. Throughout our sample period, the share of internally provided funding consistently exceeds 20 percent of daily overnight Treasury repo borrowing. Affiliated repo transactions are larger on average than unaffiliated trades. We further show that internal liquidity is primarily supplied by affiliated banks or depository institutions (DIs) that hold substantial reserves. Specifically, these affiliated banks routinely lend tens of billions of dollars per day to their dealer affiliates via repo, while virtually never borrowing in

[1] Primary dealers are the main counterparties of the Federal Reserve Bank of New York and are active participants in US Treasury markets. For example, they are expected to bid in all Treasury auctions at reasonably competitive price. See https://www.newyorkfed.org/markets/primarydealers.

[2] In the U.S., the Bank of New York Mellon (BNY) is currently the sole third-party custodian after JP Morgan's exit in 2017.

[3] Cleared tri-party transactions have grown in size since their introduction in late 2021. Between January 2024 and November 2025, roughly 18 percent of daily overnight tri-party Treasury repo volumes have been centrally cleared, on average.

the tri-party market themselves.

A key feature of internal repo borrowing — as opposed to external repo borrowing — is that it is less capital intensive. When dealers allocate balance sheet capacity to repo, they internalize the opportunity cost of using leverage today rather than preserving capacity for future balance sheet expansion. By contrast, borrowing and lending between affiliates within a BHC are netted under regulatory capital rules applied at the consolidated BHC level (e.g., Correa et al., 2020, and Bowman et al., 2024). This incentive to economize on regulatory capital is particularly strong for the Supplementary Leverage Ratio (SLR), which requires banks to hold a minimum level of Tier 1 capital against total leverage exposures (essentially, total consolidated assets) regardless of risk.

Consolidated capital treatment makes internal borrowing attractive because it relaxes binding capital constraints at the subsidiary level. But how does the internal BHC structure affect liquidity pricing and the allocation of surplus between the affiliated lender and the borrower? One possibility is that the dealer captures most of the surplus, with the affiliated lender compensated only for its opportunity cost. In this case, when reserves are abundant, internal liquidity would almost always be the dealer's preferred funding source at the margin. Our analysis, however, shows that Treasury repo trades between dealers and their affiliates are priced at a persistent premium relative to comparable trades with unaffiliated lenders. We refer to this spread as the *affiliation premium*. On average, the affiliation premium is approximately $4-5$ basis points (bps). It is statistically significant and persists even after accounting for differences in trade size and other time-varying characteristics of dealers and short-term funding markets. This pattern is evident in simple comparisons of volume-weighted rates and is confirmed in regression analysis using both aggregate daily data and the transaction-level observations. These results suggest that structural factors related to the affiliation itself play an important role. In Section 2, we present a model that formalizes the mechanism.

Consistent with general intuition, our findings indicate that the affiliation premium is linked to dealers' balance sheet constraints. We show that the premium is higher when dealers face tighter balance sheet pressures related to Treasury market intermediation.[4] Specifically, the affiliation premium widens when either dealer-specific balance sheet costs or market-wide general balance sheet costs increase. Our regression analysis indicates that a one basis point increase in a dealer's balance sheet cost leads to an approximately 0.72 bps increase in the dealer's affiliation premium. This implies a substantial pass-through of balance sheet costs into internal funding rates, roughly 70 percent on the margin.

Notably, this relationship breaks down when regulatory constraints are temporarily lifted. During April 2020–April 2021, US regulators granted a temporary SLR exemption for reserves and Treasuries, which increased reported SLR ratios and reduced balance sheet costs for raising repo funding. During this period, the affiliation premium compressed sharply — affiliated and

[4]This also helps us distinguish our hypothesis from haircuts, which for Treasury securities in the tri-party overnight repo market are generally flat.

unaffiliated repo rates converged — and also became less sensitive to balance sheet cost proxies. It only re-emerged at its prior level after the exemption expired. This temporal pattern provides compelling evidence that the affiliation premium is driven by regulatory balance sheet frictions.

Returning to the broader question, we find that these banks lend (in tri-party repo) exclusively to their affiliated dealers, and not to unaffiliated dealers. Consistent with Correa et al., 2020, this pattern suggests that the bank–dealer affiliation serves as a conduit through which bank reserves are channeled to dealers, who then redistribute that liquidity to the broader financial system. Together, the internal repo mechanism increases the "velocity" of central bank reserves by moving funding from where liquidity is abundant (banks) to where it is in high demand (dealers' counterparties, such as hedge funds and other non-bank financial institutions (NBFIs)). This channel has important implications for market liquidity and the transmission of monetary policy, especially in an environment of abundant or ample reserves. In this paper, we further trace how internal funding translates into market liquidity. We show that for every additional dollar a BHC-affiliated dealer borrows overnight from its internal affiliate, it increases its overnight reverse repo lending by approximately 55 cents, with about 23 cents to other affiliated entities and 32 cents to unaffiliated borrowers. When we normalize by the dealer's total reverse repo activity, the corresponding increase is 53 cents per dollar, of which 38 cents is lent to external entities. Most of this lending occurs in the bilateral repo market, where hedge funds, smaller dealers, and other NBFIs are the primary borrowers. Overall, this pattern underscores that a large share of dealers' internal borrowings is passed through to external market participants, supporting broader market liquidity.

The central contribution of our paper is twofold. First, we provide a richer picture of internal liquidity volumes, document the central role of BHC-affiliated banks as liquidity providers, and quantify the pass-through of this liquidity to the broader financial system *through* BHC-affiliated dealers. Second, we show that internal structure and incentives shape liquidity pricing, and, therefore, its allocation. Financial markets have evolved significantly in the decades since the Global Financial Crisis (GFC). Understanding internal liquidity management within BHCs is essential to appreciate the distinct roles of different financial intermediaries. More broadly, liquidity flows within the financial system are central to financial stability. Previous studies, including Caglio, Copeland, and Martin (2021), Lu, Macchiavelli, and Wallen (2023) and Correa, Du, and Liao (2020), document the critical role of internal capital markets for broker-dealer affiliates, especially during periods of market stress. Our insights advance this line of research.

Our insights also connect to the extensive literature on internal capital markets. Earlier works such as Gertner, Scharfstein, and Stein (1994), Stein (1997), and Stein and Scharfstein (2000) emphasize both the benefits and potential inefficiencies of internal capital allocation within firms. Our paper extends this literature by providing novel evidence from the context of large bank holding companies and their broker-dealer affiliates, showing how internal repo transactions facilitate liquidity redistribution.

We also contribute to the literature on non-risk-weighted capital regulation, particularly the SLR, and its impact on Treasury market intermediation. Duffie (2025) argues that leverage constraints materially limit dealers' intermediation capacity in Treasury markets, while He, Nagel, and Song (2022) link such constraints to market disruptions, including the turmoil in March 2020. Similarly, Favara, Infante, and Rezende (2022) show that shocks to dealer balance sheets reduce their participation in U.S. Treasury cash and repo markets, especially for dealers closer to regulatory leverage limits. Bräuning and Stein (2025) further find that dealers with lower SLR buffers reduce Treasury positions relative to those with higher buffers, and that these dealers are associated with lower turnover and higher bid-ask spreads in the Treasury cash market. Our study provides new evidence by showing that the affiliation premium co-moves strongly with balance sheet costs and responds sharply to episodes of regulatory relief.

Lastly, we build on the rich literature analyzing the tri-party repo market structure and its central role in dealer financing.[5] Copeland et al. (2014) study the tri-party market during the 2007-09 GFC and find that Treasury repo volumes were resilient. Krishnamurthy et al. (2014) analyze tri-party repo rates over the same period and find that Treasury repo rates were relatively stable. In contrast, Anbil et al. (2021) document substantial rate dispersion across repo market segments during the September 2019 repo stress event, indicating that stress can spill over across segments. Han et al. (2022) and Paddrik and Ramírez (2025) study both quantities and prices in the tri-party Treasury repo market and underscore the importance of trading relationships, while Huber (2023) quantifies dealer market power over cash lenders. Our paper complements these studies by documenting substantial internal funding activities within the tri-party repo market of large domestic BHCs, where affiliated bank-dealer pairs regularly intermediate reserve liquidity. This internal channel, previously understudied, sharpens our understanding of reserve distribution in financial markets and highlights a key conduit for monetary policy transmission.

The remainder of the paper is structured as follows. Section 2 presents a model that formalizes the economics of liquidity provision among BHC affiliates. Section 3 describes the data. Section 4 presents the empirical results. Section 5 discusses the policy implications, and Section 6 concludes.

2 The Affiliation Premium: Theoretical Framework

The relationship between dealers and affiliates and the regulatory landscape described in the introduction suggests that affiliated lending plays an important role in the reallocation of funds within a BHC. Specifically, dealers and their affiliated lenders are incentivized to use internal lending to reduce balance sheet costs. To understand these effects more clearly, in this section, we present a simple model in which a dealer and an affiliated lender engage in a bargaining game to determine the amount and pricing of internal liquidity transfers.

[5] Copeland et al. (2012) provide a detailed overview of the U.S. tri-party market.

We assume a representative dealer has an exogenous need to finance a purchase of Treasury securities.[6] Given this funding demand, our focus is on the dealer's decision of what fraction of financing should come from an affiliated lender versus an unaffiliated lender. When an affiliated entity lends to the dealer, there is an opportunity cost. In the case where the affiliated lender is a bank, this opportunity cost has a clear interpretation: it is the interest on reserve balances (IORB) that the bank could earn at the Fed, plus any additional liquidity benefits that reserves provide.[7] For other types of affiliated lenders, the opportunity cost of deploying funds internally may reflect the forgone "safe asset" convenience yield that could be earned elsewhere.[8] In our model, the affiliated lender's outside option (holding safe assets) is the main cost of internal lending.

We also assume that the BHC is subject to a balance sheet cost that affects the affiliated dealer. This balance sheet cost decreases as the fraction of affiliated lending increases, since internal financing effectively reduces the total amount of external (unaffiliated) borrowing. In the model, the reduction in balance sheet cost from greater affiliated lending is the main benefit of internal funding. Using this setup, we formalize the two main hypotheses of the paper: that the affiliation premium is positive, and that it increases with dealer balance sheet constraints.

2.1 Setup

Consider a dealer with no initial endowment that seeks to fund an amount T of Treasury securities. The dealer chooses the fraction θ of T that will be financed through their affiliated counterparty, at a negotiated repo rate of rp^A, and the fraction $1-\theta$ of T that will be financed by raising funds from an unaffiliated counterparty in repo market, at an exogenously specified rate rp^U.

The affiliated lender is endowed with a (large) quantity of funds R that earn interest at an interest rate r^O. This interest rate captures both the return on holding funds and any convenience yield associated with holding these funds. In the context of DI lenders, a natural lower bound for r^O is IORB, the interest that banks receive on their balances with the Fed. The affiliated borrower and lender choose the amount of lending they want to do internally θT, and then both parties negotiate the affiliated repo rate rp^A between each other. For now, we will assume that R is large relative to T, so the affiliate is not concerned about running out of funds to finance affiliated positions.[9] We will assume that the payoff from the affiliates outside option is greater than the

[6] Alternatively, we could assume that the dealer has an exogenous reason to lend via reverse repo backed by a Treasury rather than to purchase a Treasury. The balance sheet implication and gains between affiliated and unaffiliated borrowing are identical.

[7] For example, Acharya and Rajan (2024) and Lopez-Salido and Vissing-Jorgensen (2023) highlight the specific benefit central bank reserves provide to manage the risks of deposit outflows.

[8] For example, D'avernas and Vandeweyer (2024) and Infante (2020) show that different types of safe assets provide different levels of safe asset benefits, providing an additional incentives for financial firms to hold them.

[9] An alternative version of the model could assume the financing needs T are much larger than the amount of liquidity held by affiliates R. This would suggest that liquidity constraints may drive internal lending decisions. However, given the types of financial institutions we have in mind, i.e., large US GSIBs that hold vast quantities of central bank reserves, this specification is less empirically relevant for the period of our empirical analysis.

exogenously assumed repo rate the dealer pays when borrowing from unaffiliated counterparties, $rp^U < rp^O$. If this condition did not hold, affiliated lenders would be willing to lend *all of their* cash balances R to their affiliated dealers because of the higher return from investing in repo and the reduction in balance sheet costs. In Section 4 we provide evidence that this is the empirically relevant case.

Both the dealer and the affiliated lender must comply with non-risk weighted capital rules that in practice place a restriction on the BHCs overall size. Specifically, at the consolidated level, given an affiliated lender's initial funds R and the dealer's new Treasury position T, the overall size of the BHC's assets is $R + T$. However, if a fraction θ is financed internally, the affiliated lenders funds θT are converted into an affiliated loan, resulting in a balance sheet size of $R + (1 - \theta)T$.

We model the balance sheet cost as a strictly convex function on the BHC's balance sheet size $C(\cdot)$. This assumption captures how balance sheet constraints affect dealer behavior dynamically: the use of balance sheet capacity today restricts the BHC from adopting future profitable opportunities. Thus, dealers face a cost when expanding their balance sheet to accommodate their Treasury repo borrowing. This effect is stronger if the increase in size is larger, giving rise to a convex cost that depends on balance sheet size.[10] In this set up, the cost of borrowing from unaffiliated counterparties is $C(R+T)$ while the cost of partially borrowing from affiliated counterparties is $C(R + (1 - \theta)T)$.

[Insert Figure 1 Here]

Figure 1 shows how the internal repo lending between a dealer and its affiliated lender can affect the BHC's overall balance sheet cost. The two T-accounts on the right represent the dealer and affiliated lender balance sheets, and the T-account on the left shows both balance sheets consolidated at the BHC. As the dealer decides to take on T Treasury securities, its balance sheet increases by T. However, if it raises θT funds from the affiliated lender, the overall increase of the BHC's balance sheet size is $(1 - \theta)T$. Thus, the reduction in balance sheet costs is $C(R + T) - C(R + (1 - \theta)T)$.

2.2 Payoffs

There is a question about how dealers and affiliated lenders internalize capital costs given that capitalization is enforced at the BHC level. In practice, the allocation of balance sheet capacity is likely to be distributed between affiliates at the BHC level. However, because the dealer is choosing to fund an amount T of Treasury securities (either a direct purchases or to lend via a reverse repo) we assume that the dealer bears the entire balance sheet cost of taking on the

[10] Duffie et al. (2023) present a simple dynamic model to show that regulatory balance sheet constraints in the future imply a convex cost today. This assumption has also been used, for example, by He et al. (2022), D'avernas and Vandeweyer (2024), Infante (2020), and others.

additional Treasury.[11] That is, even in absence of internal lending, dealers' net profitability is assessed by internalizing the holding company's capital cost. The payoff to the dealer for funding the position with an unaffiliated (u_D^U) and affiliated (u_D^A) counterparty is given by:

$$\begin{aligned} u_D^U &= \tilde{r}T - rp^U T - C(R+T) \\ u_D^A &= \tilde{r}T - rp^U(1-\theta)T - rp^A\theta T - C(R+(1-\theta)T), \end{aligned}$$

where $\tilde{r}$ is the payoff of the dealer's Treasury investments.

The payoff to the affiliated lender, either holding its funds (outside option) or lending internally, is:

$$\begin{aligned} u_L^U &= r^O R \\ u_L^A &= r^O(R-\theta T) + rp^A\theta T. \end{aligned}$$

Thus, the *excess payoff* (gain) for each party from engaging in the affiliated transaction (relative to the outside option) can be written as:

$$\begin{aligned} u_D^A - u_D^U &= (rp^U - rp^A)\theta T + [C(R+T) - C(R+(1-\theta)T)] \\ u_L^A - u_L^U &= (rp^A - r^O)\theta T. \end{aligned}$$

In these expressions, $(rp^U - rp^A)\theta T$ is the dealer's interest differential from borrowing θT internally, and $(rp^A - r^O)\theta T$ is the lender's excess interest earned over its outside option (if $rp^A > r^O$). The term involving $C(\cdot)$, which only affects the dealer, captures the payoff from reducing balance sheet cost using internal borrowing.

The dealer's optimal internal financing share θ and the equilibrium internal repo rate rp^A will be determined through bargaining, as we describe next.

The total surplus at the BHC level from internalizing the transaction is the sum of the two parties' excess payoffs:[12]

$$\begin{aligned} \Pi &= \left[u_D^A - u_D^U\right] + \left[u_L^A - u_L^U\right] \\ &= -(r^O - rp^U)\theta T + [C(R+T) - C(R+(1-\theta)T)] \end{aligned} \tag{1}$$

The first term $-(r^O - rp^U)\theta T$ is the net loss of interest income to the BHC from shifting θT into an internal loan (the BHC forgoes r^O on θT and only earns rp^U on that amount, hence, overall

[11] In an alternative specification, we could assume that the dealer bears $\alpha \in [0,1]$ of the cost and the affiliate lender bears the rest. This specification assumes that the lender internalizes the benefits of reducing the holding companies overall balance sheet cost. While this modeling choice does have an effect on how gains are distributed between the borrower and lender, it does not affect the total surplus of the consolidated entity.

[12] Note that the expression for total surplus would still be the same if the lender assumed a fraction of the balance sheet cost.

the BHC losses are $(r^O - rp^U)$ per unit). The second term is the reduction in balance sheet cost from replacing θT of external borrowing with internal funding. The optimal amount of affiliated repo market trading at the BHC level is given by the FOC,

$$\begin{aligned} \left.\frac{\partial \Pi}{\partial \theta}\right|_{\theta=\theta^*} &= -(r^O - rp^U)T + C'(R + (1-\theta^*)T)T = 0 \\ &\implies C'(R + (1-\theta^*)T) = r^O - rp^U \end{aligned} \tag{2}$$

Condition (2) says that, at the BHC level, agents will borrow from affiliates until the marginal cost of the consolidated balance sheet equates the spread between the interest rate on their outside option and the unaffiliated repo rate. Intuitively, the BHC will increase internal funding until the point where the benefit of further balance sheet cost savings just equals the opportunity cost of using internal funds.

For internal funding to be an interior solution ($0 < \theta^* < 1$), we require $C'(R+T) > r^O - rp^U > C'(R)$. In other words, if the marginal cost of the balance sheet with no internal borrowing is higher than the interest rate spread, and the marginal balance sheet cost of borrowing all internal borrowing lower than the interest rate spread, an interior solution exists, that is, $0 < \theta^* < 1$.

2.3 Nash Bargaining Game

Having conditions that maximize the liquidity provision surplus between the dealer and its affiliated lender, we look at how the dealer and the affiliated lender divide that surplus through the affiliated repo rate rp^A. For simplicity, we assume that the dealer has bargaining power $\eta \in [0, 1]$ (and the bank affiliate $1 - \eta$). In the classic Nash bargaining game, both the dealer and the affiliated lender solve the following problem:

$$Max_{rp^A} \left(u_D^A - u_D^U\right)^{\eta} \left(u_L^A - u_L^U\right)^{(1-\eta)} \Big|_{\theta=\theta^*}$$

The first-order condition for this problem yields the equilibrium condition:

$$\frac{\eta}{(u_D^A - u_D^U)} = \frac{(1-\eta)}{(u_L^A - u_L^U)}$$

Intuitively, because the rate is quasi-linear in both excess payoffs, the equilibrium condition is to equate both excess payoff scaled by the relative bargaining power. Replacing the expression for the dealer and lenders excess payoff results in the following affiliated repo rate,

$$rp^A = \eta r^O + (1-\eta) rp^U + (1-\eta)\frac{[C(R+T) - C(R + (1-\theta^*)T)]}{\theta^* T}. \tag{3}$$

Equation (3) implies that the affiliated repo rate is between the unaffiliated repo rate and the outside option rate—scaled by the dealer and affiliated lender's market power—plus the gain from

reducing the BHCs balance sheet cost that benefits the dealer directly.

Note that a necessary condition for the lender and dealer enter into the Nash bargaining game, that is, $(u_D^A - u_D^U) > 0$ and $(u_L^A - u_L^U) > 0$. The expressions in (3), and the optimal condition in (2), indicate that these conditions hold when $\frac{[C(R+T)-C(R+(1-\theta^*)T)]}{\theta^* T} > C'(R+(1-\theta^*)T)$. That is, when the average savings cost is higher than the marginal cost, which holds when $C(\cdot)$ is strictly convex.

Finally, in such an equilibrium, we have that the *Affiliation Premium*, defined as the spread between the affiliated repo rate and the unaffiliated repo rate, $rp^A - rp^U$, satisfies

$$Affiliation\ Premium = \eta(r^O - rp^U) + (1-\eta)\frac{[C(R+T) - C(R+(1-\theta^*)T)]}{\theta^* T} \tag{4}$$

which is always positive.

Intuitively, if the dealer has all of the bargaining power, $\eta = 1$, then the affiliation premium is merely the affiliated lenders' opportunity costs of providing internal funds. If, in contrast, the affiliated lender has all of the bargaining power $\eta = 0$, then they reap all of the balance sheet savings through a higher affiliation premium. In this case, the affiliation premium is larger than the opportunity cost because in equilibrium $r^O - rp^U = C'(R+(1-\theta^*)T) < \frac{[C(R+T)-C(R+(1-\theta^*)T)]}{\theta^* T}$. In this stylized model, the affiliated lender's compensation, captured by the affiliation premium, is always higher than the affiliated lenders' opportunity cost of using internal funds.

To study how the equilibrium changes with balance sheet costs, we assume that the balance sheet cost $C(x; c_0)$ depends on a parameter c_0 such that $\frac{\partial C(x;c_0)}{\partial c_0}$ is increasing in x.[13] That is, a higher level of c_0 is associated with a higher marginal balance sheet cost for the dealer. In that case, we have the following proposition that characterizes the equilibrium and main comparative statics,

Proposition 1 *Given the rate on the affiliated lender's outside option r^O, an unaffiliated repo rate rp^U such that $r^O > rp^U$, and balance sheet costs $C(x; c_0)$ with $\frac{\partial C'(x;c_0)}{\partial c_0} > 0$, such that $C'(R+T; c_0) > r^O - rp^U > C'(R; c_0)$, then there exists affiliated repo equilibrium in which the affiliation premium given equation (4) and*

$$\frac{\partial Affiliation\ Premium}{\partial c_0} = (1-\eta)\left(\frac{\partial C(R+T; c_0)}{\partial c_0} - \frac{\partial C(R+(1-\theta^*)T; c_0)}{\partial c_0}\right) > 0$$

2.4 Discussion of Model Assumptions

Proposition 1 states conditions under which an affiliated repo equilibrium exists and shows that the affiliation premium is unequivocally increasing with balance sheet costs. Intuitively, if the dealer has to bear more of the balance sheet cost, then they would be willing to borrow internal funds

[13] A simple example of the type of balance sheet cost we have in mind is $C(x; c_0) = \frac{c_0}{2}x^2$.

from their affiliated bank at a higher rate. In this section we discuss two of the main assumptions of the model that are relevant to consider how to interpret the equilibrium.

2.4.1 Configuration of Rates

An important tradeoff that pins down affiliated lending in the model is between the dealer's balance sheet cost savings and the spread between the lender's outside option and unaffiliated repo rates. Specifically, the lender has to be incentivized to lend to its affiliated dealer, which increases the dealer's financing cost above what they would receive from an outside lender. Dealers are willing to engage in this transaction because of their balance sheet savings. Thus, in equilibrium, the dealer is willing to finance its position at a higher rate to reap the netting benefits of affiliated lending.

The model's core assumption for an interior equilibrium ($\theta^* \in (0,1)$) is that the affiliated lender's outside option, r^O, is greater than the unaffiliated repo rate, rp^U. If we interpret r^O as the interest on reserve balances (IORB) and rp^U as the prevailing private market repo rate (e.g., TGCR or SOFR), the empirical evidence shown in Section 3 confirms that $r^O > rp^U$ is the relevant case for the majority of our sample period (2018-2025). This configuration is characteristic of the Federal Reserve's "ample reserves" or floor system, where the consolidated BHC bears a net interest loss of $-(r^O - rp^U)\theta T$ on the internal transaction, which must be strictly offset by the regulatory gain C'.

However, this condition is regime-dependent. The equilibrium outcome changes when the inequality is reversed, i.e., $rp^U \geq r^O$. This configuration occurs when the reduction in aggregate liquidity in the financial system puts upward pressure short-term rates, and pushes them above the Fed's administered IORB rate. In this environment, the BHC maximizes its surplus by:

1. Realizing a pecuniary gain, as the DI can earn a rate (rp^A) above its outside option (r^O).
2. Still avoiding the regulatory balance sheet cost (C').

Since the internal transaction now generates both a pecuniary and a regulatory gain, the core trade-off formalized by the model is eliminated. The BHC's incentive shifts toward maximizing the volume of internal funding, potentially leading to an extreme equilibrium outcome where the dealer borrows the maximum possible amount from its affiliated lender, $\theta^* = 1$, limited only by the physical amount of reserves R held by the DI. In this scenario, however, lenders may be more cautious with deploying their additional reserves into repo. This observation underscores that the relevant tradeoffs to participate in affiliated markets depend crucially on the overall configuration of rates and system-wide liquidity levels.

2.5 Role of the BHC

The model assumes that the dealer and lender maximize their joint surplus and split the gain through the negotiated affiliated repo rate rp^A, with the dealer having bargaining power $\eta \in [0, 1]$. This is equivalent to assuming a strategic BHC whose incentives are completely aligned with both affiliates and that can reallocate funding internally to maximize consolidated surplus. In practice, however, internal funding flows are not frictionless: bank–affiliate transactions are subject to statutory and supervisory constraints that can limit the scale of internal repos and, in some cases, discipline their pricing.

In particular, Sections 23A and 23B of the Federal Reserve Act, implemented through Regulation W, impose quantitative limits and collateral requirements on "covered transactions" between a bank and its affiliates, including certain repo-style transactions. [14] Large institutions also overlay these statutory constraints with internal limits, funds-transfer pricing schemes, and risk-management objectives that can influence the level and pricing of internal repo.

Our modeling choice is to abstract from these additional frictions and to treat the BHC as a consolidated decision-maker that maximizes joint surplus subject to a reduced-form balance sheet cost $C(\cdot; c_0)$. This abstraction allows us to isolate the balance sheet channel and derive sharp comparative statics for the affiliation premium and affiliated volumes without taking a stand on the full institutional details of internal capital markets. In this sense, the assumption is best viewed as a disciplined benchmark: it is consistent with the empirical evidence that BHCs actively reallocate liquidity across affiliates and adjust internal funding structures in response to regulatory balance sheet costs, while recognizing that in practice the extreme corner solution $\theta^* = 1$ would be tempered by Regulation W limits, internal risk constraints, and other organizational considerations.

Overall, the assumptions in this subsection are not intended to provide an exhaustive description of all institutional features of bank-affiliated repo markets. Rather, they are chosen to capture a central and empirically relevant mechanism, that is, affiliated lending as a response to balance sheet costs in an ample-reserves environment, in a tractable way that is consistent with observed patterns in volumes and prices across affiliated and unaffiliated repo transactions.

In what follows, we explore the empirical relevance of the model's main prediction in Proposition 1 on the level and sensitivity of the affiliation premium. Our empirical results are structured around two main hypotheses. First, the spread between affiliated and unaffiliated overnight Treasury repo borrowing rates for BHC-affiliated dealers is positive. Second, this spread increases with the dealer's regulatory balance sheet costs.

[14] Section 23A caps covered transactions between a bank and a single affiliate at 10% of the bank's capital stock and surplus, and 20% with all affiliates combined. It also imposes collateral quality and valuation requirements—importantly, secured transactions collateralized by U.S. Treasury securities are exempt from this limit. Section 23B requires that transactions with affiliates be on terms at least as favorable to the bank as those prevailing in comparable transactions with non-affiliates. See, for example, Federal Reserve (2025), "Affiliate Transactions (Regulation W)."

3 Data

We focus on the five largest domestic primary dealers in the overall repo market. To study their balance sheet management, we mainly utilize two confidential data sources: (i) transaction-level data from the tri-party repo platform, and (ii) regulatory liquidity reports (FR 2052a Complex Institution Liquidity Monitoring Report). The tri-party transaction data allow us to observe repo transaction terms and analyze dealers' funding costs across different counterparties, including their affiliates. The FR 2052a data capture aggregate repo and reverse repo volumes by collateral type and counterparty type for large institutions. Using the two datasets at the dealer-day level, we construct dealer-specific funding rates in the tri-party market and measure overall repo volumes across market segments. Our sample spans February 2018 (when the SLR took effect) through November 2025. Below, we introduce these data in detail.

3.1 Tri-party Repo Data

To compare dealers' Treasury repo financing costs across affiliated and unaffiliated counterparties, we use supervisory transaction-level data from the tri-party repo platform collected by the Federal Reserve Bank of New York (FRBNY) on a mandatory basis pursuant to its supervisory authority. We focus on overnight tri-party repos collateralized by U.S. Treasuries—an important source of secured short-term funding that supports liquidity in key fixed-income markets. Over our sample period, the overnight uncleared Treasury tri-party repo market averages on aggregate about $640 billion in daily volume and features a diverse set of cash lenders that invest primarily with large dealers, many of which are subsidiaries of large bank holding companies (BHCs).[15]

The repo contracts in this market are general collateral, meaning that cash borrowers can post any securities within a specified collateral class (such as U.S. Treasury securities). Because of this feature, the economic motive to trade in the tri-party repo market is to borrow or lend funds, rather than to source or distribute particular securities.[16] Moreover, trading in this market tends to be one-directional: cash lenders generally do not borrow funds, and cash borrowers rarely lend funds. This one-way flow eliminates the possibility of netting positions on dealers' balance sheets.[17]

For each repo transaction, we observe transaction size, rate, trade date and time, maturity date, cash lender name, cash borrower name, collateral class, and whether the trade has any special

[15]This includes both affiliated and unaffiliated transactions. This excludes forward settling trades, trades with optionality, and trades with the Federal Reserve.

[16]The different motivations to enter repo contacts leave an imprint on repo contracting terms, and thus need to be considered when studying repo rates. For example, Duffie (1996) and Infante (2019) show, respectively, that repo rates can trade below the prevailing market rates and that haircuts can be negative if the economic motive is to source a specific security.

[17]Figure 1 in Infante, Petrasek, Saravay, and Tian (2022) shows the total outstanding volumes of primary dealers in different repo market segments, indicating the importance of their borrowing in the general tri-party market and their limited amount of lending.

features or forward-settling terms. We restrict the sample to overnight Treasury-collateralized repos that cannot be cleared with a central counterparty. These are the most common tri-party repos. We exclude forward-settling trades and trades with optionality that could extend effective maturity to ensure we analyze true overnight funding.

We exclude sponsored GC trades executed on the tri-party platform, because they can potentially be netted with corresponding reverse repo positions, implying a smaller economic impact on balance sheets than uncleared tri-party repos.[18] Sponsored GC trades are flagged in the raw data from November 2022 onward, but not in the year preceding November 2022 (sponsored GC as a product began in September 2021). To identify sponsored GC trades earlier in the sample, we manually flag trades using string patterns and collateral schedule identifiers specific to GC trades. We then verify these flags using (i) an additional BNYM dataset with collateral allocated to counterparties and (ii) the Office of Financial Research (OFR) confidential repo dataset that contains sponsored GC trades where the Fixed Income Clearing Corporation (FICC) is the central counterparty.

A central empirical challenge is that the tri-party dataset does not directly identify whether a given repo is between a dealer and a counterparty affiliated with the dealer's own BHC. This affiliation indicator is essential for our analysis, but it is not observable "off the shelf" because participant names are non-standardized, accounts can appear under many name variants, and the cash-borrower field can be especially coarse. On the cash-lender side, for example, a single government money market fund (MMF) entity may appear under multiple strings (e.g., "Government MMF," "Gov Money Mkt," "Govern MNY Market"). On the cash-borrower side, the transaction record may list only the BHC name rather than the specific broker-dealer/dealer institution (DI) subsidiary that actually borrows cash. As a result, affiliation cannot be inferred reliably from raw name strings alone; instead, it requires mapping each trading account to a legal entity and then to an ultimate parent, so that we can determine whether the lender and the dealer belong to the same BHC.

Identifying affiliation: mapping accounts → legal entities → BHC parents. To classify trades as affiliated or unaffiliated, we construct an account-to-parent mapping for both cash lenders and cash borrowers. We adopt the account mapping strategy developed in Bostrom (2025), which combines automated and manual matching to associate each tri-party trading account with legal identifiers (as available), including the Legal Entity Identifier (LEI), SEC Series ID, Private Fund Identifier (PFID), RSSD ID, and SEC Central Index Key (CIK). We then roll each identified legal entity up to its ultimate parent organization. A trade is classified as *affiliated* if the counterparty's ultimate parent is the same BHC as the dealer's ultimate parent; otherwise it is *unaffiliated*.

Because the tri-party platform provides only name strings (and, in the transaction file, no

[18] Sponsored GC trades have grown notably in the past two years and are usually reported in aggregate activity in the tri-party market.

consistent legal identifiers), this mapping requires substantial reconciliation and verification. Our approach proceeds in three steps.

Step 1 (cash lenders): resolve name strings to entities. For cash lenders, we begin with manual tagging based on name strings, explicitly accounting for common abbreviations and multiple account names for a single fund. We then verify uncertain matches using datasets that provide snapshots of tri-party activity with legal identifiers. For mutual funds (including MMFs), we rely on the SEC's Form N-MFP and Form N-PORT filings, which provide month-end and quarterly snapshots of holdings and often include tri-party transactions. In addition, sponsored GC trades identified on the platform can be matched to confidential OFR-provided data that includes LEIs.

Step 2 (cash borrowers/dealers): recover the borrowing subsidiary within the BHC. The cash-borrower field in the transaction file is often too coarse to distinguish entities within the same BHC, which is precisely the distinction needed to identify the direction of affiliated trades. To refine borrower identities, we link the transaction-level tri-party dataset to a separate supervisory BNYM tri-party dataset provided to FRBNY that includes collateral allocation information and more detailed cash-borrower names. We match the transaction and allocation datasets using account numbers and construct a refined borrower name for each trade. For trades without a borrower name in the allocation dataset, we infer the detailed borrower identity from unique combinations of borrower-account strings that map to account number patterns associated with a single borrowing entity. Using these refined names, we then assign legal identifiers through the same manual-plus-automated procedure as for lenders, and we verify borrower mappings using the lender-side datasets where applicable, along with confidential Federal Reserve data from the FR 2004 and FR 2052a collections.

Step 3 (parent roll-up and affiliation flag): Once cash lenders and cash borrowers are mapped to legal entities and then to ultimate parents, we flag each repo as affiliated if the lender's ultimate parent is the same BHC as the dealer's ultimate parent. As of November 2025, nearly 14k cash lender accounts and 72k cash borrower account numbers had been mapped in the tri-party segment (with multiple accounts often corresponding to the same underlying entity but appearing under different names or account numbers).

Dealer sample and affiliated activity. Restricting the sample to the five largest domestic primary dealers, we find that each conducts overnight Treasury tri-party repos with both affiliated and unaffiliated lenders throughout the sample period. These dealers are subsidiaries of the largest U.S. BHCs and are key intermediaries in Treasury cash and repo markets, accounting for approximately 28 percent of overnight Treasury tri-party repo borrowing in our sample period.

The tri-party market is often characterized as dealer borrowing from unaffiliated MMFs. While unaffiliated MMFs are indeed a dominant lender group, our mapping shows that a meaningful share of volume reflects borrowing from affiliated entities, flows that are typically excluded from standard tri-party market reports and reference rate calculations such as the tri-party general collateral

rate (TGCR) and the secured overnight financing rate (SOFR). In our data, affiliated lenders are primarily depository institutions (banks), other broker-dealers, and international affiliates within the same BHCs.

[Insert Figures 2 and 3 Here]

Figure 2 shows aggregate uncleared overnight daily tri-party repo volume for the primary dealers in our sample, broken down by counterparty type, with the left panel showing dealers' repo borrowing and the right panel showing their reverse repo activity.[19] On average, affiliated borrowing accounts for approximately 48% of these dealers' aggregate overnight uncleared Treasury tri-party repo volume, with about 32% coming specifically from their depository affiliates, indicating that borrowing from affiliated banks is a major funding source for dealers. Dealers' reverse repo activity in tri-party is nearly negligible, consistent with tri-party being primarily a venue where dealers raise funding rather than deploy it.

Panel A of Figure 3 provides a complementary view by focusing on non-dealer affiliates within the same BHC (excluding activity with mutual funds or other asset managers that are only associated by name). Non-dealer affiliates rarely borrow in tri-party; when they do, it is exclusively from their affiliates. These affiliates lend almost exclusively to their affiliated dealers, with the interquartile range of daily lending volumes between roughly \$70 $\sim$ \$95 billion (and most days above \$85 billion). Panel B shows similar patterns when restricting non-dealer affiliates to depository institutions: DI borrowing is close to zero, and DI lending occurs uniquely to affiliated dealers.

Overall, outside of their dealer subsidiaries, other BHC affiliates, especially banks, do not actively use tri-party to borrow from or lend to external counterparties. Instead, the affiliated channel is effectively the conduit through which reserves held by banks are deployed into the tri-party repo market via their dealer affiliates.

3.2 Measuring Balance Sheet Costs

To measure dealers' balance sheet intermediation costs, we adopt the Cross-Market Treasury Repo ($CMTR$) spread as introduced in Chabot et al. (2024). The $CMTR$ spread is a dealer-level measure that isolates the compensation dealers receive for intermediating overnight Treasury repos across different market segments. Specifically, it is each dealers' volume-weighted average overnight reverse repo rate in the centrally cleared segment of the repo market——excluding trades that are motivated by sourcing collateral——minus its volume-weighted average repo rate in the uncleared tri-party market. We calculate the $CMTR$ individually for each of the dealers in our sample using confidential data collected by FRBNY on a mandatory basis pursuant to its supervisory authority. The $CMTR$ is constructed focusing on financing-motivated trades (excluding those

[19] Figure A.1 in the Appendix shows repo and reverse repo volume across all repo market segments for the dealers in our sample using the FR 2052a data, broken down by counterparty type. See 3.3 for a description of these data.

aimed at sourcing specific collateral) and excludes any trades between affiliates in tri-party. By construction, the $CMTR$ captures the extra yield a dealer earns by borrowing in one segment (tri-party) and lending in another (cleared bilateral), which should reflect compensation for balance sheet usage and intermediation frictions.

Traditionally, a common proxy for the cost of balance sheet intermediation is the spread between the General Collateral Finance (GCF) rate and the TGCR in the overall market, the $GCF–TGCR$ spread.[20] However, in recent years the GCF market has shrunk considerably, raising questions about the informativeness of the $GCF–TGCR$ spread. Moreover, that measure is market-wide and not dealer-specific. By contrast, the $CMTR$ spread is based on trading volumes and is computed at the dealer level.

For our analysis, we use the dealer-level $CMTR$ spreads for each of the five dealers in our sample. For robustness, we also look at the traditional $GCF–TGCR$ spread as alternative cost proxies; these yield similar results in our tests.

3.3 FR 2052a Data: Aggregate Repo Market Activity

To calculate each dealer's total overnight repo and reverse repo positions (across all market segments), we use the FR 2052a Complex Institution Liquidity Monitoring Report. The FR 2052a is a regulatory report collected by the Federal Reserve to monitor large banking organizations' liquidity profiles daily. The largest domestic BHCs and foreign banking organizations are required to report, providing separate reports for the parent company and any major US broker-dealer or bank subsidiaries. The data include secured borrowing and lending transactions, wholesale funding transactions, unencumbered asset positions, and various other liquidity-relevant items.

From the FR 2052a, we extract each dealer subsidiary's daily borrowing and lending volumes for overnight and open repos, segmented by collateral type (we filter to Treasury collateral) and counterparty type (affiliated vs. unaffiliated). This allows us to identify, for each dealer-day, how much the dealer borrowed from affiliates vs. outsiders, and how much it lent to affiliates vs. outsiders.

3.4 Control Variables

In our empirical analysis, we control for various factors that might affect dealers' repo activities or rates, including general market conditions and institution-specific factors:

To capture BHC credit risk, we include each BHC's daily five-year senior credit default swap (CDS) spread from Bloomberg. High reserve balances for banks might ease the availability of internal funding. To measure overall liquidity conditions in the banking system, we use confidential Federal Reserve data on the daily level of reserve balances held by the affiliated DIs in our sample.

[20] TGCR is obtained from public data on the FRBNY website, while the GCF rate is obtained publicly from the Depository Trust & Clearing Corporation's (DTCC) website.

We include four variables to account for the repo rate environment. First, we create a dummy for the period when the federal funds target rate was at the zero lower bound (ZLB), to allow for structural changes when rates are near zero. Second, we make a quarter-end dummy for the last business day of each quarter and the two days before/after (*Quarter-End*) to capture any rate moves around regulatory reporting dates. Third, we add in the secured overnight financing rate ($SOFR$) published by FRBNY, as a proxy for the general level of repo rates on a given day. Fourth, we add a measure of daily liquidity in the banking system: the sum of total reserve balances held by banks plus take up from the Fed's overnight reverse repurchase agreement (ON RRP) operations. ON RRP allows eligible counterparties to lend cash to the Fed overnight in exchange for Treasuries. This combined measure accounts for any effects Fed-provided liquidity may have had on private repo market rates.

We also consider a dummy for the SLR exemption period (April 1, 2020 to March 31, 2021) when reserves and Treasuries were excluded from SLR calculations in the context of COVID bond and Treasury market disruption. During this period, SLR constraints were effectively relaxed, so we expect the relationship between balance sheet costs and the affiliation premium to be attenuated. This dummy allows us to test for a change in our results during the exemption.

Lastly, we include variables related to Treasury market supply that could affect repo dynamics: the daily levels of Treasury coupon securities and bills outstanding held by the public, as well as their five-day log changes. These series proxy for net issuance or supply shocks in Treasuries, which might influence repo financing conditions. Both series are derived from CUSIP-level data released by the U.S. Treasury Department at a daily frequency and include both Federal Reserve System Open Market Account (SOMA) holdings and non-SOMA holdings.

3.5 Summary Statistics

Table 1 summarizes the main variables used throughout the analysis. Panel A reports market-specific outcomes from the overnight, uncleared Treasury tri-party segment, separately for affiliated and unaffiliated counterparties. Consistent with our focus on internal versus external funding, dealers' repo rates (measured as spreads to IORB) are systematically higher for affiliated borrowing than for unaffiliated borrowing, producing a positive affiliation premium. The premium is economically meaningful on average and is particularly pronounced for borrowing from depository-institution affiliates. Panel A also reports summary statistics for our balance sheet cost proxies, including the dealer-level $CMTR$ spread and the market-wide $GCF–TGCR$ spread, as well as 5-day changes used in some specifications.

[Insert Table 1 Here]

Panel B summarizes dealer-level changes in aggregate overnight repo and reverse repo activity from FR 2052a, segmented by whether trading is with affiliates or unaffiliated counterparties. These data highlight that both quantities and composition (e.g., the overnight share of total

repo) vary substantially over short horizons, consistent with active balance sheet and liquidity management.

Panel C reports summary statistics for key control variables used in the regressions, including dealer CDS spreads, the level of SOFR, system liquidity (log of reserve balances plus ON RRP), and Treasury supply measures (log of bills and coupons outstanding) along with their 5-day log changes. Together, the summary statistics confirm substantial time-series variation in both the pricing variables of interest and the balance sheet cost and liquidity controls, providing the variation needed for identification in our empirical analysis.[21]

4 The Affiliation Premium and Its Drivers

We begin our empirical analysis by first documenting how dealers obtain financing in the tri-party repo market and their reliance on affiliated repo transaction. We then show the differential pricing of affiliated vs unaffiliated transactions and how non-risk based capital requirements drive these differences.

Dealers raise short-term secured funding from a range of cash investors, including MMFs, other dealers, DIs, offshore funds, securities lenders (e.g., insurance companies), and other investment vehicles. Prior research has extensively documented the role of repo markets in facilitating the flow of cash and collateral in the financial system (e.g., Adrian et al., 2013; Infante and Saravay, 2025; Correa et al., 2020, and Bowman et al., 2024). However, less attention has been given to the significant funding that dealers obtain from affiliated counterparties, such as affiliated DIs within the same BHC.[22]

Our model and empirical analysis focus on the economic attractiveness of affiliated transaction from the (risk-adjusted) return on capital perspective. As shown in Figure 2, approximately 48% of these dealers' daily tri-party repo borrowing volume is from affiliated lenders, on average. In particular, funding provided by affiliated bank (DI) generally fluctuates between $48 billion and $65 billion (interquartile range), with most days exceeding $55 billion. The share of affiliated funding in tri-party was generally above 30% for much of our sample, until 2023 when–due to the Fed's quantitative tightening policies–money market funds moved large amounts of cash from the Fed's ON RRP operations back into private repos (increasing the unaffiliated share).

In this section, we first present general results on the existence and magnitude of the affiliation premium for the dealers. In the next section, we delve into the factors influencing this premium.

[21] Table A.1 details the key variables used throughout our analysis.

[22] Hempel et al. (2023) document that the volume of affiliated tri-party repo transactions is sizable.

4.1 Affiliated vs. Unaffiliated Repo Spreads to IORB

To quantify the effect of BHC affiliation on repo rates, for each dealer-day, we construct the volume-weighted average repo spread to IORB for that dealer's borrowing from unaffiliated lenders and from affiliated lenders. We then compute the affiliation premium as the difference between the affiliated spread and the unaffiliated spread.

[Insert Figures 4 and 5 Here]

Figure 4 plots the five-day moving average of the daily tri-party borrowing rate spreads for affiliated versus unaffiliated lenders, aggregated across the five dealers. We use spreads to IORB, the Fed's interest on reserve balances rate, to control for shifts in the policy rate that affect the level of all short-term rates. The size of the Fed's balance sheet also affects the overall level of these spreads. A larger Fed balance sheet increases the amount of liquidity in the system, which puts downward pressure on short-term money market spreads to IORB. For example, during the first round of quantitative tightening which began in 2017 and ended in 2019, repo spreads to IORB were increasing; while after the expansion of the Fed's balance sheet at the onset of the COVID-19 pandemic, these spreads declined precipitously. Regardless, the figure shows that repo spreads on affiliated transactions are consistently higher than those on unaffiliated transactions. In other words, dealers pay a higher spread over IORB when borrowing from affiliates, which is what we call dealer affiliation premium.

Figure 5 plots the time series of the affiliation premium (all affiliates) and the DI affiliation premium (bank affiliates only). Consistent with Figure 4, the DI affiliation premium is generally positive, averaging on the order of a few basis points in normal times. From April 2020 through February 2022, however, the premium is visibly compressed. Two forces contribute to this compression: (i) an ample-reserves environment with a large Federal Reserve balance sheet that pushed money-market rates toward the repo administered-rate, i.e., the ON RRP offering rate, and (ii) the bottom of the target range for the policy rate set at the zero lower bound, which truncates how far repo rates can fall. When both affiliated and unaffiliated repo rates are pinned close to their effective lower bound, the *observed* difference between them becomes mechanically small even if underlying balance sheet costs would otherwise generate a positive wedge.

It is worth noting that the time-series plot reflects *raw* differences in average rates and therefore conflates changes in the affiliation wedge with market-wide compression of money-market spreads during the ZLB period. In Section 4.3, we will identify the incremental effect of the SLR exemption on the affiliation premium conditional on time effects and other controls. During the first half of this period—which coincides with the SLR exemption period—the affiliation premium is relatively higher because the lower regulatory balance sheet costs boosted the level of repo rates, allowing the spread to widen. Once the SLR exemption was lifted after April 2021, the premium drops to near zero as the general level of repo rates declined. In other words, the period between April 2021 and March 2022 shown in Figure 5 should be interpreted primarily as a *compression episode*, not

as evidence that the balance sheet channel ceased to operate. Once the policy rate lifts off from the ZLB in early 2022, money-market spreads reopen and the DI affiliation premium becomes visibly positive again.

The figure also reports affiliation premiums for non-bank affiliates. While our theoretical setup abstracts from heterogeneity across subsidiaries, it is natural for internal pricing and constraints to differ across affiliate types. Consistent with that view, premiums for non-bank affiliates are also generally positive, though their level and dynamics differ from those for DIs, suggesting that the strength of the affiliation wedge varies across entities within the consolidated group.

Panel A of Table 1 contains summary statistics for affiliated and unaffiliated transactions, confirming that affiliated trades carry higher rates. For unaffiliated trades, the daily volume-weighted average rate spread to IORB is -7.7 bps, while the affiliated spread to IORB is -3.4 bps, resulting in an average affiliation premium of about 4 bps. We also see that when looking at DI affiliated trades compared to unaffiliated trades, the DI affiliation premium is slightly larger, at roughly 5 bps, on average. This economically large, *positive*, and persistent premium (large relative to other short-term funding spreads) is not a mechanical implication of Regulation W; Section 23B, if anything, would push affiliate and non-affiliate rates toward parity.[23]

We formally test the difference in rates using a panel regression framework. Specifically, we estimate the following baseline model on the daily panel of dealer tri-party repo borrowing rates:

$$\begin{aligned} \textit{Repo Spread}_{D,L,t} \;=\; & \alpha + \delta \textit{Affiliated Lender}_{D,L,t} \\ & + \beta_1 \textit{Repo Volume}_{D,L,t} + \beta_2 \ln(\textit{Reserves})_{D,t} + \beta_3 CDS_{D,t} \\ & + \beta_4 \ln(\textit{System Liquidity})_t + \beta_5 QTR_End_t + \beta_6 ZLB_t \\ & + \beta_7 \ln(\textit{Coupon Supply})_t + \beta_8 \ln(\textit{Bill Supply})_t \\ & + \beta_9 SOFR_t + \varepsilon_{D,L,t}, \end{aligned} \tag{5}$$

where D identifies the dealer (cash borrower), L identifies the cash lender (affiliated vs. unaffiliated), and t corresponds to the trading day. Consistent with Figure 4, *Repo Spread* is aggregated using volume-weighted transactions during the day for each dealer-lender pair minus IORB.

The primary variable of interest, *Affiliated Lender*, is a binary indicator set to one if cash lender and borrower belong to the same BHC, and zero otherwise. The dependent variable, $\textit{Repo Spread}_{D,L,t}$, defined as the difference between the tri-party repo rate and IORB. The literature has documented a set of factors that may affect repo spreads. For example, Cordes and Infante (2025) show that repo rates are sensitive to Treasury issuance. Munyan (2017) documents that financial institutions with low capital ratios appear to temporarily withdraw from the tri-party repo market before each quarter-end in order to appear safer and less levered.[24] Kahn et al.

[23] Section 23B of Regulation W requires affiliate transactions to be on arm's-length terms at least as favorable to the bank as comparable market trades. That standard cannot by itself produce the *positive* 4–5 bps premium we estimate relative to unaffiliated repos. The magnitude of the premium therefore points to an economic mechanism, namely, reduced consolidated balance sheet costs, rather than a purely legal constraint.

[24] Figure A.2 in the appendix shows that DI affiliation premiums tend to increase around quarter-end, consistent

(2023) show that the decline of reserves contributed to the repo rate spike in September 2019.

To account for potential influences on the repo spread, we control for the dealer characteristics and market conditions. The dealer-level variables include the aggregate daily repo affiliated or unaffiliated volume by each dealer, the log of reserves of the affiliated domestic DIs, the CDS spread of dealer's parent BHC. The market conditions consist of the log of Treasury coupon securities or Treasury bills held by the public ($\ln(Coupon\ Supply)_t$, $\ln(Bill\ Supply)_t$), the log of Fed-provided liquidity—reserve balances plus ON RRP—($\ln(System\ Liquidity)_t$), and the secured overnight financing rate ($SOFR_t$). We also control for the quarter-end dummy (QTR_End_t) which is equal to one for the last business day of quarter-end and the 2 business days around the quarter-end date to capture dealers' window dressing activity; and the zero-lower-bound dummy (ZLB_t) equal to 1 when the Fed's policy rate is at zero, given that these periods correspond to significantly lower repo spreads. All specifications also incorporate the dealer-fixed effect and the last specification adds the day-fixed effect. Standard errors are clustered by dealer, year-month.

[Insert Table 2 Here]

Table 2 reports the results. In the simplest specification (column 1), the coefficient on $Affiliated$ is 4.27 bps (t-stat of 11.90), indicating that affiliated borrowing carries a premium of 4.27 bps as compared to unaffiliated borrowing, and it is highly statistically significant. In columns (2) through (5), we sequentially add dealer- and market-level control variables. Our results suggest that repo spreads to IORB tend to be smaller when the dealer-affiliated BHC has higher credit risk, the DI has higher reserves, and the amount of Fed-provided liquidity is high. Additionally, repo spreads tend to rise at the zero-lower-bound and at the end of quarters (as documented by Correa et al. (2020)). The spreads also increase when SOFR is higher and the coupon supply elevates. With all these control variables, the affiliation premium remains positive and statistically significant, between the range of 4.27 to 5.04 bps when dealers get repo financing from affiliated lenders. In column (5), we add a calendar-day-fixed effect to control for unobserved time-varying conditions in the repo and Treasury markets. The result is stable to these additional controls.

4.2 Transaction Size and the Affiliation Premium

The analysis above relies on dealer-day volume-weighted average rates. We next examine whether the affiliation premium manifests similarly across trades of different sizes. Since our focus is on the overnight tri-party repo market, all transactions share identical terms (overnight) and collateral quality (Treasury collateral). Consequently, the primary distinguishing feature across transactions is their size. Another important feature of repo contracts is haircut. However, haircut rates for Treasury securities in the tri-party overnight repo market are generally stable, with most transactions receiving a standard 2 percent haircut. For our sample, the median haircut is 1.96

with the increase in balance sheet costs.

percent with a standard deviation of 0.32 percent.[25]

[Insert Figure 6 Here]

To visualize how trade sizes differ, Figure 6 provides density plots of tri-party repo transaction volumes by affiliation. We observe that affiliated trades have a distribution skewed toward larger sizes compared to unaffiliated trades. In fact, transactions above $5 billion are much more frequently affiliated (often DI-to-dealer trades), whereas unaffiliated trades are typically smaller (e.g., MMF lendings are often $1−$2 billion or less). This further underscores that affiliates serve as a large and continual source of liquidity for these dealers, capable of providing very sizable repo loans.

Taking a step back, the relationship between repo transaction size and repo rates is nuanced. Kotidis and Van Horen (2018) demonstrate that large clients in the repo market may secure more favorable rates due to their market power. Conversely, Perli (2024) highlights that market liquidity and volatility can influence price impact; during periods of stress or low liquidity, larger transactions may exert a more pronounced effect on prices, potentially leading to higher rates for larger trades. To investigate the role of transaction size in shaping repo spreads of affiliates vs. unaffiliated lenders, we leverage transaction-level data (note the number of observations) and replicate the regression analysis from Table 2. The dependent variable is the repo spread of each individual transaction relative to IORB, $Repo\ Spread_{D,L,t,s}$, where s refers to a specific transaction on a given day t. We also replace the dealer-level daily trading volume separated by affiliated and unaffiliated volumes $Repo\ Volume_{D,L,t}$ with the volume of each individual repo transaction, $Transaction\ Size_{D,L,t,s}$. All other variables remain unchanged.

[Insert Table 3 Here]

Table 3 presents the results of regressions that control for transaction size. Consistent with earlier findings, we continue to see a positive and significant affiliation effect in transaction-level data. However, the magnitude of the affiliation premium at the transaction level is somewhat smaller than in the dealer-day aggregates. In the univariate regression (column 1), affiliated transactions are about 2.40 bps more expensive than unaffiliated (t-stat of 8.33). With dealer and day fixed effects in column (5), the premium is about 1.57 bps (t-stat of 8.20). These are roughly half the size of the dealer-averaged estimates, suggesting that some portion of the premium is realized through dealers perhaps choosing to do larger trades with affiliates (or other composition effects).

In unreported results, we also examined whether the premium varies with trade size by including an interaction of $Affiliated\ Lender \times Transaction\ Size$. We find a positive interaction term, indicating that the affiliation premium is a bit larger for larger trades, which is consistent with cash lenders receiving better rates when deploying large amounts funds. However, the economic magnitude of this interaction is modest as the affiliation dummy remains positive and statistically

[25]For robustness check, we repeat our main test in this subsection by including haircut in the analysis and report the results in Table A.2 of the appendix.

significant and most unaffiliated trades are not large in magnitude.

In summary, the transaction-level analysis confirms the presence of an affiliation premium across trades of various sizes and shows that larger trades do not eliminate the premium. If anything, after accounting for trade size, the affiliation effect remains robust, and larger affiliated transactions carry an additional premium compared to smaller trades. These findings underscore the pervasiveness of the affiliation premium and suggest that it is not driven solely by differences in trade size or negotiating power, but rather by structural factors related to the affiliation itself.

4.3 Non-Risk-Based Capital Constraints and The Affiliation Premium

The previous subsection established that affiliated repo borrowing rates are higher than unaffiliated ones. At first glance, this finding might seem counterintuitive: why would a dealer borrow at a higher rate, when it can get cheaper financing externally? As outlined in Section 2, internal repo transactions help reduce the burden of balance sheet costs associated with external repos, and the premium is a by-product of sharing these gains between the dealer and the affiliated lender.

In this subsection, we empirically test whether the affiliation premium is driven by non-risk-based capital requirements. As outlined in Section 2, borrowing externally in the tri-party market expands the balance sheets of the dealer and its BHC, thereby increasing regulatory capital requirements (like the SLR). In addition, banks may have internal risk limits or other motives to constrain balance sheet usage. Because repo funds raised via internal transactions with affiliates do not affect the consolidated balance sheet or capital ratios, the BHC can economize on balance sheet costs by using internal funding. Thus, when balance sheet costs are high, dealer borrowers should have a stronger incentive to curtail external borrowing and instead borrow internally, even if it means paying a premium to the affiliated lender. Figure 7 graphically shows how the affiliation premium co-moved with two measures of balance sheet costs: *CMTR* and *GCF-TGCR* spread.

[Insert Figure 7 Here]

To test this hypothesis, we examine how the affiliation premium moves with measures of dealer balance sheet cost. We estimate panel regressions where the dependent variable is the change in a dealer's affiliation premium over time, and the key independent variable is a change in that dealer's balance sheet cost. Specifically, we run regressions of the form:

$$\begin{aligned} \Delta Affiliation\ Premium_{D,t} \;=\; & \alpha + \delta \Delta BSCost_{D,t} + \sum \gamma_k \Delta BSCost_{D,t} \times Z_t^k \\ & + \sum \beta_k Z_t^k + \sum \eta_k M_{D,t}^k \\ & + \Delta Affiliation\ Premium_{D,t-5} + \varepsilon_{D,t}. \end{aligned} \tag{6}$$

where $\Delta Affiliation\ Premium_{D,t}$ is the five-day change in dealer D's affiliation premium on day t. $\Delta BSCost_{D,t}$ is the five-day change in the balance sheet cost proxy (e.g., the CMTR spread) for dealer D. We include interaction terms of $\Delta BSCost$ with key dummy variables Z_t^k (such as

the SLR exemption period dummy) to see if the relationship changes in those regimes. We also include controls Z_t^k for factors like ZLB, quarter-end, system liquidity changes, etc., and $M_{D,t}^k$ for any dealer-specific controls (e.g., changes in reserves at the dealer's affiliate bank). We include a lagged change in the affiliation premium to control for persistence. Dealer and day fixed effects are also included. Standard errors are computed using Driscoll-Kraay corrections with 12-day lags, to account for cross-sectional dependence and serial correlation.

Before presenting regression results, we note that Figure 7 which looks at the balance sheet cost proxies visually suggested a correlation. The affiliation premium and the two balance sheet cost proxies, the dealer-specific $CMTR$ spread and the market-wide $GCF\text{-}TGCR$ spread, move together and all fell markedly during the SLR exemption period (April 2020 to April 2021). We formally confirm this with regressions.

[Insert Tables 4 and 5 Here]

Tables 4 summarizes our main findings using the change of the balance sheet cost measure.[26] The results show that affiliation premiums are higher when balance sheet costs are higher, and they increase as balance sheet costs increase. Specifically, we find that a one basis point increase in the dealer's $CMTR$ spread is associated with approximately a 0.72 bps increase in that dealer's affiliation premium (t-stat of 10.25). This is a substantial pass-through: roughly 72% of marginal balance sheet cost increases are reflected in a wider internal/external repo spread.

This relationship holds even after controlling for lender characteristics, interest rate environment shifts, and Treasury market conditions. Notably, the correlation between the affiliation premium and the $CMTR$ spread weakens during the SLR exemption period. In particular, when we interact the change in $CMTR$ with the SLR exemption dummy, the coefficient on the interaction is approximately -0.54 bps (t-stat of -6.10) in Specification (4), nearly offsetting the base effect, which is 0.62 in that specification. In other words, during the period when SLR constraints were relaxed, the sensitivity of the affiliation premium to balance sheet costs essentially vanished. This is consistent with our hypothesis: when balance sheet constraints were effectively neutralized by the temporary rule change, internal vs. external funding should have been on a more equal footing cost-wise, and indeed the premium largely disappeared and became unresponsive to the cost proxy.

As a robustness check, we also use the traditional market-wide measure, the $GCF\text{-}TGCR$ spread instead of $CMTR$. Those results in Table 5 also show a positive relationship: using changes, the coefficient on Δ $GCF\text{–}TGCR$ is about 0.22 bps (t-stat of 12.94) for the average affiliation premium.[27] While smaller than the dealer-specific measure's coefficient, it is still significant, indicating that even a coarse market-wide cost proxy picks up some of the effect.

As an additional robustness check, in Table A.5 we repeat the exercise in Table 4, but replace the SLR exemption dummy with cross-sectional variation in BHC SLR leverage slack. Specifically,

[26] Table A.3 presents a robust test using the level of the deal-level balance sheet cost measure, $CMTR$.
[27] Table A.4 presents a robust test using the level of the $GCF\text{-}TGCR$ spread on the affiliation premium.

we interact changes in the $CMTR$ with a normalized measure of each dealer's BHC-level SLR buffer in that quarter, which we call $SLR\,Distance$.[28] If balance sheet costs are less salient when the SLR is further from binding, then the sensitivity of the affiliation premium to $\Delta CMTR$ should be weaker for BHCs with larger SLR buffers; correspondingly, we expect the coefficient on $SLR\,Distance \times \Delta CMTR$ to be negative. The estimated interaction coefficients are indeed negative, but are not precisely estimated, consistent with the limited cross-sectional and low-frequency (quarterly) variation in reported SLR buffers.

To sharpen the comparison, we allow the $\Delta CMTR$ sensitivity to differ more discretely across high- versus low-buffer BHCs. In Table A.6, we augment the specification by interacting $\Delta CMTR$ with an indicator for dealers whose BHC has an above-median SLR buffer in that quarter. The results confirm that affiliation premiums at high-buffer BHCs are less sensitive to changes in our balance sheet cost proxy. This buffer-based evidence aligns with the exemption-period analysis: greater leverage slack—whether arising from a temporary relaxation of constraints or from a larger buffer—is associated with a more muted link between the affiliation premium and balance sheet costs.

Overall, the findings in this section indicate that non-risk-based capital requirements are an important driver of the affiliation premium. Using both a dealer-specific balance sheet cost measure and more generic proxies, we show that higher balance sheet costs are associated with a significantly higher premium. Moreover, this relationship weakens when regulatory constraints are relaxed during the SLR exemption period, supporting the interpretation that the premium reflects regulatory cost pressures. These results suggest that the affiliation premium can be viewed as a form of regulatory arbitrage: dealers pay more to borrow internally, effectively compensating their affiliates, while easing consolidated capital constraints.

4.4 The DI Affiliation Premium

Our investigation of the tri-party repo market uncovers another important fact: DIs of large BHCs actively deploy their reserve holdings in this market through their dealer affiliates. In the era of ample reserves (post-2008 and especially post-2020), large banks have been holding surplus reserves far above their immediate needs. Acharya and Rajan (2024) warn that flooding banks with central bank reserves doesn't automatically translate into more lending or market liquidity — banks may just hold the reserves, undermining the stimulative intent of monetary policy and causing money market distortions. In this section, we take a closer look at the specific affiliated lenders: DIs, and examine their behavior and the resulting premium.

The dealers in our sample are affiliated with largest BHCs whose bank subsidiaries hold vast quantities of reserves and thus have ample liquidity to deploy. Importantly, these banks have a

[28] For each quarter, $SLR\,Distance$ is defined as the BHC's SLR minus the cross-sectional average SLR across BHCs in our dealer sample.

very clear outside option for their funds: simply leaving them as reserve balances at the Fed to earn the $IORB$ rate. Earlier, we noted in Figure 2 that dealers actively borrow from their affiliated DIs in the tri-party market, and that the premium on this bank-provided funding is especially large, as shown in Figure 5. Also, Panel B in Figure 3 shows that the DIs themselves do not use tri-party to borrow and only use it to lend, and lend exclusively to their affiliated dealers. The combination of these observations suggests that the bank-dealer internal channel is how reserve liquidity held at banks gets funneled into the repo market.

[Insert Table 6 Here]

Table 6 replicates the results in Table 2, separating the volume weighted average affiliation premium into DI affiliated lending and non-DI affiliated lending to directly measure effect of DI affiliate lending. There we observe that the DI affiliation premium is much larger than the effect of average affiliation premium across both DI and non-DI affiliates, with point estimate of 7.00 (t-stat of 16.09) vs. 4.27 (t-stat of 11.90) . The increased premium of DI lending is indeed consistently higher across all specifications.

[Insert Table 7 Here]

Similarly, Table 7 repeats the empirical exercise in Table 4 and show how the DI affiliation premium changes with dealer-level balance sheet costs. The results corroborate that the effects of balance sheet constraints are concentrated at the DI-level. Specifically, the results suggest that the sensitivity of the DI affiliation premium to balance sheet costs is 0.47 (t-stat of 5.47). This suggests that the reduction in balance sheet costs is salient for DI lending. For robustness check, we report the results in Table A.7 using the market-level balance sheet proxy, $\Delta GCF\text{-}TGCR$.

In summary, we observe a distinct bank affiliation premium: when the affiliate is a bank, the repo rate paid by the dealer tends to be even higher. This is intuitive given the bank's opportunity cost is IORB and its bargaining power might be stronger. Thus, the affiliated bank charges a premium that roughly compensates it for giving up IORB interest. The dealer is willing to pay this as long as it's still beneficial compared to raising funds externally under balance sheet constraints. We find that this bank affiliation premium drives the overall affiliation premium in relation to balance sheet costs.

The takeaway is that affiliated banks play a pivotal role in internal repo markets: they supply internal lending at rates that incorporate the cost-of-funds considerations (IORB) and relieve balance sheet pressure for the dealer. This internal liquidity channel is an important piece of the modern market intermediation puzzle, as it connects the banking system's excess liquidity with the financing needs of non-bank market participants via the broker-dealer.

5 Liquidity Transmission: Internal Borrowing and Market Liquidity Provision

5.1 Pass-Through of Internal Funding to Market Liquidity

Figure 2 showed that the tri-party repo market primarily serves as a source of funding for dealers (left-hand side), and dealers engage in very little lending back into that same market (right-hand side). It is reasonable to hypothesize that funds raised by dealers in the tri-party market — whether from affiliated or unaffiliated lenders — are subsequently intermediated into other repo market segments, particularly the bilateral repo market. In the bilateral market, primary dealers act as key lenders to various NBFI clients. If this is the case, the higher internal funding costs, that is, the affiliation premium, could be passed through to external borrowers such as hedge funds and mortgage REITs that rely on dealers for financing in the bilateral market.

In this subsection, we empirically test the relevance of internal borrowing for dealers' overall lending activities in other repo segments. Using the FR 2052a data, we analyze how dealers' borrowing from affiliated vs. unaffiliated sources relate to their reverse repo lending to other entities. Although this dataset lacks transaction-level details and pricing information such as repo rates, it provides daily aggregate volumes of borrowing and lending segmented by counterparty type for each dealer in our sample. For each dealer (D) on each day (t), we compute the following:

- $Repo_{D,t}^{Aff.}$: the total overnight repo volume borrowed from affiliated institutions (internal borrowing);
- $Repo_{D,t}^{UnAff.}$: the total overnight repo volume borrowed from unaffiliated lenders (external borrowing);
- $ReverseRepo_{D,t}^{Aff.}$: the total overnight reverse repo volume the dealer lent to affiliated counterparties (internal lending);
- $ReverseRepo_{D,t}^{UnAff.}$: the total overnight reverse repo volume lent to unaffiliated counterparties (external lending);
- $ReverseRepo_{D,t}^{All}$: the total overnight reverse repo volume lent to all counterparties.

We then consider the five-day changes in these volumes to examine the flow-through. Specifically, we estimate panel regressions of the form, an approach similar to that of Carlson and Macchiavelli (2020):

$$\Delta ReverseRepo_{D,t}^{All} = \alpha + \gamma \Delta Repo_{D,t}^{Aff.} + \delta \Delta Repo_{D,t}^{UnAff.} + \beta CDS_{D,t-5} + \mathbb{1}_D + \mathbb{1}_t + \varepsilon_{D,t}, \quad (7)$$

$$\Delta ReverseRepo_{D,t}^{Aff.} = \alpha + \gamma \Delta Repo_{D,t}^{Aff.} + \delta \Delta Repo_{D,t}^{UnAff.} + \beta CDS_{D,t-5} + \mathbb{1}_D + \mathbb{1}_t + \varepsilon_{D,t}, \quad (8)$$

$$\Delta ReverseRepo_{D,t}^{UnAff.} = \alpha + \gamma \Delta Repo_{D,t}^{Aff.} + \delta \Delta Repo_{D,t}^{UnAff.} + \beta CDS_{D,t-5} + \mathbb{1}_D + \mathbb{1}_t + \varepsilon_{D,t}. \quad (9)$$

In these specifications, we control for dealer credit risk using the five-day lagged CDS spreads of the dealer's holding company ($CDS_{D,t-5}$) and include dealer fixed effects ($\mathbb{1}_D$) and day fixed effects ($\mathbb{1}_t$). Standard errors are computed using Driscoll-Kraay corrections with 12-day lags, to account for cross-sectional dependence and serial correlation.

[Insert Tables 8 Here]

Table 8 presents our core findings on the relationship between a dealer's internal borrowing and its reverse repo lending. In Panel A, we find a strong pass-through effect: for every additional dollar a BHC-affiliated dealer borrows overnight from affiliated counterparties, its overnight reverse repo lending increases by approximately 55 cents (t-stat of 10.15) in column (1). Of this, about 23 cents (t-stat of 7.75) is lent back to other affiliated entities within the BHC in column (3), and about 32 cents (t-stat of 7.67) flows to unaffiliated borrowers in column (5). This pattern suggests that while some portion of internal funding is recycled within the holding company, a majority of funds borrowed by dealers — nearly 60 percent — flows to unaffiliated parties (external borrowers), enhancing market-wide liquidity. Notably, most lending occurs in the bilateral repo market, where hedge funds, smaller dealers, and other NBFIs are the primary borrowers.

Recognizing that absolute trading volumes vary with dealer size, we perform a robustness check by examining the proportion of trading volume allocated to each counterparty type, scaled by the dealer's total repo or reverse repo volumes in the prior period. Panel B of Table 8 confirms that the results remain consistent in magnitude and statistical significance across alternative specifications. For every additional dollar of internal overnight borrowing, overnight reverse repo lending increases by 53−61 cents relative to prior-period levels, with roughly 16 cents of this going to affiliated counterparties and the remaining 38−44 cents flowing to unaffiliated borrowers. This consistency across absolute and relative specifications underscores the robustness of our results.

The role of affiliated dealers as liquidity conduits is further highlighted by additional analyses when we focus on the internal repo borrowing specifically from DIs with large central bank reserves. Table 9 shows that the above pattern holds when disaggregating internal borrowing into DI-affiliated and non-DI affiliated sources. For every dollar of reverse repo lending, about 49-51 cents (in level terms) or about 47-59 cents (in ratio terms) is linked to increased reverse repo activity via DI affiliates, compared to 69 cents via non-DI affiliates. These results confirm that both DI and non-DI affiliated channels are important sources of liquidity redistribution.

[Insert Table 9 Here]

Taken together, the evidence suggests that internal funding obtained by BHC-affiliated dealers is not merely a mechanism for intra-group liquidity management, but a crucial channel for redistributing reserves and liquidity to the broader financial system. These internal flows enable affiliated dealers to intermediate between cash-rich affiliates (such as depository institutions) and external counterparties, thereby sustaining liquidity provision even when balance sheet constraints bind. The capacity of affiliated dealers to tap into internal funding thus plays a critical role in maintaining market functioning, particularly during times of market dislocation or regulatory

stress.

Moreover, the funding costs the dealer faces, such as the affiliation premium, can indeed be transmitted outward. If internal funds are more costly and those funds constitute a sizable portion of the dealer's funding base that it uses to extend loans, one might expect that to put upward pressure on the rates the dealer charges its borrowers, say hedge funds. Essentially, the dealer needs to cover its funding cost. We do not directly observe the rates in the bilateral market for each dealer's clients due to the data limitation. However, we can indirectly gauge the effect by looking at market indicators, which we do next.

5.2 Spillovers to Repo Market Pricing and Policy Implications

Our findings thus far indicate that (i) price of affiliated borrowing reflects balance sheet costs which are split between the borrower and the lender, and (ii) roughly 40 percent of the repo funds dealers raise internally flow out to unaffiliated borrowers. This naturally raises the question: How does the affiliation premium affect broader repo market pricing or near-arbitrage relationships?

Unfortunately, there is no comprehensive pricing data for all repo market segments. However, we can gauge the effect of the increased tri-party repo funding costs to (near) arbitrage activities in the Treasury market, say the cash-futures basis trade. This trade entails going long Treasury securities while shorting Treasury futures, and it requires repo financing for the cash bonds. The profitability and scale of the basis trade depends on the cost of repo funding. When repo funding is expensive or constrained — as might happen when balance sheet costs bite, the basis trade widens.

[Insert Figure 8 Here]

Specifically, we compare the general financing cost in the bilateral repo market with that in the tri-party repo market. A key consideration is that a bilateral repo transaction may be driven by either the need for financing or the demand for specific collateral, the latter of which can create "specialness" in the repo rate. Therefore, to ensure a fair comparison of financing costs, our analysis focuses on financing-motivated repo transactions. Although the limited availability of detailed transaction data in the bilateral repo market poses challenges, the approach we borrowed from Gilcoes, Iorio, Monin, and Petrasek (2024) successfully isolates these financing-driven costs.[29] By combining our analysis of repo volumes and pricing with their insights, we can infer the impact of internal funding frictions on broader market pricing.

We find evidence that the affiliation premium's fluctuations correlate with movements in the Treasury cash-future basis. When the affiliation premium declined sharply during the SLR exemption (internal funding became cheaper), dealers were able to intermediate more freely, and the Treasury basis narrowed as observed in early 2021. Conversely, when the affiliation premium re-emerged after the exemption ended, the basis widened again. Figure 8 shows that reductions in

[29] Proxies of the cash-futures basis trade in Figure 8 are copied from the original Figure 6 in Gilcoes et al. (2024).

the affiliation premium are closely followed by decreases in the observed cash-futures basis spread labeled as *TRACE Proxy* in Gilcoes et al. (2024). This suggests that when internal funding frictions are alleviated, it has a tangible effect on market pricing.

In policy circles, one proposal to address the persistent Treasury basis spread has been for the Fed to directly intervene by borrowing in repo or using its balance sheet to relieve dealer constraints; for example, Kashyap, Stein, Wallen, and Younger (2025) argue the Fed could take on the basis trade itself.[30] This policy proposal is attractive because it would not alter the Fed's interest rate exposure, could (in principle) be a short-term intervention, and would provide Treasury futures for asset managers that demand them. Such interventions, however, involve the Fed's participation in the futures market in potentially complex ways.

Our findings point to a more straightforward policy lever: reducing the binding nature of leverage requirements (like SLR) during stressed times or permanently recalibrating them. Doing so would directly lower balance sheet costs, shrinking the affiliation premium, and thereby allowing funding to flow more freely through the short-term funding system. This type of policy, along with central bank open market operations or standing facilities that provide repo funding, may be an effective way for liquidity to be deployed more broadly, ultimately alleviating market stress.

In essence, the affiliation premium we document can be seen as a barometer of balance sheet strain in the system. A high premium indicates dealers are effectively paying extra to shuffle liquidity internally to avoid balance sheet costs, which in turn affects market pricing and liquidity. Keeping that premium in check, either via regulatory tweaks or central bank facilities that provide cheap financing, can help ensure liquidity flows across markets and prevent large distortions.

6 Conclusion

Understanding internal liquidity management within bank holding companies is crucial for understanding the unique roles played by different financial intermediaries in the modern financial system. Moreover, the efficient flow of liquidity in U.S. funding markets is central to the functioning of financial markets and the transmission of monetary policy. In this paper, we show that the internal capital markets of large bank holding companies play a pivotal role in redistributing liquidity across the financial system by mitigating regulatory constraints faced by intermediaries.

Our paper provides the first in-depth analysis of internal repo market looking at both volumes and prices. Using confidential, transaction-level data from the uncleared tri-party Treasury repo market, we find that affiliated entities—specifically commercial bank subsidiaries within the same BHC as dealers—routinely lend to their dealer affiliates, but rarely to unaffiliated dealers. These internal repo transactions account for a substantial share of dealers' daily borrowing and are

[30] See Barth, Kahn, et al. (2021) for an alternative model that characterizes how intermediaries support the cash-future basis trade.

consistently priced at a premium of approximately 4 basis points relative to trades with unaffiliated lenders. We refer to this spread as the affiliation premium.

We argue that this premium reflects how the surplus arising due to regulatory arbitrage are allocated within the BHC: while internal transactions are economically similar to external ones, they do not increase the consolidated balance sheet and therefore do not incur additional capital charges under the SLR. The resulting regulatory surplus is shared between the affiliated lender and borrower through pricing, giving rise to a positive pricing premium.

We find that the affiliation premium is tightly linked to dealers' balance sheet costs. It increases with proxies for balance sheet pressure (particularly those related to Treasury market intermediation) and disappears during the temporary SLR exemption for reserves and Treasuries.

These findings highlight how the regulatory environment shapes liquidity flows and dealers' intermediation activity. In particular, they show that commercial banks' willingness to deploy reserves into broader funding markets depends on their ability to generate regulatory relief at the BHC level and to pass that relief through to affiliated dealers. More broadly, internal capital markets within BHCs serve as a conduit for transmitting bank liquidity to non-bank financial institutions. The effectiveness of this channel, however, depends on the structure of regulatory constraints—such as the SLR—and on the opportunity cost of liquidity at lending subsidiaries, which together determine the internal cost of balance sheet usage.

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Figure 1: Dealer's Internal Repo and Consolidated Balance Sheet Netting

This figure presents stylized balance sheets for a dealer, an affiliated cash lender, and the consolidated BHC. The dealer finances a Treasury position of size T by borrowing a share θT from an affiliated lender and $(1-\theta)T$ from external lenders. With initial affiliate safe-asset holdings R (e.g., reserves) and a balance-sheet cost function $C(\cdot)$, consolidated balance-sheet usage is reduced by θT relative to external financing, and the implied reduction in balance-sheet cost is $C(R+T) - C(R+(1-\theta)T)$. The figure motivates why internal funding can be valuable even when affiliated repo rates exceed unaffiliated rates.

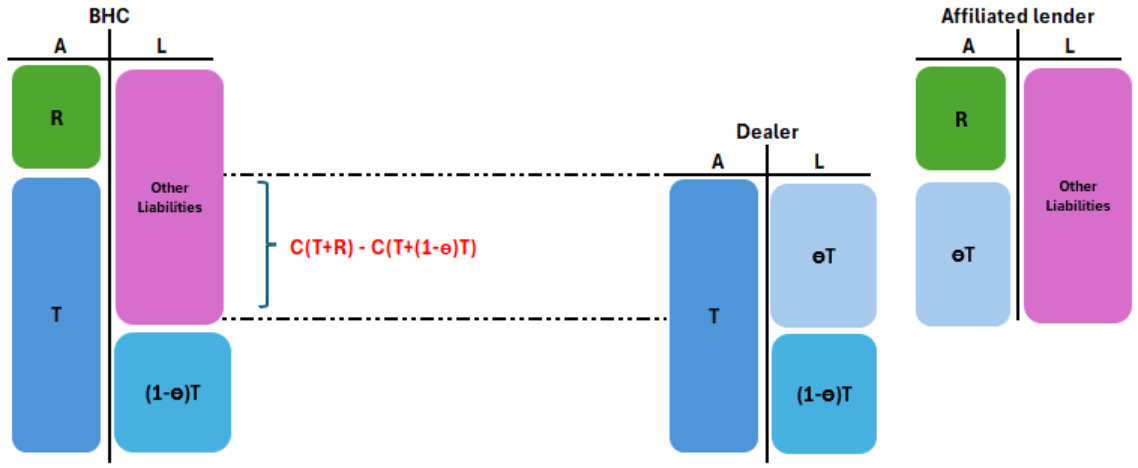


Figure 2: Dealers' Tri-party Repo Volumes by Counterparty

This figure presents the aggregate daily overnight, uncleared, Treasury-collateralized tri-party repo volume (USD Billions) for primary dealers in our sample, broken down by counterparty type. Counterparty categories are: depository institutions affiliated within the dealer's BHC (Affiliated DI), other affiliated entities (Affiliated Other), unaffiliated money market funds and omnibus accounts (Unaffiliated MMF), and other unaffiliated entities (Unaffiliated Other). The left subfigure reports dealer borrowing (repo) and the right reports dealer lending (reverse repo). The sample period is from February 2018 to November 2025.

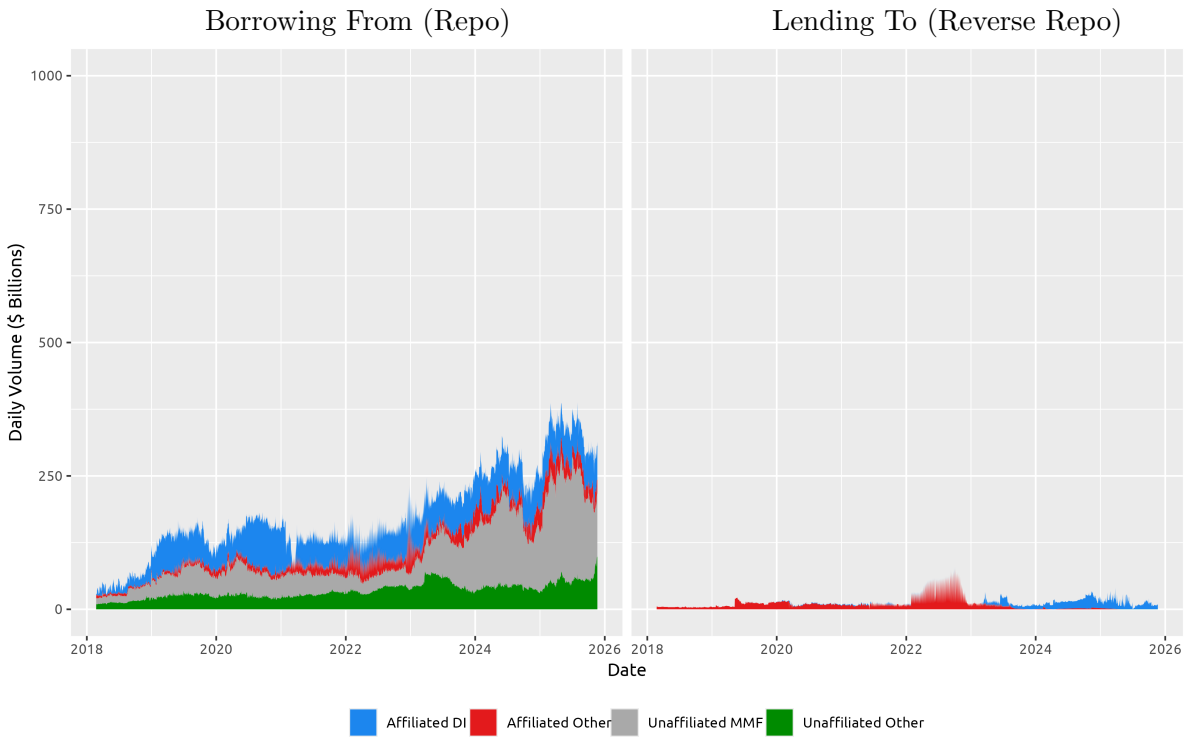


Figure 3: Non-Dealer Affiliates' Tri-party Repo Volumes by Counterparty

This figure plots aggregate daily overnight, uncleared, Treasury-collateralized tri-party repo volumes (USD billions) for non-dealer affiliates of the five BHCs in the sample, by counterparty type. Panel A includes all non-dealer affiliates; Panel B restricts to depository-institution (DI) affiliates. Counterparty categories are: affiliated dealers (Affiliated Dealer), other affiliated entities (Affiliated Other), unaffiliated money market funds and omnibus accounts (Unaffiliated MMF), and other unaffiliated entities (Unaffiliated Other). In each panel, the left plot shows borrowing (repo) and the right plot shows lending (reverse repo). The sample period is from February 2018 to November 2025.

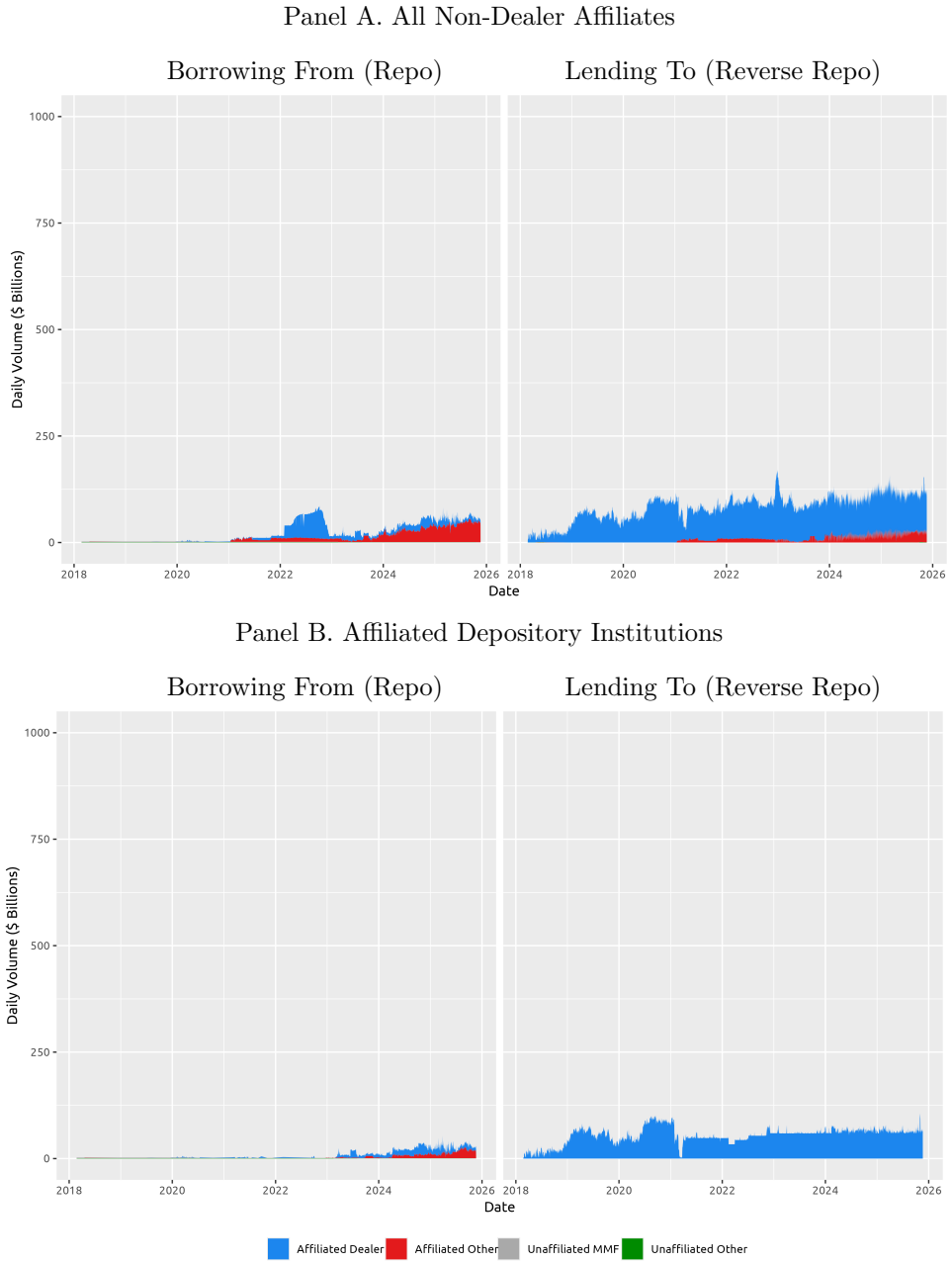


Figure 4: Affiliated vs Unaffiliated Tri-Party Repo Pricing

This figure plots the five-day moving average of daily repo spreads to interest on reserve balances (IORB) (bps) for overnight, uncleared, Treasury-collateralized tri-party repos, separately for affiliated and unaffiliated cash lenders. Rates are aggregated across dealers in the sample. For each day and lender group, the repo rate is computed as a volume-weighted average across transactions in that group. The sample period is from February 2018 to November 2025.

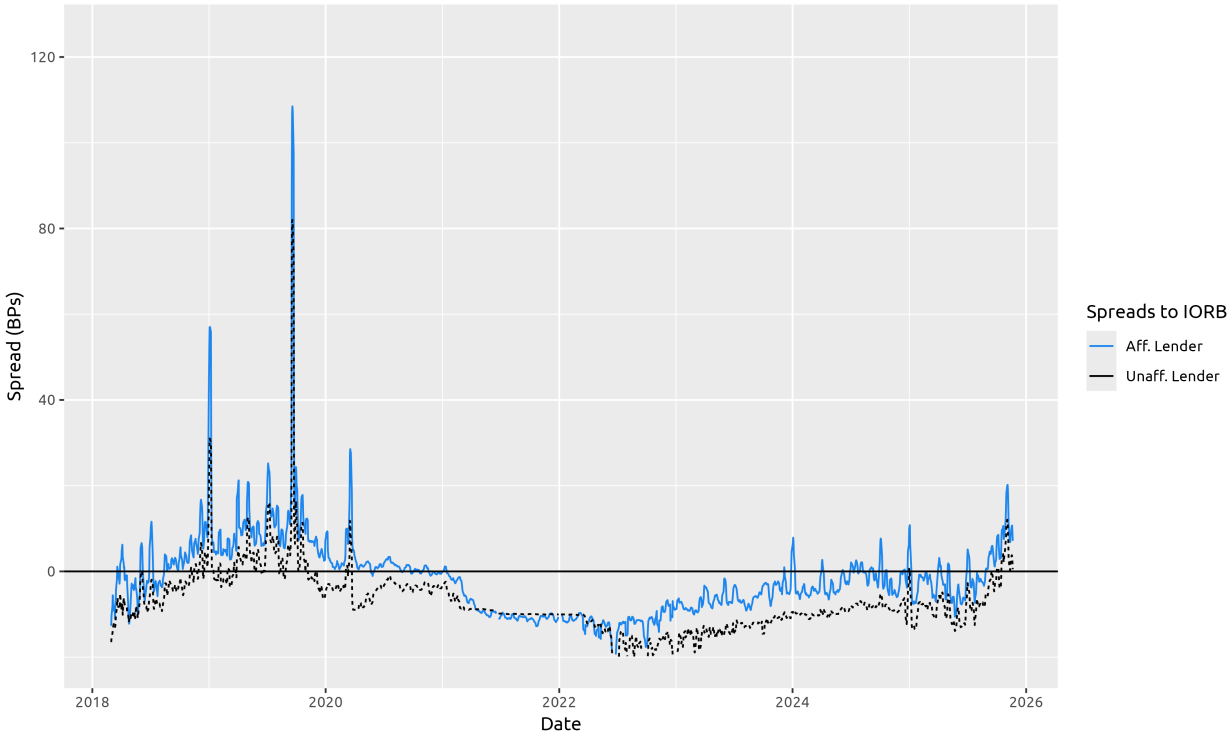


Figure 5: Affiliation Premium by Affiliate Type: DI vs Non-DI

This figure plots the five-day moving average of the daily affiliation premium (bps), defined as the difference between the repo rate paid to affiliates and the repo rate paid to unaffiliated lenders for overnight, uncleared, Treasury-collateralized tri-party repos. The DI affiliation premium is computed using only affiliated depository-institution lenders; the non-DI premium is computed using only affiliated non-DI lenders. Daily repo rates are volume-weighted averages within each lender group. The sample period is from February 2018 to November 2025.

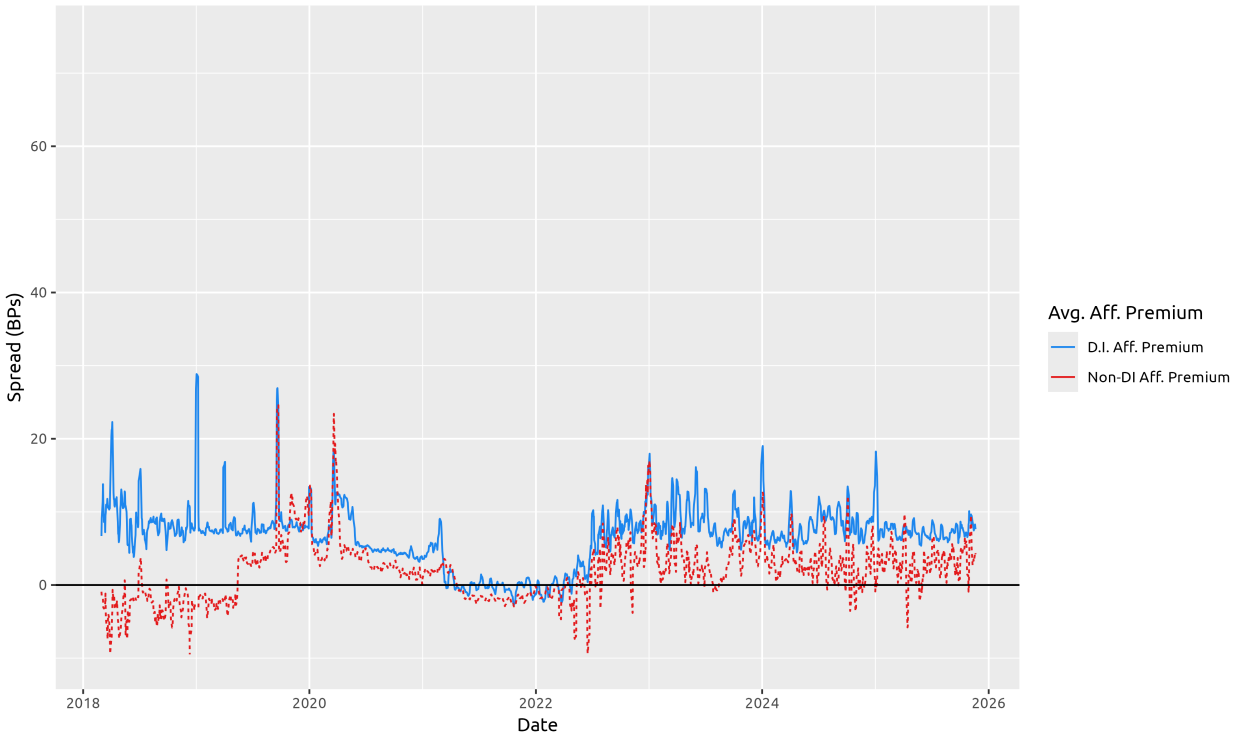
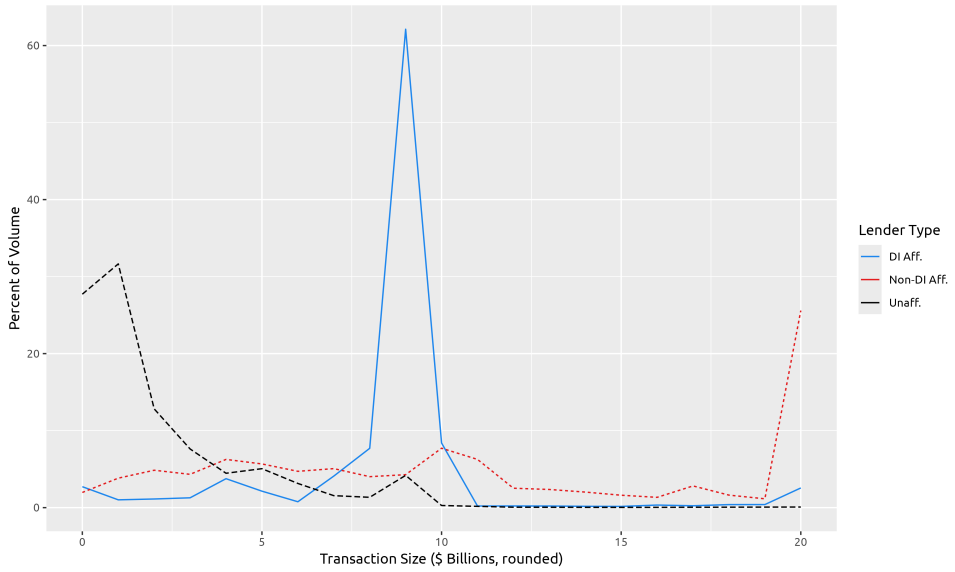


Figure 6: Trade Sizes, Repo Volumes, and Trading Frequency

This figure summarizes overnight, uncleared, Treasury-collateralized tri-party repo transactions to the five dealers in the sample by transaction size (USD billions) and lender type (DI affiliated, non-DI affiliated, unaffiliated). Panel A plots the percentage of total volume executed at each transaction-size bin. Panel B plots the percentage of trades executed at each transaction-size bin. The sample period is from February 2018 to November 2025.

Panel A. Trade Frequency



Panel B. Trade Volumes

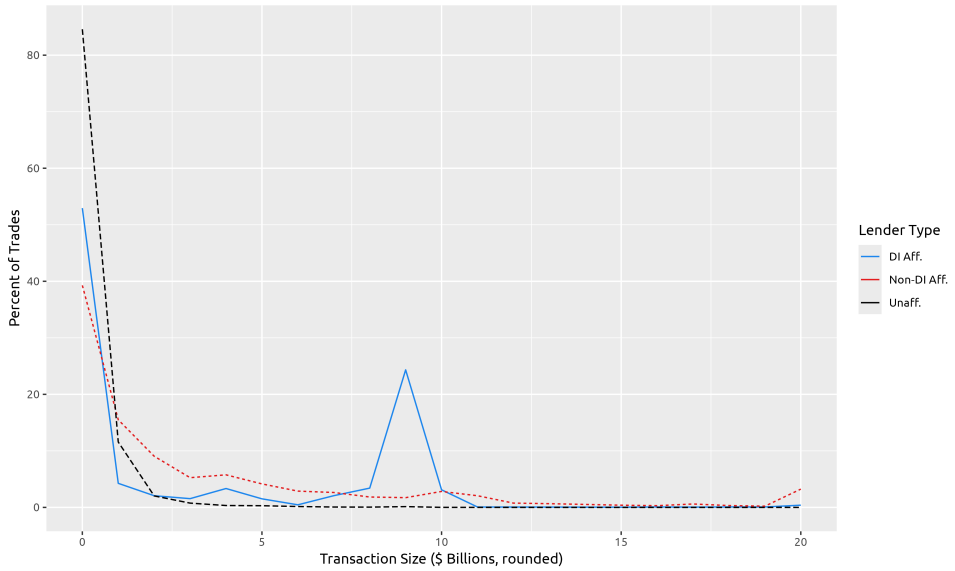


Figure 7: Affiliation Premium and Balance Sheet Cost Proxies

This figure plots the five-day moving average of the daily affiliation premium (bps) and two balance-sheet-cost proxies. The affiliation premium is constructed from overnight, uncleared, Treasury-collateralized tri-party repo transactions as the difference between affiliated and unaffiliated volume-weighted average repo rates, aggregated across dealers in the sample. The dealer-level cross-market Treasury repo ($CMTR$) spread is each dealer's volume-weighted average overnight reverse-repo rate in the centrally cleared segment (excluding collateral-sourcing-motivated trades) minus its volume-weighted average overnight tri-party repo rate (excluding affiliated tri-party trades), averaged across dealers. The market-wide proxy is the spread between the general collateral financing (GCF) Treasury repo rate and the tri-party General collateral rate ($TGCR$). The sample period is from February 2018 to November 2025.

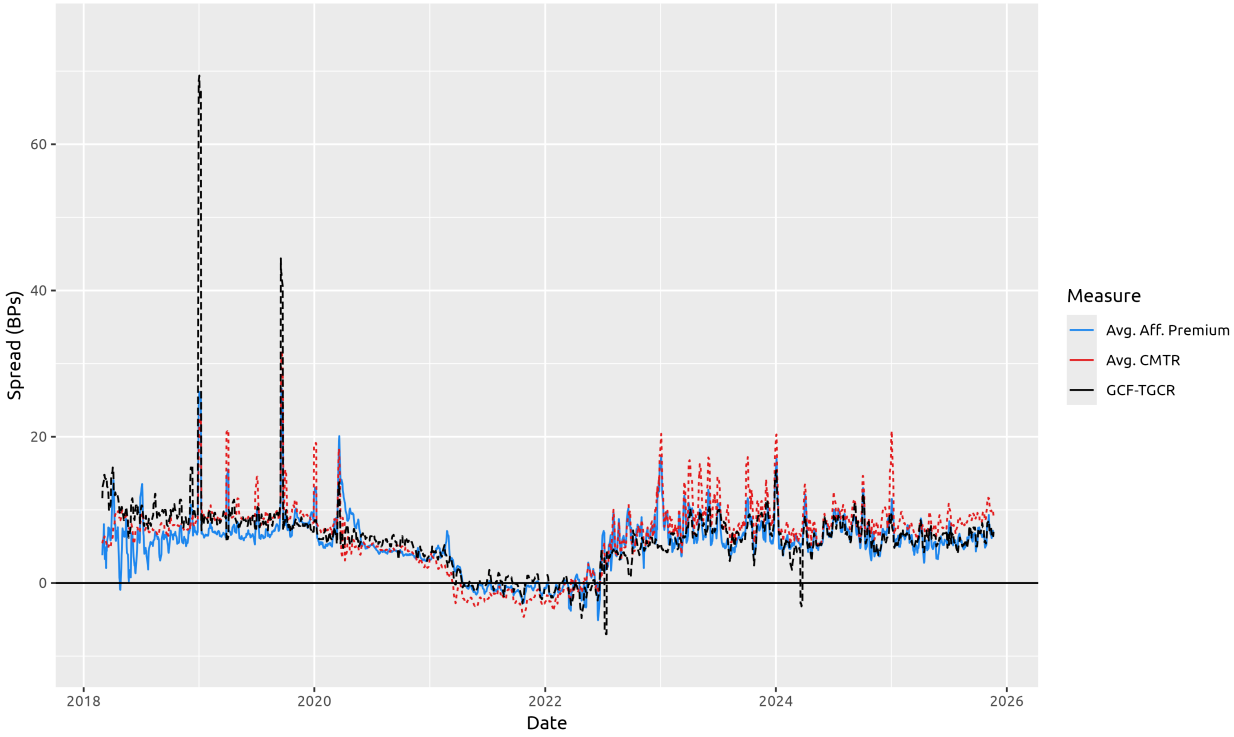


Figure 8: Affiliation Premium and Proxies for Cash-Futures Basis Trade

This figure plots the five-day moving average of the affiliation premium (left axis, bps) together with proxies for the aggregate size of cash–futures basis trade from Gilcoes, Iorio, Monin, and Petrasek (2024) (right axis, USD billions). The right-axis series include leveraged-fund short futures, net repo, and a basis trade proxy as defined in Gilcoes et al. (2024). The sample period is February 2018 to January 2024 to match availability of the basis trade proxies.

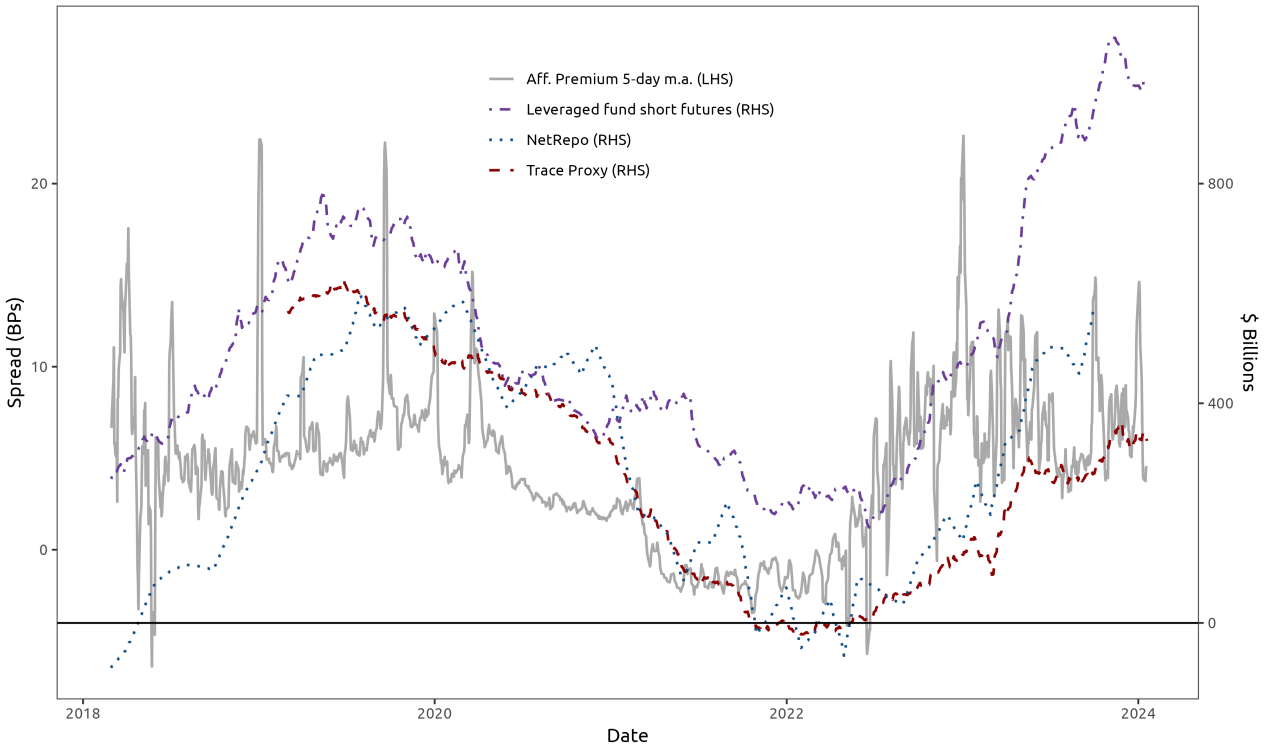


Table 1: Summary Statistics

This table reports summary statistics for variables used in the analysis. Panel A reports dealer-day measures from the uncleared tri-party Treasury repo market, including volume-weighted repo spreads to IORB (bps), repo volumes (USD billions), affiliation premiums (bps), and balance-sheet-cost proxies ($CMTR$ and $GCF\text{-}TGCR$, bps). Panel B reports dealer-day five-business-day changes in repo and reverse-repo volumes from FR 2052a, split by affiliated/DI-affiliated/unaffiliated counterparties (USD billions) and, where shown, scaled by the dealer's total repo or reverse repo at $t-5$ (percent). Panel C reports summary statistics for control variables used in regressions. D indexes dealers and t indexes days. The sample period is from February 2018 to November 2025.

Panel A. Overnight Tri-party Repo Data

Variable	Lender Type	Mean	Median	STD	P25	P75	Count
Tri-Party Repo-IORB Spread$_{D,t}$ (bps)	Aff. All	-3.40	-5.00	12.78	-10.06	2.00	8251
	Aff. DI	-0.89	-1.50	13.23	-9.00	4.21	5440
	Unaff.	-7.73	-8.98	12.03	-10.97	-3.64	8822
Tri-Party Repo Volume$_{D,t}$ ($bil)	Aff. All	18.89	10.40	19.42	5.30	27.15	8260
	Aff. DI	19.30	5.00	22.54	1.60	42.00	5445
	Unaff.	22.21	15.29	23.82	6.35	28.49	8830
Tri-Party Aff. Premium$_{D,t}$ (bps)		4.63	3.57	9.59	-0.64	7.50	7925
Tri-Party DI Aff. Premium$_{D,t}$ (bps)		5.14	4.37	7.99	0.06	7.94	5384
CMTR$_{D,t}$ (bps)		6.26	6.49	8.50	1.80	8.98	8750
GCF-TGCR Spread$_t$ (bps)		6.00	6.00	8.88	4.00	8.00	1941
ΔAff. Premium$_{D,t}$ (bps)		0.01	-0.00	9.79	-1.10	1.05	7669
ΔAff. DI Premium$_{D,t}$ (bps)		-0.08	-0.00	7.26	-0.91	0.80	5002
ΔCMTR$_{D,t}$ (bps)		0.00	-0.00	8.30	-1.18	1.17	8508
ΔGCF-TGCR Spread$_t$ (bps)		-0.01	0.00	11.49	-1.00	1.00	1936

Panel B. Market-Wide Repo and Reverse Repo Data

Variable	Trading With	Mean	Median	STD	P25	P75	Count
ΔOvernight Repo$_{D,t}$ ($bil)							
	Aff.	0.15	0.04	8.05	-2.81	2.97	9465
	Aff. DI	0.07	0.00	4.76	-0.89	0.94	9465
	Unaff.	0.34	0.17	12.38	-5.41	6.06	9465
ΔOvernight Rev Repo$_{D,t}$ ($bil)							
	Aff.	0.11	0.03	5.85	-2.20	2.31	9465
	Aff. DI	0.03	0.00	3.75	-0.23	0.30	9465
	Unaff.	0.29	0.13	11.62	-6.39	6.63	9465
ΔOvernight Repo$_{D,t}$/Total Repo$_{D,t-5}$ (%)							
	Aff.	0.26	0.03	6.11	-1.95	2.08	9465
	Aff. DI	0.08	0.00	3.12	-0.58	0.59	9465
	Unaff.	0.41	0.13	7.87	-4.03	4.50	9465
ΔOvernight Rev Repo$_{D,t}$/Total Rev Repo$_{D,t-5}$ (%)							
	Aff.	0.19	0.03	4.41	-1.82	1.98	9465
	Aff. DI	0.05	0.00	2.25	-0.20	0.26	9465
	Unaff.	0.62	0.09	9.34	-5.14	5.80	9465

Panel C. Control Variables

Variable	Mean	Median	STD	P25	P75	Count
$CDS_{D,t}$ (bps)	64.93	58.13	21.20	51.27	74.45	9780
$SOFR_t$ (bps)	256.59	228.00	198.90	10.00	441.00	1930
$Log(System\ Liquidity)_t$ (Log \$bil)	8.09	8.16	0.44	7.65	8.52	1932
$Log(Bill)_t$ (Log \$bil)	8.23	8.23	0.36	7.79	8.60	1932
$Log(Coupon)_t$ (Log \$bil)	9.52	9.51	0.19	9.34	9.68	1932
$\Delta Log(System\ Liquidity)_t$*1000	0.66	1.02	26.56	-12.50	13.03	1925
$\Delta Log(Bill)_t$*1000	2.94	0.43	17.21	-6.32	8.64	1925
$\Delta Log(Coupon)_t$*1000	1.69	0.37	5.08	-0.06	4.02	1925

Table 2: Affiliation Premium: Evidence from Aggregate Daily Repo Spreads

This table reports panel regressions using daily volume-weighted average repo spreads to IORB (bps) for overnight, uncleared, Treasury-collateralized tri-party repos. Observations are at the dealer × lender-group × day level. The indicator **Affiliated Lender** equals one for lender groups affiliated with the dealer's BHC and zero for unaffiliated lender groups. We control for a set of variables that may affect the repo spreads: the aggregate daily repo volume by each dealer, dealer-affiliated domestic DI's daily total reserves ($\ln(Reserves)_{D,t}$) and their BHC's CDS spreads ($CDS_{D,t}$); the sum of system-wide DI reserve balances at the Fed and ON RRP take-up ($\ln(\text{System liquidity})_t$), Treasury Bill and coupon supply, and the benchmark interest rate of the overnight secured cash borrowing cost ($SOFR_t$). We also include the end-of-quarter dummy that equals to one if a date is a quarter-end plus and minus two business days, and the zero-lower-bound dummy for dates when the federal funds target rate is at the zero lower bound. The sample period is from February 2018 through November 2025. Standard errors are clustered by dealer×year-month. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	VWA Repo Spread to $\text{IORB}_{D,L,t}$				
	(1)	(2)	(3)	(4)	(5)
$\text{Affiliated Lender}_{D,L,t}$	4.27***	4.32***	5.04***	4.93***	4.85***
	(11.90)	(12.34)	(15.16)	(14.80)	(13.88)
$\text{Repo Volume}_{D,L,t}$		0.00	0.07***	0.05***	0.05***
		(0.18)	(6.60)	(4.61)	(5.43)
$\ln(\text{Reserves})_{D,t}$		-9.59***	-1.26**	-2.77***	-1.99***
		(-11.45)	(-2.09)	(-4.35)	(-4.88)
$\text{CDS}_{D,t}$		-0.11***	-0.03***	0.01	0.00
		(-6.69)	(-2.89)	(1.02)	(0.17)
$\ln(\text{System Liquidity})_t$			-13.82***	-16.98***	
			(-19.85)	(-18.11)	
Quarter-end				2.31***	
				(4.88)	
ZLB				10.37***	
				(5.13)	
$\ln(\text{Bill Supply})_t$				-2.88	
				(-1.56)	
$\ln(\text{Coupon Supply})_t$				8.03***	
				(3.02)	
SOFR_t				0.02***	
				(3.30)	
Observations	17073	16519	16519	16493	16519
AdjustedR^2	0.029	0.200	0.302	0.329	0.164
Dealer FE	Y	Y	Y	Y	Y
Calendar Day FE	N	N	N	N	Y

Table 3: Affiliation Premium: Evidence from Transaction-Level Repo Spreads

This table reports regressions at the transaction level for repo spreads to IORB (bps) on overnight, uncleared, Treasury-collateralized tri-party repos. The primary independent variable, **Affiliated Lender**$_{D,L,t,s}$ indicates whether a repo transaction between dealer D and its cash lender L in transaction s in Day t is an internal repo trade and takes the value of zero if the trade is with external lenders. We control for a set of variables that may affect the repo spreads: trade size for a given transaction (Transaction Size$_{D,L,t,s}$); dealer-affiliated DI's daily total reserves ($\ln(Reserves)_{D,t}$) and their BHC's CDS spreads ($CDS_{D,t}$); the sum of system-wide DI reserve balances at the Fed and ON RRP take-up ($\ln(\text{System liquidity})_t$), Treasury bill and coupon supply, and the benchmark interest rate of the overnight secured cash borrowing cost ($SOFR_t$). We also include the end-of-quarter dummy that equals to one if a date is a quarter-end plus and minus two business days, and the zero-lower-bound dummy for dates when the federal funds target rate is at the zero lower bound. The data sample is from February 2018 through November 2025. Standard errors are clustered by dealer×year-month. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Trade Repo Spread to IORB$_{D,L,t,s}$				
	(1)	(2)	(3)	(4)	(5)
Affiliated Lender$_{D,L,t,s}$	2.40***	1.82***	1.40***	1.58***	1.57***
	(8.33)	(6.36)	(5.60)	(6.82)	(8.20)
Transaction Size$_{D,L,t,s}$		0.18***	0.34***	0.31***	0.34***
		(4.80)	(11.29)	(12.24)	(15.36)
$\ln(\text{Reserves})_{D,t}$		-6.54***	-0.60	-1.81***	-0.76***
		(-7.04)	(-1.00)	(-2.67)	(-3.37)
CDS$_{D,t}$		-0.11***	-0.03***	0.00	-0.01
		(-6.80)	(-4.28)	(0.39)	(-0.58)
$\ln(\text{System Liquidity})_t$			-12.32***	-15.28***	
			(-14.43)	(-13.47)	
Quarter-end				1.92***	
				(4.74)	
ZLB				9.09***	
				(3.49)	
$\ln(\text{Bill Supply})_t$				-3.40	
				(-1.47)	
$\ln(\text{Coupon Supply})_t$				9.97***	
				(3.45)	
SOFR$_t$				0.01	
				(1.62)	
Observations	720652	698121	698121	696939	698121
Adjusted R^2	0.002	0.087	0.166	0.180	0.009
Dealer FE	Y	Y	Y	Y	Y
Calendar Day FE	N	N	N	N	Y

Table 4: Affiliation Premium and Balance Sheet Cost (5-Day Changes)

This table shows regression results of the 5-day change in the dealer-level affiliation premium against the change in dealer-level balance sheet cost proxy, CMTR. We calculate the affiliation premium for each dealer each day using the difference of the aggregated daily uncleared tri-party repo spreads across two types of cash lenders: affiliated versus unaffiliated. We also consider the intersection of $\Delta CMTR$ with the dummy variable indicating the SLR exemption period (April 1, 2020 through March 31, 2021). Quarter-end indicates if the day is the last business day of the quarter, plus or minus two business days. We control for the change of dealer-affiliated DI's daily total reserves and their BHC's five-day lagged CDS spreads; the change of system-wide DI reserve balances at the Fed, the change of Treasury bill and coupon supply, and the five-day lagged benchmark interest rate of the overnight secured cash borrowing cost. The data sample is from February 2018 through November 2025. Standard errors are Driscoll-Kraay with 12 lags. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Δ Affiliation Premium$_{D,t}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ΔCMTR$_{D,t}$	0.72***	0.61***	0.62***	0.61***	0.61***	0.61***	0.61***
	(10.25)	(8.01)	(8.03)	(7.96)	(7.83)	(7.82)	(4.69)
SLR Exemption			-0.26*	-0.28*	-0.33*	-0.09	
			(-1.87)	(-1.83)	(-1.96)	(-0.57)	
SLR Exemption$\times\Delta$CMTR$_{D,t}$			-0.54***	-0.54***	-0.54***	-0.54***	
			(-6.10)	(-5.95)	(-6.17)	(-6.37)	
Δln(Reserves)$_{D,t}$				1.05	1.07	0.76	0.52
				(1.10)	(1.11)	(0.79)	(0.43)
CDS$_{D,t-5}$				-0.00	-0.00	0.00	-0.02
				(-0.03)	(-0.05)	(0.37)	(-0.69)
Quarter-end					0.32	0.19	
					(0.73)	(0.43)	
ZLB					0.06	0.14	
					(0.30)	(0.47)	
Δln(System Liquidity)$_t$						8.99*	
						(1.73)	
Δln(Bill Supply)$_t$						-8.25	
						(-1.61)	
Δln(Coupon Supply)$_t$						35.94*	
						(1.86)	
SOFR$_{t-5}$						0.00	
						(0.98)	
Observations	7101	6959	6959	6746	6746	6726	6628
Adjusted R^2	0.428	0.514	0.517	0.516	0.516	0.517	0.475
Dealer FE	Y	Y	Y	Y	Y	Y	Y
Calendar Day FE	N	N	N	N	N	N	Y
ΔDependent Variable$_{D,t-5}$	N	Y	Y	Y	Y	Y	Y

Table 5: The Average Affiliation Premium and Market-Wide Balance Sheet Cost (5-Day Changes)

This table shows regression results of the 5-day change in the average affiliation premium across dealers against the change in market-wide balance sheet cost proxy, the *GCF-TGCR* spread. We calculate the affiliation premium for each dealer each day using the difference of the aggregated daily repo spreads across two types of cash lenders: affiliated versus unaffiliated. The we take the average across dealers for the dependent variable. We consider the intersection of ΔGCF-TGCR with the dummy variable indicating the SLR exepmtion period (April 1, 2020 through March 31, 2021). Quarter-end indicates if the day is the last business day of the quarter, plus or minus two business days. We control for the average dealer-affiliated BHC's five-day lagged CDS spreads across dealers; the change of system-wide DI reserve balances at the Fed, the change of Treasury bill and coupon supply, and the five-day lagged benchmark interest rate of the overnight secured cash borrowing cost. The data sample is from February 2018 through November 2025. Standard errors are Driscoll-Kraay with 12 lags. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Δ Average Affiliation Premium$_t$					
	(1)	(2)	(3)	(4)	(5)	(6)
ΔGCF-TGCR$_t$	0.22***	0.17***	0.17***	0.17***	0.16***	0.16***
	(12.94)	(8.01)	(8.02)	(7.90)	(8.14)	(8.09)
SLR Exemption			-0.31	-0.24	-0.44*	-0.34
			(-1.62)	(-1.21)	(-1.77)	(-1.34)
SLR Exemption×ΔGCF-TGCR$_t$			-0.17*	-0.18*	-0.24***	-0.24***
			(-1.86)	(-1.92)	(-2.86)	(-2.94)
Δln(System Liquidity)$_t$				-6.77	-8.28	-3.92
				(-1.15)	(-1.32)	(-0.59)
Avg. CDS$_{t-5}$				0.00	0.00	0.00
				(0.32)	(0.15)	(0.51)
Quarter-end					2.64***	2.49***
					(4.36)	(4.06)
ZLB					0.23	0.26
					(0.84)	(0.50)
Δln(Bill Supply)$_t$						1.80
						(0.21)
Δln(Coupon Supply)$_t$						74.61***
						(2.89)
SOFR$_{t-5}$						0.00
						(0.19)
Observations	1925	1920	1920	1859	1859	1855
Adjusted R^2	0.181	0.341	0.342	0.337	0.352	0.356
ΔDependent Variable$_{t-5}$	N	Y	Y	Y	Y	Y

Table 6: Affiliation Premium by Affiliate Type: DI versus Others

This table shows regression results for repo rate spreads to interest on reserves balances (IORB). Repo rates are calculated daily (t) as a volume-weighted average for each dealer (D) with three lender types (L): DIs affiliated with the same BHC as the corresponding dealer (**DI Affiliated Lender**), non-DIs affiliated with the same BHC (**Other Affiliated Lender**), and those unaffiliated (external lenders). We control for a set of variables that may affect the repo spreads: the aggregate daily repo volume by each dealer, dealer-affiliated domestic DI's daily total reserves ($\ln(Reserves)_{D,t}$) and their BHC's CDS spreads ($CDS_{D,t}$); the sum of system-wide DI reserve balances at the Fed and ON RRP take-up ($\ln(\text{System liquidity})_t$), Treasury bill and coupon supply, and the benchmark interest rate of the overnight secured cash borrowing cost ($SOFR_t$). We also include the end-of-quarter dummy that equals to one if a date is a quarter-end plus and minus two business days, and the zero-lower-bound dummy for dates when the federal funds target rate is at the zero lower bound. The data sample is from February 2018 through November 2025. Standard errors are clustered by Dealer*Year-Month. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	VWA Repo Spread to $\text{IORB}_{D,L,t}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\text{Affiliated Lender}_{D,L,t}$	4.27***					
	(11.90)					
$\text{DI Affiliated Lender}_{D,L,t}$		7.00***	6.18***	6.54***	6.29***	6.22***
		(16.09)	(17.25)	(19.37)	(19.04)	(18.23)
$\text{Other Affiliated Lender}_{D,L,t}$		1.23***	1.89***	3.32***	2.99***	3.01***
		(3.01)	(4.16)	(7.84)	(6.80)	(6.63)
$\text{Repo Volume}_{D,t}$			0.02*	0.07***	0.05***	0.05***
			(1.66)	(7.63)	(5.83)	(6.44)
$\ln(\text{Reserves})_{D,t}$			-8.37***	-1.12*	-2.46***	-1.73***
			(-10.75)	(-1.94)	(-4.06)	(-4.68)
$\text{CDS}_{D,t}$			-0.11***	-0.03***	0.01	-0.05**
			(-6.47)	(-3.18)	(1.27)	(-2.04)
$\ln(\text{System Liquidity})_t$				-12.34***	-16.30***	
				(-17.20)	(-17.08)	
Quarter-end					2.35***	
					(5.31)	
ZLB					10.20***	
					(5.26)	
$\ln(\text{Bill Supply})_t$					-2.66	
					(-1.53)	
$\ln(\text{Coupon Supply})_t$					10.73***	
					(3.74)	
SOFR_t					0.01***	
					(3.02)	
Observations	17073	21805	21095	21095	21063	21095
Adjusted R^2	0.029	0.049	0.182	0.267	0.295	0.117
Dealer FE	Y	Y	Y	Y	Y	Y
Calendar Day FE	N	N	N	N	N	Y

Table 7: DI Affiliation Premium and Balance Sheet Costs (5-Day Changes)

This table shows regression results of the 5-day change in the dealer-level DI affiliation premium against the change in dealer-level balance sheet cost proxy, CMTR. We calculate the DI affiliation premium for each dealer each day using the difference of the aggregated daily repo spreads across two types of cash lenders: affiliated DI versus unaffiliated. We also consider the intersection of $\Delta CMTR$ with the dummy variable indicating the SLR exepmtion period (April 1, 2020 through March 31, 2021). Quarter-end indicates if the day is the last business day of the quarter, plus or minus two business days. We control for the change of dealer-affiliated DI's daily total reserves and their BHC's five-day lagged CDS spreads; the change of system-wide DI reserve balances at the Fed, the change of Treasury bill and coupon supply, and the five-day lagged benchmark interest rate of the overnight secured cash borrowing cost. The data sample is from February 2018 through November 2025. Standard errors are Driscoll-Kraay with 12 lags. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Δ DI affiliation premium$_{D,t}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Δ CMTR$_{D,t}$	0.47***	0.37***	0.39***	0.38***	0.38***	0.38***	0.37**
	(5.47)	(4.71)	(4.86)	(4.67)	(4.55)	(4.53)	(2.56)
SLR Exemption			0.04	-0.01	-0.00	0.03	
			(0.27)	(-0.06)	(-0.02)	(0.14)	
SLR Exemption $\times$ Δ CMTR$_{D,t}$			-0.38***	-0.37***	-0.38***	-0.38***	
			(-4.57)	(-4.45)	(-4.52)	(-4.64)	
Δ ln(Reserves)$_{D,t}$				-0.33	-0.30	-0.38	0.09
				(-0.50)	(-0.45)	(-0.54)	(0.10)
CDS$_{D,t-5}$				-0.00	-0.00	-0.00	-0.03
				(-0.67)	(-0.73)	(-0.74)	(-0.99)
Quarter-end					0.36	0.33	
					(1.23)	(1.13)	
ZLB					-0.01	0.06	
					(-0.05)	(0.42)	
Δ ln(System Liquidity)$_t$						2.11	
						(0.53)	
Δ ln(Bill Supply)$_t$						0.23	
						(0.08)	
Δ ln(Coupon Supply)$_t$						11.67	
						(0.83)	
SOFR$_{t-5}$						0.00	
						(0.87)	
Observations	4484	4322	4322	4191	4191	4181	4005
Adjusted R^2	0.229	0.423	0.432	0.420	0.420	0.421	0.285
Dealer FE	Y	Y	Y	Y	Y	Y	Y
Calendar Day FE	N	N	N	N	N	N	Y
Δ Dependent Variable$_{D,t-5}$	N	Y	Y	Y	Y	Y	Y

Table 8: The Sensitivity of Reverse Repo to Affiliated vs Unaffiliated Repo

This table reports panel regressions relating 5-business-day changes in dealer overnight (ON) reverse repo (USD billions) to 5-business-day changes in dealer ON repo borrowing, split into affiliated and unaffiliated counterparties (FR 2052a). Panel A uses changes in levels. Panel B scales both dependent and key independent variables by the dealer's total repo or reverse repo at $t-5$, producing changes in ratios (percent). The data sample covers the five largest primary dealers and ranges from February 2018 to September 2025. Standard errors are Driscoll-Kraay with 12 lags. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Changes in Level

	Δ All$_{D,t}$		Δ Aff.$_{D,t}$		Δ Unaff.$_{D,t}$	
	(1)	(2)	(3)	(4)	(5)	(6)
ΔON Aff. Repo$_{D,t}$	0.55***	0.60***	0.23***	0.21***	0.32***	0.38***
	(10.15)	(14.15)	(7.75)	(8.00)	(7.67)	(11.99)
ΔON Unaff. Repo$_{D,t}$		0.49***		0.09***		0.38***
		(18.16)		(6.97)		(18.80)
CDS$_{D,t-5}$	0.00	-0.00	-0.02	-0.03	0.03	0.03
	(0.07)	(-0.06)	(-1.14)	(-1.40)	(0.89)	(0.90)
Observations	9165	9140	9165	9140	9165	9140
Adjusted R^2	0.145	0.463	0.105	0.266	0.068	0.362
Dealer FE	Y	Y	Y	Y	Y	Y
Calendar Day FE	Y	Y	Y	Y	Y	Y
ΔDependent Variable$_{D,t-5}$	N	Y	N	Y	N	Y

Panel B. Changes in Ratio

	Δ All$_{D,t}$/Total$_{D,t-5}$		Δ Aff.$_{D,t}$/Total$_{D,t-5}$		Δ Unaff.$_{D,t}$/Total$_{D,t-5}$	
	(1)	(2)	(3)	(4)	(5)	(6)
ΔON Aff. Repo$_{D,t}$/Total$_{D,t-5}$	0.53***	0.61***	0.16***	0.15***	0.38***	0.44***
	(15.97)	(24.36)	(7.57)	(8.36)	(14.79)	(21.61)
ΔON Unaff. Repo$_{D,t}$/Total$_{D,t-5}$		0.50***		0.09***		0.41***
		(28.10)		(7.45)		(27.46)
CDS$_{D,t-5}$	-0.00	-0.00	-0.00	-0.00	0.00	0.00
	(-0.39)	(-0.29)	(-1.04)	(-1.12)	(0.46)	(0.61)
Observations	9165	9140	9165	9140	9165	9140
Adjusted R^2	0.192	0.464	0.078	0.197	0.124	0.373
Dealer FE	Y	Y	Y	Y	Y	Y
Calendar Day FE	Y	Y	Y	Y	Y	Y
ΔDependent Variable$_{D,t-5}$	N	Y	N	Y	N	Y

Table 9: DI Repo Usage for Reverse Repo

This table reports panel regressions relating 5-business-day changes in dealer overnight (ON) reverse repo (USD billions) to 5-business-day changes in ON repo borrowing broken into affiliated DI, affiliated non-DI, and unaffiliated counterparties (FR 2052a). Panel A uses changes in levels. Panel B scales both dependent and key independent variables by the dealer's total repo or reverse repo at $t-5$, producing changes in ratios (percent). The data sample covers the five largest primary dealers and ranges from February 2018 to September 2025. Standard errors are Driscoll-Kraay with 12 lags. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Changes in Level

	Δ All$_{D,t}$		Δ Aff.$_{D,t}$		Δ Unaff.$_{D,t}$	
	(1)	(2)	(3)	(4)	(5)	(6)
ΔON Aff. DI Repo$_{D,t}$	0.49***	0.51***	0.20***	0.19***	0.29***	0.30***
	(5.34)	(8.83)	(5.44)	(6.74)	(4.14)	(6.21)
ΔON Aff. Non-DI Repo$_{D,t}$		0.64***		0.21***		0.41***
		(12.02)		(6.85)		(10.88)
ΔON Unaff. Repo$_{D,t}$		0.49***		0.09***		0.39***
		(18.75)		(7.00)		(19.17)
CDS$_{D,t-5}$	0.01	-0.00	-0.02	-0.03	0.03	0.03
	(0.19)	(-0.08)	(-1.09)	(-1.41)	(0.92)	(0.88)
Observations	9165	9140	9165	9140	9165	9140
Adjusted R^2	0.042	0.465	0.029	0.266	0.020	0.365
Dealer FE	Y	Y	Y	Y	Y	Y
Calendar Day FE	Y	Y	Y	Y	Y	Y
ΔDependent Variable$_{D,t-5}$	N	Y	N	Y	N	Y

Panel B. Changes in Ratio

	Δ All$_{D,t}$/Total$_{D,t-5}$		Δ Aff.$_{D,t}$/Total$_{D,t-5}$		Δ Unaff.$_{D,t}$/Total$_{D,t-5}$	
	(1)	(2)	(3)	(4)	(5)	(6)
ΔON Aff. DI Aff. Repo$_{D,t}$/Total$_{D,t-5}$	0.47***	0.59***	0.19***	0.20***	0.28***	0.38***
	(6.16)	(10.70)	(5.60)	(6.70)	(4.41)	(7.86)
ΔON Aff. Non-DI Aff. Repo$_{D,t}$/Total$_{D,t-5}$		0.69***		0.15***		0.53***
		(21.37)		(6.94)		(20.02)
ΔON Unaff. Repo$_{D,t}$/Total$_{D,t-5}$		0.61***		0.14***		0.46***
		(28.15)		(7.45)		(27.40)
CDS$_{D,t-5}$	-0.00	-0.00	-0.00	-0.00	0.00	0.00
	(-0.19)	(-0.30)	(-0.99)	(-1.11)	(0.55)	(0.60)
Observations	9165	9140	9165	9140	9165	9140
Adjusted R^2	0.035	0.464	0.027	0.199	0.016	0.374
Dealer FE	Y	Y	Y	Y	Y	Y
Calendar Day FE	Y	Y	Y	Y	Y	Y
ΔDependent Variable$_{D,t-5}$	N	Y	N	Y	N	Y

Internet Appendix

Figure A.1: Dealer Overnight Repo Volumes by Counterparty Type (All Segments)

This figure shows (1) dealers' total aggregated overnight, Treasury repo volume broken down by the cash lender type and (2) dealers' total aggregated overnight, Treasury reverse repo transactions, broken down by the cash borrower type. All volumes are at a daily frequency using FR 2052a data. Volumes shown include activity by the five dealers in our sample. Dealers' trading counterparties are aggregated to depository institutions affiliated with the dealer's BHC (Affiliated DI), other lenders affiliated with the dealer's BHC (Affiliated Other), and other entities that are not affiliated with the dealer's BHC (Unaffiliated Other). The sample period is from February 2018 through September 2025.

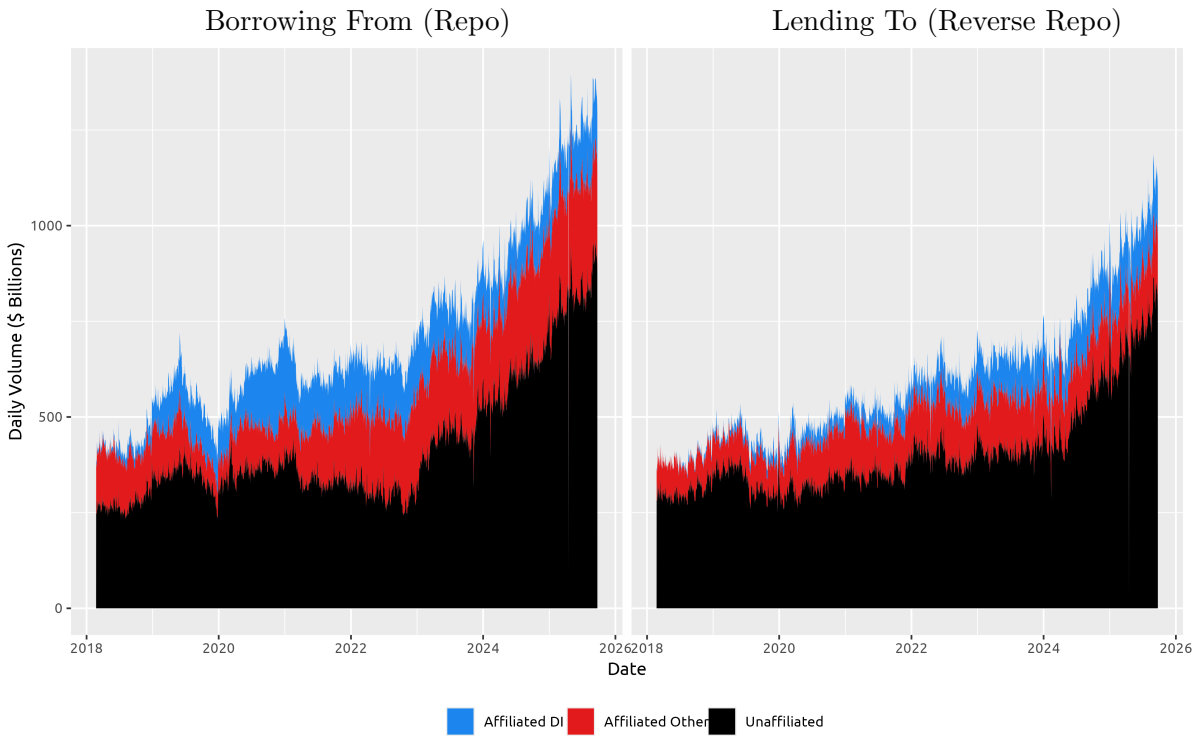


Figure A.2: DI Affiliation Premiums around Quarter-End

This figure plots the average of daily DI affiliation premiums (affiliated rate minus unaffiliated rate) around quarter-ends using the tri-party data collected by the Federal Reserve Bank of New York. Each day within +/- two business days of quarter-end, we construct a volume-weighted average repo rate across two types of overnight tri-party repo transactions: those with the affiliated DI counterparties and those with unaffiliated counterparties for the five dealers in our sample. We then calculate the spread between these two daily volume-weighted average repo rates as the premium. We then take the mean DI affiliation premium at each day relative to quarter-end in our sample and plot the mean and +/- one standard deviation for each day relative to quarter-end (t). The sample period is from February 2018 through November 2025.

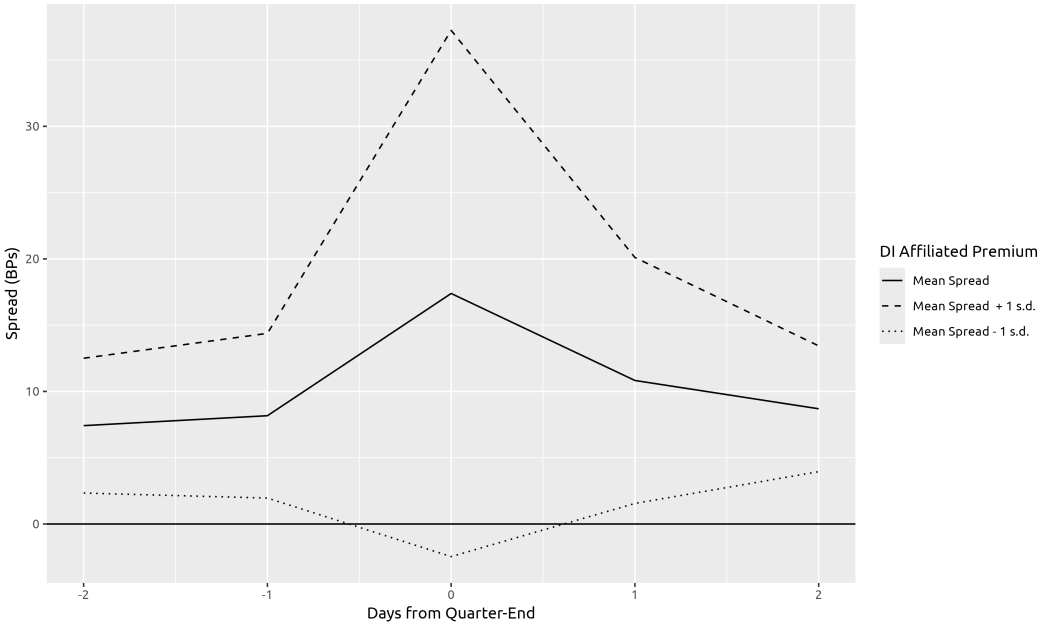


Table A.1: Variable Descriptions and Sources

Variable	Description	Source
Tri-party Repo Rates/Volumes	Rates/volumes from uncleared tri-party Treasury-collateralized transactions	BNYM/FRBNY
FR 2052a Repo Volumes	Aggregate repo volumes from Treasury-collateralized repo across all segments	Federal Reserve
IORB	Interest rate on reserve balances	Federal Reserve
TGCR	Tri-party general collateral rate	FRBNY
SOFR	Secured overnight financing rate	FRBNY
GCF	General Collateral Financing rate on Treasury transactions	DTCC
Aff. Premium	VWA borrowing rate with affiliates in uncleared tri-party minus VWA borrowing rate with non-affiliates in uncleared tri-party	Authors' Calc.
DI Aff. Premium	VWA borrowing rate with domestic DI affiliates in uncleared tri-party minus VWA borrowing rate with non-affiliates in uncleared tri-party	Authors' Calc.
CMTR	Cross market Treasury repo spread	Chabot et al.
CDS	Credit default swap rates	Bloomberg
Reserves	Reserve balances of depository institutions	Federal Reserve
ON RRP	Aggregate ON RRP take-up	FRBNY
System Liquidity	Reserve balances of depository institutions plus aggregate ON RRP take-up	Authors' Calc.
Bill Supply	Treasury bills outstanding to the public	Treasury Dept.
Coupon Supply	Treasury coupons outstanding to the public	Treasury Dept.

Table A.2: Affiliation Premium: Evidence from Transaction-Level Repo Spreads with Haircuts

This table shows regression results for repo rate spreads to interest on reserves balances (IORB) at the transaction level. The primary independent variable, **Affiliated Lender**$_{D,L,t,s}$ indicates whether a repo transaction between dealer D and its cash lender L in transaction s in Day t is an internal repo trade and takes the value of zero if the trade is with external lenders. We control for a set of variables that may affect the repo spreads: trade size for a given transaction (Transaction Size$_{D,L,t,s}$); transaction haircut (Haircut$_{D,L,t,s}$); dealer-affiliated DI's daily total reserves ($\ln(Reserves)_{D,t}$) and their BHC's CDS spreads ($CDS_{D,t}$); the sum of system-wide DI reserve balances at the Fed and ON RRP take-up ($\ln(\text{System liquidity})_t$), Treasury bill and coupon supply, and the benchmark interest rate of the overnight secured cash borrowing cost ($SOFR_t$). Haircuts are in percentage points. We also include the end-of-quarter dummy that equals to one if a date is a quarter-end plus and minus two business days, and the zero-lower-bound dummy for dates when the federal funds target rate is at the zero lower bound. The data sample is from February 2018 to November 2025. Standard errors are clustered by Dealer*Year-Month. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Trade Repo Spread to IORB$_{D,L,t,s}$				
	(1)	(2)	(3)	(4)	(5)
Affiliated Lender$_{D,L,t,s}$	2.40***	1.71***	1.35***	1.52***	1.51***
	(8.33)	(6.19)	(5.55)	(6.69)	(7.91)
Transaction Size$_{D,L,t,s}$		0.16***	0.33***	0.30***	0.33***
		(3.73)	(9.63)	(10.05)	(12.72)
Haircut$_{D,L,t,s}$		-0.27	-0.09	-0.14	-0.13
		(-1.49)	(-0.55)	(-0.80)	(-0.81)
$\ln(\text{Reserves})_{D,t}$		-6.56***	-0.62	-1.82***	-0.76***
		(-7.02)	(-1.03)	(-2.69)	(-3.37)
CDS$_{D,t}$		-0.11***	-0.03***	0.00	-0.01
		(-6.78)	(-4.31)	(0.39)	(-0.60)
$\ln(\text{System Liquidity})_t$			-12.37***	-15.37***	
			(-14.38)	(-13.44)	
Quarter-end				1.92***	
				(4.64)	
ZLB				9.21***	
				(3.50)	
$\ln(\text{Bill Supply})_t$				-3.50	
				(-1.50)	
$\ln(\text{Coupon Supply})_t$				10.18***	
				(3.50)	
SOFR$_t$				0.01	
				(1.63)	
Observations	720652	692892	692892	691710	692892
Adjusted R^2	0.002	0.087	0.165	0.180	0.009
Dealer FE	Y	Y	Y	Y	Y
Calender Day FE	N	N	N	N	Y

Table A.3: Affiliation Premium and Balance Sheet Costs (Level)

This table shows unbalanced regression results of affiliation premiums (spread between affiliated rate and unaffiliated rate) against the CMTR. D is the specific dealer. CDS and SOFR are in basis points. Premiums, CMTR, and CDS are specific to each dealer. Reserve balances are specific to domestic DIs affiliated with the dealer. System liquidity is the sum of system-wide DI reserve balances at the Fed and ON RRP take-up. Bill and coupon supply are the measured as marketable debt issued to the public (SOMA plus non-SOMA). Quarter-end indicates if the date was a quarter-end +/- 2 business days. ZLB is when the target federal funds rate was at the zero lower bound. The SLR exemption period is April 1, 2020 through March 31, 2021. The data sample ranges from February 2018 through November 2025 and is limited to the five broker-dealers in our sample. Regressions are run with and without dealer and day fixed effects. Standard errors are clustered by Dealer*Year*Month. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	affiliation premium$_{D,t}$					
	(1)	(2)	(3)	(4)	(5)	(6)
CMTR$_{D,t}$	0.65***	0.66***	0.66***	0.70***	0.71***	0.74***
	(11.24)	(11.16)	(10.85)	(9.77)	(9.10)	(7.04)
SLR Exemption		1.70**	2.01***	0.52	1.95*	
		(2.18)	(2.61)	(0.61)	(1.82)	
SLR Exemption × CMTR$_{B,D}$		-0.24	-0.28*	-0.30*	-0.22	
		(-1.52)	(-1.73)	(-1.86)	(-1.38)	
ln(Reserves)$_{D,t}$			0.15	-0.26	-0.92**	-1.19**
			(0.32)	(-0.58)	(-2.03)	(-2.04)
CDS$_{D,t}$			0.02**	0.03**	0.01	-0.03
			(1.98)	(2.47)	(0.76)	(-0.62)
Quarter-end				0.11	0.06	
				(0.28)	(0.16)	
ZLB				2.15**	2.49**	
				(2.33)	(2.02)	
ln(System Liquidity)$_t$					1.35	
					(1.28)	
ln(Bill Supply)$_t$					-2.69	
					(-1.55)	
ln(Coupon Supply)$_t$					6.01**	
					(2.17)	
SOFR$_t$					-0.00	
					(-0.11)	
Observations	7391	7391	7147	7147	7139	7040
Adjusted R^2	0.469	0.471	0.471	0.477	0.481	0.394
Dealer FE	Y	Y	Y	Y	Y	Y
Day FE	N	N	N	N	N	Y

Table A.4: The Average Affiliation Premium and Market-Wide Balance Sheet Costs (Level)

This table shows unbalanced regression results of the average affiliation premium (spread between volume weighted average affiliated rate and volume weighted average unaffiliated rate) against the GCF-TGCR spread. CDS and SOFR are in basis points. Premiums and CDS the average of the dealers in the sample. System liquidity is the sum of system-wide DI reserve balances at the Fed and ON RRP take-up. Bill and coupon supply are the measured as marketable debt issued to the public (SOMA plus non-SOMA). Quarter-end indicates if the date was a quarter-end +/- 2 business days. ZLB is when the target federal funds rate was at the zero lower bound. The SLR exemption period is April 1, 2020 through March 31, 2021. The data sample ranges from 2018 to 2025 and is limited to the five broker-dealers in our sample. Standard errors are clustered by Year*Month. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Avg. Affiliation Premium$_t$				
	(1)	(2)	(3)	(4)	(5)
GCF-TGCR$_t$	0.29***	0.29***	0.26***	0.22***	0.20***
	(5.47)	(5.51)	(6.23)	(9.77)	(10.33)
SLR Exemption		-2.74***	-1.77**	1.72**	3.01***
		(-3.86)	(-2.34)	(2.16)	(2.73)
SLR Exemption × GCF-TGCR$_t$		0.25**	0.09	0.23	0.18
		(1.98)	(0.70)	(1.51)	(1.23)
ln(System Liquidity)$_t$			-2.00***	-0.49	-2.48***
			(-3.05)	(-0.66)	(-2.76)
Avg. CDS$_t$			0.05***	0.02	0.03**
			(3.55)	(1.12)	(2.49)
Quarter-end				2.78***	2.70***
				(4.73)	(4.72)
ZLB				-5.06***	0.40
				(-6.45)	(0.35)
ln(Bill Supply)$_t$					-4.48***
					(-2.59)
ln(Coupon Supply)$_t$					7.47**
					(2.08)
SOFR$_t$					0.01***
					(5.98)
Observations	1932	1932	1870	1870	1867
Adjusted R^2	0.244	0.254	0.282	0.378	0.422

Table A.5: Change in Affiliation Premium, Change in CMTR, and SLR Distance

This table shows regression results for the 5-day change in affiliation premiums. The primary independent variable is the 5-day change in the CMTR. SLR Distance$_{D,q}$ indicates the difference of each dealer's supplementary leverage ratio to the cross sectional average supplementary leverage ratio of the five dealers for the quarter q . Other variables include dealer-affiliated DI's daily reserves ($\ln(Reserves)_{D,t}$) and their BHC's CDS spreads ($CDS_{D,t}$); the system-wide DI reserve balances at the Fed plus ON RRP take-up (ln(System liquidity)$_t$), Treasury bill and coupon supply, and the benchmark interest rate of the overnight secured cash borrowing cost ($SOFR_t$). We also include the SLR exemption dummy that equals one if the observation is during the SLR exemption period (April 2020 through March 2021). The data sample is from Q1 2018 to Q3 2023. Standard errors are Driscoll-Kraay with 12 lags. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	ΔAffiliation Premium$_{D,t}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ΔCMTR$_{D,t}$	0.69***	0.59***	0.56***	0.55***	0.56***	0.56***	0.52***
	(6.63)	(5.31)	(4.59)	(4.53)	(4.60)	(4.57)	(2.61)
SLR Distance$_{D,q}$			0.36	0.48	0.43	0.22	0.47
			(0.66)	(0.88)	(0.79)	(0.44)	(0.77)
SLR Distance$_{D,q}$×ΔCMTR$_{D,t}$			-0.67	-0.72	-0.83	-0.82	-1.13
			(-1.00)	(-1.07)	(-1.27)	(-1.25)	(-1.52)
Δln(Reserves)$_{D,t}$				3.54***	3.45**	3.10**	3.59*
				(2.63)	(2.55)	(2.31)	(1.77)
CDS$_{D,t-5}$				0.00	0.00	0.00	-0.02
				(0.49)	(0.36)	(0.46)	(-0.91)
SLR Exemption$_t$					-0.28*	0.03	
					(-1.67)	(0.16)	
SLR Exemption$_{D,q}$×ΔCMTR$_{D,t}$					-0.63***	-0.62***	
					(-4.31)	(-4.06)	
Δln(System Liquidity)$_t$						6.78	
						(1.25)	
Δln(Bill Supply)$_t$						-14.75**	
						(-2.45)	
Δln(Coupon Supply)$_t$						3.67	
						(0.13)	
SOFR$_{t-5}$						0.00	
						(1.07)	
Observations	4867	4739	4739	4570	4570	4570	4454
Adjusted R^2	0.414	0.493	0.499	0.498	0.504	0.505	0.461
Dealer FE	Y	Y	Y	Y	Y	Y	Y
Day FE	N	N	N	N	N	N	Y
Δ Dependent Variable$_{t-5}$	N	Y	Y	Y	Y	Y	Y

Table A.6: Change in Affiliation Premium, Change in CMTR, and SLR Distance and High SLR Distance

This table shows regression results for the 5-day change in affiliation premiums. The primary independent variables is the 5-day change in the CMTR. SLR Distance$_{D,q}$ indicates the difference of each dealer's supplementary leverage ratio to the cross sectional average supplementary leverage ratio of the five dealers for the quarter q and $1_{H\,D,q}$ is an indicator variable equal to 1 if dealer D's SLR ratio is above the median in each quarter. As such, dealers will only receive non-zero values for these two variables if they are above or below the SLR median for a given quarter. Other variables include dealer-affiliated DI's daily reserves ($\ln(Reserves)_{D,t}$) and their BHC's CDS spreads ($CDS_{D,t}$); the system-wide DI reserve balances at the Fed plus ON RRP take-up ($\ln(\text{System liquidity})_t$), Treasury bill and coupon supply, and the benchmark interest rate of the overnight secured cash borrowing cost ($SOFR_t$). We also include the SLR exemption dummy that equals one if the observation is during the SLR exemption period (April 2020 through March 2021). The data sample is from Q1 2018 to Q3 2023. Standard errors are Driscoll-Kraay with 12 lags. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	ΔAffiliation Premium$_{D,t}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ΔCMTR$_{D,t}$	0.69***	0.59***	0.64***	0.64***	0.65***	0.65***	0.64***
	(6.63)	(5.31)	(5.98)	(5.97)	(5.96)	(5.96)	(5.06)
SLR Distance$_{D,q}\times$ $1_{H\,D,q}$			0.76	0.99	1.03	0.82	1.24
			(1.03)	(1.30)	(1.31)	(1.02)	(1.13)
SLR Distance$_{D,q}\times$ $1_{H\,D,q}\times\Delta$CMTR$_{D,t}$			-2.41***	-2.54***	-2.52***	-2.52***	-3.72***
			(-2.76)	(-3.09)	(-3.00)	(-2.99)	(-3.07)
$\Delta\ln(\text{Reserves})_{D,t}$				3.85***	3.75***	3.40**	4.16**
				(2.84)	(2.74)	(2.51)	(2.05)
CDS$_{D,t-5}$				0.00	0.00	0.00	-0.03
				(0.54)	(0.36)	(0.43)	(-1.25)
SLR Exemption$_t$					-0.28	0.05	
					(-1.63)	(0.30)	
SLR Exemption$_t\times\Delta$CMTR$_{D,t}$					-0.49***	-0.48***	
					(-4.08)	(-3.95)	
$\Delta\ln(\text{System Liquidity})_t$						7.25	
						(1.38)	
$\Delta\ln(\text{Bill Supply})_t$						-13.55**	
						(-2.37)	
$\Delta\ln(\text{Coupon Supply})_t$						8.15	
						(0.33)	
SOFR$_{t-5}$						0.00	
						(1.33)	
Observations	4867	4739	4739	4570	4570	4570	4454
Adjusted R^2	0.414	0.493	0.516	0.516	0.519	0.521	0.495
Dealer FE	Y	Y	Y	Y	Y	Y	Y
Day FE	N	N	N	N	N	N	Y
Δ Dependent Variable$_{t-5}$	N	Y	Y	Y	Y	Y	Y

Table A.7: The Average DI Affiliation Premium and Market-Wide Balance Sheet Costs (5-Day Changes)

This table shows unbalanced regression results of the 5-day change in the average DI affiliation premium (spread between DI affiliated rate and unaffiliated rate) against the GCF-TGCR spread. CDS and SOFR are in basis points. Premiums and CDS the average of the dealers. System liquidity is the sum of system-wide DI reserve balances at the Fed and ON RRP take-up. Bill and coupon supply are the measured as marketable debt issued to the public (SOMA plus non-SOMA). Quarter-end indicates if the date was a quarter-end +/- 2 business days. ZLB is when the target federal funds rate was at the zero lower bound. The SLR exemption period is April 1, 2020 through March 31, 2021. The data sample ranges from 2018 to 2025 and is limited to the five broker-dealers in our sample. Standard errors are Driscoll-Kraay with 12 lags. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

	Δ Avg. DI Affiliation Premium$_t$					
	(1)	(2)	(3)	(4)	(5)	(6)
Δ GCF-TGCR $_t$	0.25***	0.20***	0.20***	0.19***	0.19***	0.19***
	(25.59)	(11.61)	(11.64)	(11.79)	(11.84)	(11.75)
SLR Exemption			-0.10	-0.01	-0.15	-0.19
			(-0.57)	(-0.07)	(-0.69)	(-0.78)
SLR Exemption $\times$ Δ GCF-TGCR $_t$			-0.14*	-0.16*	-0.20**	-0.21**
			(-1.72)	(-1.94)	(-2.53)	(-2.48)
Δ ln(System Liquidity)$_t$				-11.26**	-12.28**	-9.84
				(-2.21)	(-2.25)	(-1.60)
Avg. CDS$_{t-5}$				0.00	0.00	0.00
				(0.25)	(0.07)	(0.14)
Quarter-end					1.69***	1.64***
					(3.33)	(3.18)
ZLB					0.16	0.14
					(0.73)	(0.34)
Δ ln(Bill Supply)$_t$						6.25
						(0.79)
Δ ln(Coupon Supply)$_t$						35.79
						(1.26)
SOFR$_{t-5}$						-0.00
						(-0.03)
Observations	1925	1920	1920	1859	1859	1855
Adjusted R^2	0.295	0.431	0.431	0.428	0.436	0.437
Δ Dependent Variable$_{t-5}$	N	Y	Y	Y	Y	Y