Bank of England

Price efficiency in securities lending

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Evangelos Benos,[1] Gerardo Ferrara,[2] Angelo Ranaldo[3] and Vittorio Vergano[4]

Abstract

Securities lending – the temporary transfer of securities in exchange for collateral – is essential to the modern financial system, facilitating short selling, market making, and efficient liquidity management. Yet, little is known about how these contracts are priced. Using comprehensive transaction-level data, we identify the determinants of returns from lending the same security against cash or securities collateral. We develop a model in which lending returns compensate for security risk, illiquidity, and the use of scarce dealer balance-sheet capacity. We also define a return wedge between the two market segments. Consistent with the model, the wedge widens with risk, illiquidity, dealer constraints, and collateral reusability but narrows as participation across both segments increases.

Key words: Asset pricing, limits to arbitrage, intermediary asset pricing, market segmentation, collateral, securities lending, rehypothecation.

JEL classification: G12, G14, G23.

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1 Introduction

Securities lending—the temporary transfer of securities in exchange for collateral—is a cornerstone of modern financial markets. It facilitates short selling, market making, derivatives hedging, settlement, and collateral transformation, while allowing institutional investors to earn returns on long-term holdings. With global on-loan balances of approximately USD 4.3 trillion, its well-functioning is important for both market efficiency and financial stability.[1] Yet, despite the market's size and importance, we know relatively little about how securities lending contracts are priced and whether market segmentation permits price differences to persist across economically related transactions.

We study these questions by exploiting a distinctive feature of securities lending: the same security can be lent against either cash or securities collateral. The two collateral regimes differ in their pricing conventions, collateral-use rights, and balance-sheet costs, and involve diverse market participants whose transactions are largely intermediated by dealers with potentially constrained balance-sheet capacity. This combination—the same securities lent through dealers in two segmented markets—allows us to study both the pricing of securities lending contracts within each regime and the relative pricing of otherwise comparable transactions across regimes. We first identify the main determinants of lending returns, showing how the risk and illiquidity of the lent security, dealer balance-sheet constraints, and collateral reusability are reflected in contract prices. We then derive an equilibrium pricing condition linking returns across regimes and show that the resulting wedge reflects differences in how security risk and illiquidity are priced across segments, as well as dealer constraints and market segmentation. Greater cross-segment participation, in turn, narrows the wedge and improves price efficiency across the two markets.

The institutional differences between the two regimes make this comparison economically meaningful. In a cash-collateralized loan, the borrower delivers cash and receives a rebate rate, while the lender reinvests the collateral. The lender's return is therefore the spread between the cash reinvestment rate and the rebate rate. In a securities-collateralized loan, the borrower instead delivers securities as collateral and pays an explicit lending fee. These two returns from supplying the same security form the basis of our cross-regime comparison.

Dealer intermediation connects beneficial owners supplying securities with the institutions that ultimately borrow them, making dealer balance-sheet capacity a central determinant

[1] Global on-loan balances reached approximately USD 4.2–4.4 trillion in the first half of 2026. Sources: EquiLend Data & Analytics, `https://equilend.com/insight/press-releases/equilend-global-securities-lending-revenue-reaches-3-84-billion-in-q1-2026/`; S&P Global Market Intelligence, as reported in *Securities Finance Times*, `https://www.securitiesfinancetimes.com/securitieslendingnews/industryarticle.php?article_id=228802`; and the International Securities Lending Association, `https://www.islaemea.org/securities-lending-market-data/`.

of lending prices. Cash-collateralized transactions are particularly balance-sheet intensive because receiving and reinvesting cash collateral expands the dealer's balance sheet. For securities-collateralized transactions, balance-sheet treatment depends on the contractual form of the collateral. Pledged collateral remains off the dealer's balance sheet and cannot be reused. Under title transfer, ownership passes to the dealer, who may reuse the collateral to obtain funding, meet delivery obligations, or collateralize other positions. Reusability has economic value and can lower the securities-collateralized lending fee, but contracts granting reuse rights are also more balance-sheet intensive and therefore more costly when dealer balance-sheet capacity is scarce. Collateral reusability therefore creates a trade-off between its economic value and a regulatory cost that rises as dealer balance-sheet capacity becomes scarcer.

Market segmentation constitutes the other central friction. Establishing new legal agreements is costly and time-consuming, while persistent counterparty relationships and geographical conventions make switching between collateral regimes difficult. Consequently, although many securities are lent in both segments, most counterparties operate in only one. Security overlap makes relative-price comparisons possible, whereas limited counterparty mobility allows price differences to persist. Non-dealer institutions active in both segments can compare terms and redirect their activity, reducing segmentation and promoting price integration.

We formalize these mechanisms in a stylized model of a balance-sheet-constrained dealer intermediating the lending of the same security in both collateral regimes. Sourcing and holding the security expose the dealer to fundamental risk and illiquidity, whose pricing may differ across segments. The dealer also requires compensation for the shadow cost of the balance-sheet capacity used by each transaction. In the securities-collateralized segment, reusability lowers the lending fee through its economic value, while the balance-sheet intensity associated with title transfer can offset this benefit when the dealer is constrained. Cross-segment participation by non-dealers allows activity to respond to relative prices, linking the two markets and narrowing the return wedge. The model translates these mechanisms into testable predictions for contract-level returns and relative pricing across collateral regimes.

We test these predictions using transaction-level data reported under the Securities Financing Transactions Regulation (SFTR). Our sample contains approximately 16.5 million newly established USD-denominated equity lending transactions between April 2022 and December 2025, covering 21,947 securities over 869 trading days. The data provide broad coverage of an internationally active segment of the securities lending market and allow us to observe transaction prices, collateral regimes, contractual characteristics, trade sizes, and counterparties. We complement these records with equity-market measures of risk and

illiquidity and balance-sheet information for participating dealers.

Our empirical analysis proceeds in two steps. We first estimate transaction-level pricing regressions separately for the cash- and securities-collateralized segments. Lending returns increase with the risk and illiquidity of the lent security in both segments, consistent with compensation for securities that are riskier or more costly to source and trade. Dealer balance-sheet constraints also increase lending returns, indicating that intermediaries pass the cost of scarce balance-sheet capacity through to their clients. In the securities-collateralized segment, the price of reusability depends on these constraints: reusability is associated with lower lending fees when constraints are weak, but the discount diminishes as constraints tighten. Securities lending prices therefore reflect both the economic value of collateral reuse and its regulatory cost to constrained dealers.

We next examine price efficiency across the two segmented markets. For each security-day on which the same equity is lent against both cash and securities collateral, we compare the two returns and measure their absolute wedge. The wedge widens with the risk and illiquidity of the lent security, indicating that these characteristics are priced differently across collateral regimes. It also widens with dealer balance-sheet constraints and collateral reusability. By contrast, the wedge narrows when a larger share of non-dealer participants is active in both segments. Cross-segment participation therefore disciplines relative prices: institutions with access to both regimes can compare terms and redirect their transactions, mitigating segmentation and limiting price discrepancies.

The return wedge need not represent a pure arbitrage opportunity because it partly reflects economically meaningful differences in collateral value and intermediation costs. Nevertheless, its systematic relation to dealer constraints and cross-segment participation shows that limits to intermediation and market segmentation affect the alignment of prices across otherwise comparable transactions. Collateral choice therefore matters not only for counterparty protection, but also for the allocation of intermediary balance-sheet capacity and the transmission of arbitrage across market segments.

The paper makes two main contributions. First, it contributes to the securities lending literature. Existing studies have largely relied on data from a single lender or collateral segment and have focused on cash-collateralized transactions, using the rebate rate as the principal measure of loan pricing (D'Avolio, 2002; Geczy, Musto, and Reed, 2002; Kaplan, Moskowitz, and Sensoy, 2013). Chague et al. (2017) show that persistent borrower–lender relationships affect lending terms, highlighting the importance of search and relationship frictions in this market. We develop a stylized framework and use comprehensive transaction-level data to provide a unified analysis of how cash- and securities-collateralized loans are priced. By comparing transactions involving the same security, we identify how security risk and illiquidity,

dealer balance-sheet constraints, collateral-use rights, and market segmentation are reflected in lending returns and relative prices. To our knowledge, we provide the first market-based evidence that the value of reusable securities collateral is priced in equity securities lending. Importantly, its effect is state-dependent: reusability lowers lending fees when dealer constraints are weak, but this discount diminishes as balance-sheet capacity becomes scarcer. We further identify limited cross-segment participation as a friction to price efficiency and show that participation by non-dealers in both regimes improves price alignment.

Second, we contribute to the literature on limits to arbitrage in funding and collateral markets (e.g., Shleifer and Vishny, 1997; Gromb and Vayanos, 2018; Siriwardane, Sunderam, and Wallen, 2023). We derive and empirically measure a return wedge between loans of the same security against different forms of collateral. Holding the lent security and trading day fixed provides a particularly transparent setting in which to separate common security-level pricing from differences arising from collateral value, intermediation costs, and market segmentation. The wedge widens with differences in how security risk and illiquidity are priced across collateral regimes and as dealer balance-sheet constraints tighten, but narrows with greater cross-segment participation. These findings show that limits to intermediation can impede price alignment even across secured transactions involving the same underlying asset. More broadly, they demonstrate how contract design, intermediary constraints, and market structure jointly shape price efficiency in collateralized financial markets.

2 Institutional Framework

2.1 Economic Function and Participants

Securities lending facilitates the temporary transfer of securities—primarily equities and government bonds—from beneficial owners to borrowers in exchange for collateral.[2] Although securities lending is economically related to repurchase agreements, both being securities financing transactions involving the transfer of legal title and the obligation to return equivalent assets, the two markets serve different purposes. In a securities lending transaction, the borrower typically seeks to obtain a specific security, for example to short-sell, meet settlement obligations, or hedge a derivatives position. In a repo transaction, by contrast, the borrower typically seeks cash and pledges securities as collateral.

The market connects two broad groups of end-users. On the demand side, borrowers are mainly broker-dealers and hedge funds, who use securities lending to support short selling, arbitrage strategies, market making, and settlement activity. On the supply side, lenders

[2]Other actively lent securities include exchange-traded funds (ETFs) and corporate bonds.

are institutional investors with large, long-term holdings—including mutual funds, pension funds, insurance companies, sovereign wealth funds, and exchange-traded funds—that lend otherwise idle securities to generate incremental income without selling the underlying positions.

Securities lending is predominantly an over-the-counter market based on bilateral trading relationships and historically characterized by substantial opacity (D'Avolio, 2002; Geczy, Musto, and Reed, 2002; Kaplan, Moskowitz, and Sensoy, 2013; Kolasinski, Reed, and Ringgenberg, 2013).[3] Lenders and borrowers rarely transact directly. Beneficial owners typically delegate lending activity to agent lenders, often large custodian banks, which match lendable supply with borrower demand and provide operational, credit, and indemnification services. Borrowers, especially hedge funds, often access lendable securities through prime brokers. As a result, dealers, prime brokers, and custodian banks occupy a central position in the market, intermediating between dispersed lenders and borrowers. Their balance-sheet capacity and relationship networks are therefore central determinants of the cost and availability of securities lending.

2.2 Cash- versus Securities-Collateralized Lending

Securities lending transactions are typically governed by standardized legal frameworks, most prominently the Global Master Securities Lending Agreement (GMSLA), which generally operates as a title-transfer agreement.[4] Under title transfer, legal ownership of both the lent security and the collateral passes between counterparties, with an obligation to return equivalent assets at termination. This feature is important because the recipient of collateral may, subject to regulation, contractual terms, and client mandates, acquire the right to reuse the collateral in subsequent transactions.

The choice between cash and securities collateral determines both the pricing convention and the relevant source of funding. In a *cash-collateralized* loan, the borrower delivers cash to the lender. The lender invests this cash at a short-term reinvestment rate and pays part of the return back to the borrower through a *rebate rate*. The lender's net revenue is therefore the spread between the reinvestment rate and the rebate rate. In a *securities-collateralized* loan, the borrower delivers another security as collateral and pays the lender an explicit *lending fee*. The lender's economics then depend not only on the fee, but also on the costs and benefits associated with receiving, holding, managing, and potentially reusing

[3]Collateral can be managed bilaterally or by a triparty agent, adding further institutional complexity and potentially affecting the ability to reuse collateral.

[4]A 2018 variant of the GMSLA developed by ISLA offers a pledge-based alternative to the title-transfer framework.

the securities collateral.

This distinction gives rise to two economically important asymmetries. First, the cash- and securities-collateralized segments are exposed to different cost structures. Cash-collateralized lending is directly linked to short-term funding markets through the reinvestment-rate channel, whereas securities-collateralized lending depends more on collateral management, balance-sheet usage, and operational costs.

Second, securities collateral may generate reuse value. Under title transfer, the recipient of collateral may pledge or sell the received collateral in further transactions, thereby generating an additional source of income (Singh, 2011; Infante, 2019). In principle, this value should be reflected in securities-collateralized lending prices: a lender that can monetize collateral through rehypothecation may be willing to accept a lower explicit lending fee, all else equal. In practice, reuse rights are constrained by regulation, including Article 15 of SFTR, by client mandates such as UCITS restrictions or investment-policy statements, and by counterparty-specific risk limits. These constraints vary across transactions and create cross-sectional variation in the value of reuse.

2.3 Market Segmentation

The securities lending market is segmented along geographical, contractual, and relationship dimensions. Settlement practices differ across jurisdictions. The United States relies more heavily on delivery-versus-payment arrangements and has well-developed cash reinvestment programs, supporting cash-collateralized lending. Europe relies more extensively on free-of-payment settlement and has historically made greater use of securities collateral. As a result, the counterparty bases of the two segments are only partially overlapping.

Collateral choice is also shaped by the master agreements and operational arrangements already in place between counterparties. Establishing a new master agreement is costly and time-consuming, so existing contractual relationships often determine the collateral structure of subsequent trades. This contractual stickiness implies that cash- and securities-collateralized loans are conducted by partially distinct sets of counterparty pairs, limiting the extent to which activity can quickly migrate across segments in response to pricing differences.

Finally, securities lending is relationship-driven. Pricing reflects counterparty importance, access to lendable inventory, borrower demand, and the availability of alternative lenders. Prime brokers and large custodians with broad networks may therefore play a central role in linking otherwise segmented pools of supply and demand. Trading remains largely bilateral, reinforcing the importance of established relationships in determining who lends

to whom, on what terms, and against which collateral type.

These features imply that the cash- and securities-collateralized segments are not seamlessly integrated. Even when the same security is lent in both segments on the same day, the relevant counterparties, settlement mechanics, contractual arrangements, and collateral-use rights may differ. This segmentation is central to the return wedge studied below.

2.4 Regulation and Collateral Reusability

Prudential regulation also shapes the economics of securities lending. Under the Basel III leverage-ratio framework (Basel Committee on Banking Supervision, 2013), securities financing transactions enter the bank exposure measure and can therefore consume balance-sheet capacity even when they are secured. This treatment matters because dealers and bank-affiliated intermediaries play a central role in the market.

The regulatory burden differs across collateral types, and, within securities collateral, across contractual structures. Cash-collateralized transactions expand the dealer's balance sheet through the receipt and reinvestment of cash collateral. Securities collateral, in turn, can be structured either as a title transfer or as a pledge. Under a title-transfer arrangement, ownership of the collateral passes to the dealer, generally giving it the right to reuse the securities. Such arrangements, particularly when the collateral is subsequently reused or rehypothecated, are more balance-sheet intensive than pledges, under which the dealer holds only a security interest and reuse is generally unavailable. As a result, otherwise similar securities lending transactions can impose materially different balance-sheet costs depending on both the collateral type and, for securities collateral, the contractual structure under which it is held. This asymmetry provides the institutional basis for allowing cash- and securities-collateralized loans (and, within the latter, title-transfer and pledge structures) to carry different balance-sheet loadings in the model of Section 4, and motivates the hypothesis that intermediary balance-sheet constraints affect the relative pricing of the two collateral regimes.

3 Data

3.1 Data Characteristics

We use transaction-level securities lending data reported under the Securities Financing Transactions Regulation (SFTR). As discussed in Section 2, SFTR requires counterparties to report contract-level details of securities financing transactions to registered trade repositories. For each transaction, we observe the execution date and time, the rebate rate or

lending fee, the trade size, the collateral type, the master agreement, and the identities of the counterparties. We can therefore distinguish between cash-collateralized and securities-collateralized trades. For securities-collateralized trades, we observe that securities collateral is used, but not the specific security pledged as collateral.

The data include all newly established trades. Our sample consists of USD-denominated equity lending transactions between April 1, 2022 and December 31, 2025. It includes approximately 16.5 million trades, covering 21,947 distinct securities over 869 trading days. The UK SFTR data capture transactions with at least one UK-based counterparty. Hence, the sample does not cover the entire global USD equity securities lending market, but it provides broad transaction-level coverage of an important internationally active segment.

The remainder of this section describes the structure and evolution of the USD equity securities lending market across two collateral regimes. Cash-collateralized loans are transactions in which the borrower posts cash and the lender earns the spread between the reinvestment rate and the rebate rate. Securities-collateralized loans are transactions in which the borrower posts securities collateral and pays an explicit lending fee. These two regimes differ in their contractual mechanics, pricing conventions, counterparty composition, and exposure to funding and balance-sheet constraints.

3.2 Market Size

As of December 2025, our sample captures around $460 billion in outstanding positions, with over-the-counter trades comprising roughly 92% of the total.[5]

Figure 1 plots daily aggregate notional volumes for new trades across the two collateral regimes. Total market volume increases substantially over the sample period, from approximately $25–50 billion per day in mid 2022 to around $50–75 billion per day by late 2025. Securities-collateralized transactions account for roughly two-thirds of total sample volume and represent the larger segment throughout most of the period. Both collateral regimes contribute to the expansion, although the securities-collateralized segment grows more strongly and accounts for a larger share of activity by the end of the sample.

[5]Relative to aggregate market metrics from ISLA and EquiLend, our dataset covers about 11% of total activity, given our scope is limited exclusively to USD equities.

Figure 1: **Aggregate lending volume by collateral regime.** This figure plots daily aggregate notional lending volumes in the USD equity securities lending market, separately for cash- and securities-collateralized transactions. Volumes are reported in USD billions. The sample period is April 1, 2022 to December 31, 2025.

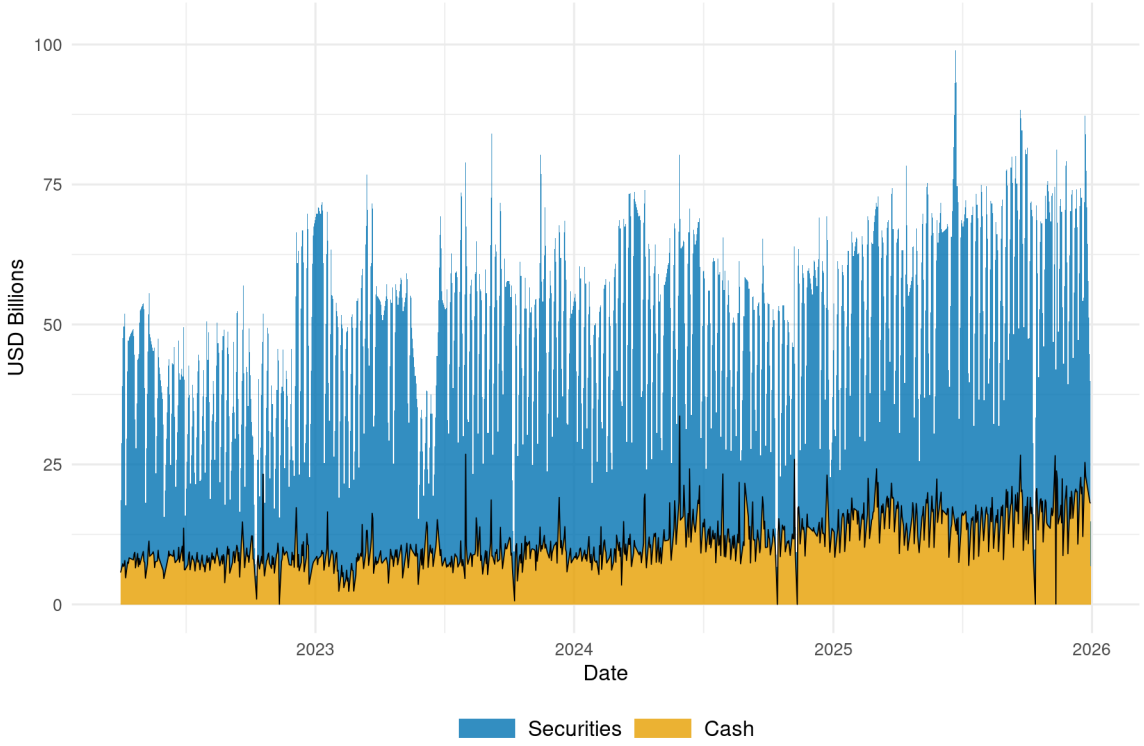
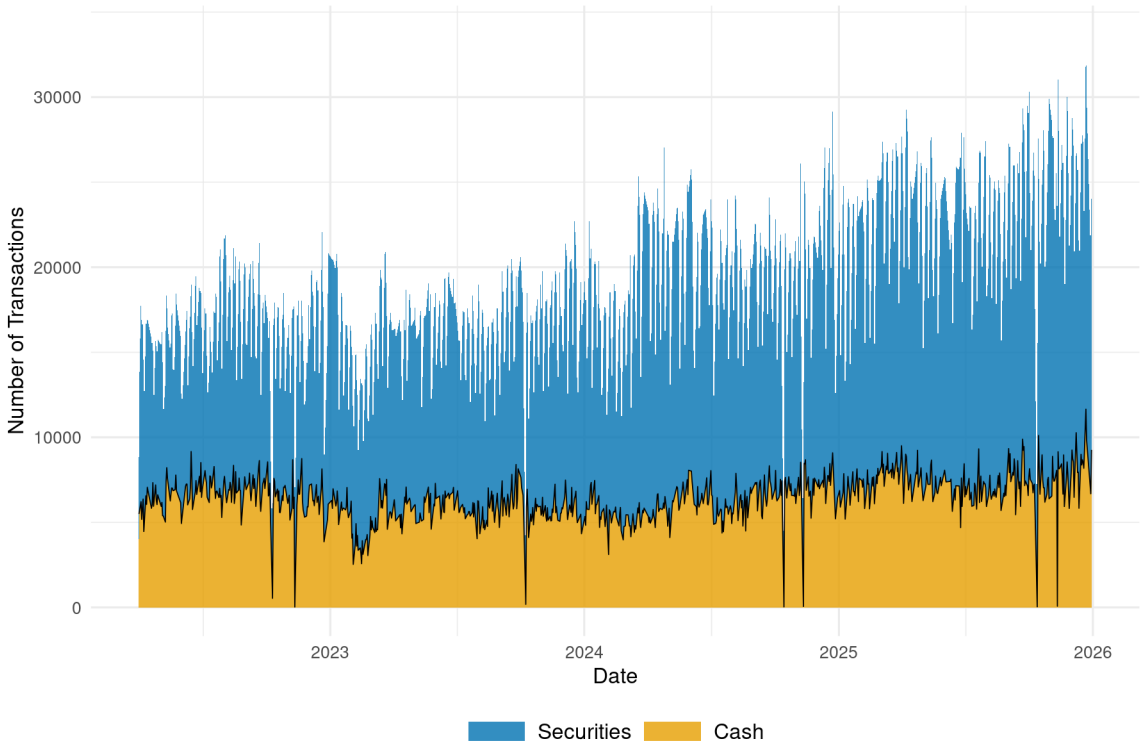


Figure 2 reports the number of daily transactions. Daily trade counts increase from roughly 10,000–20,000 in 2022 to values regularly exceeding 20,000–30,000 by late 2025. The growth in activity is therefore not driven solely by larger average trade sizes, but also by an expansion in the number of contracts. As with notional volumes, the securities-collateralized segment exhibits stronger growth in trade counts over the latter part of the sample.

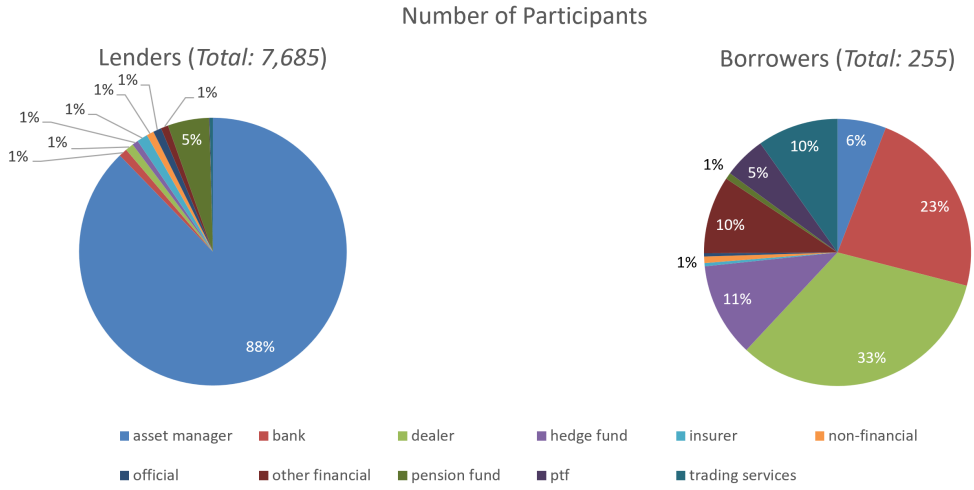
Figure 2: **Number of trades by collateral regime.** This figure plots the daily number of securities lending transactions in the USD equity securities lending market, separately for cash- and securities-collateralized transactions. The sample period is April 1, 2022 to December 31, 2025.



3.3 Counterparty Composition

Figure 3 summarizes the sectoral composition of market participants over the full sample period. The lending side, composed of 7,685 market participants, is highly concentrated among asset managers, which account for 88% of unique lenders. Pension funds are the second-largest lender group, with 5%, while all other participants account for 1% or less each. The lending side is therefore dominated by long-term institutional investors that lend securities to generate incremental income on portfolio holdings.

Figure 3: **Number of participants by sector.**



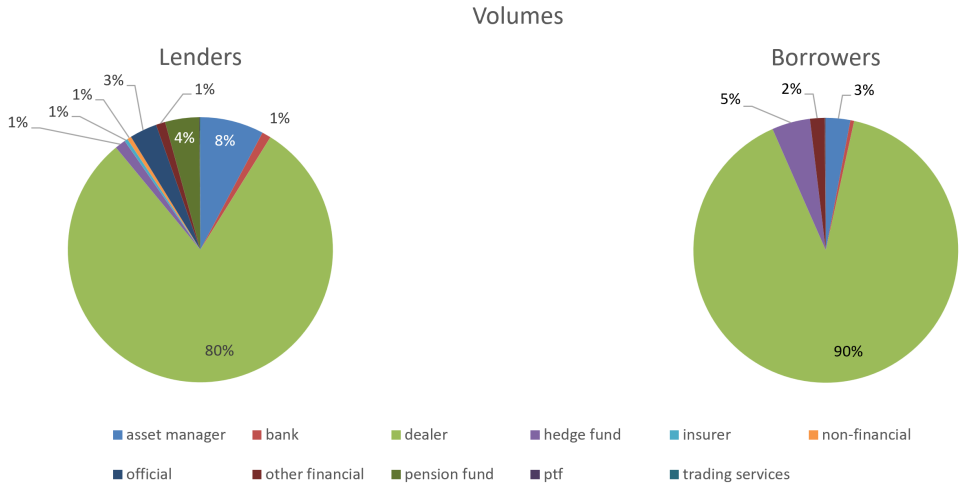
The borrowing side is more heterogeneous and more intermediary-intensive. Among the 255 unique borrowers active over the sample period, dealers [6] account for 33%, banks for 23%, hedge funds for 11%, trading services firms and other financial intermediaries for 10%, asset managers 6% and principal trading firms (PTF) at 5%, while all other sectors play only a marginal role at 1% or less. This asymmetry in participation between an asset-manager-dominated lending side and an intermediary-intensive borrowing side is a defining feature of the market.

Figure 4 shows sectoral participation measured as each sector's overall contribution to total traded volume.[7] Dealers account for the largest shares of market volume throughout the sample, both on the lending and on the borrowing side, suggesting the predominant role of intermediation in this market.

[6] We define dealers based on the Federal Reserve Bank of New York's Primary Dealers list, which identifies only the U.S.-based counterparties. For our purposes, we extend this definition to include the overseas subsidiaries of these institutions as well.

[7] The volume of each transaction is split equally so that it is attributed to both counterparties.

Figure 4: **Aggregate volume by sector.**



3.4 Segmentation

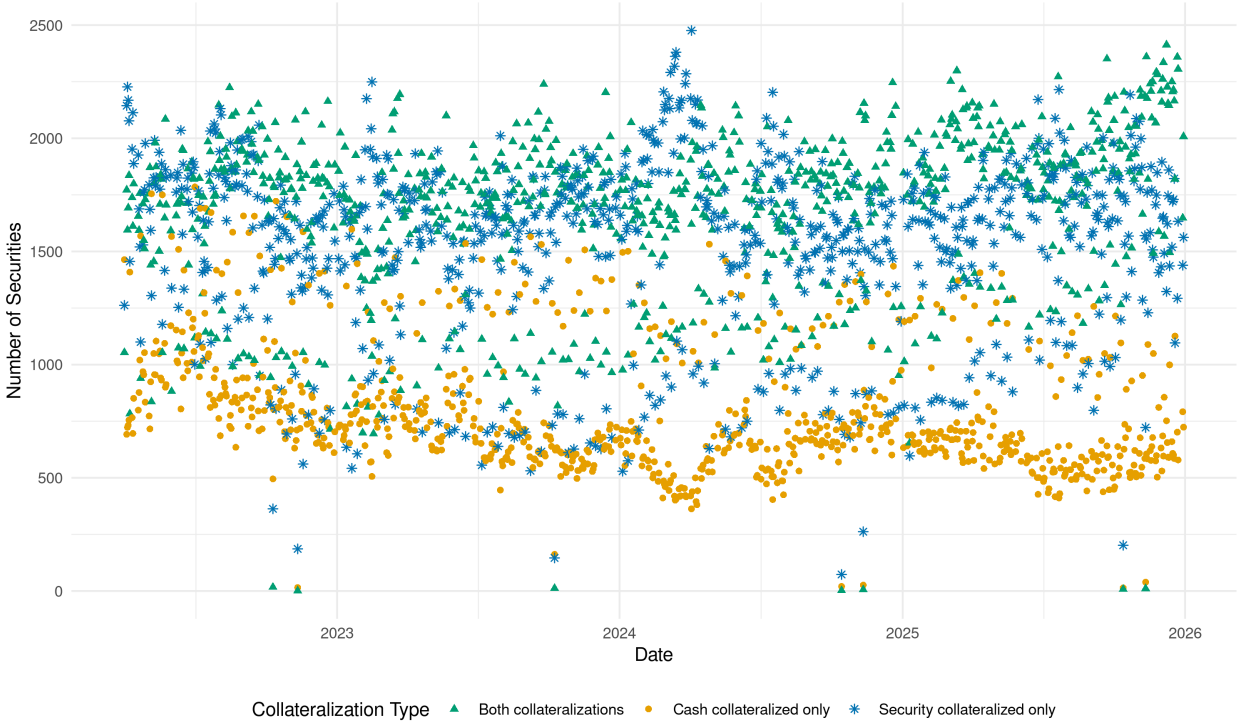
Figures 5 and 6 describe the overlap between cash- and securities-collateralized lending along two dimensions: the securities being lent and the counterparties active in the market. In each figure, observations are classified into three mutually exclusive groups: activity only in the securities-collateralized segment, activity only in the cash-collateralized segment, and activity in both segments on the same day.

This decomposition is useful for two reasons. First, overlap at the security level identifies the ISIN-day observations for which the pricing of cash- and securities-collateralized loans can be compared on the same underlying security. These observations form the basis for constructing the return wedge introduced in Section 4. Second, overlap at the counterparty level provides direct evidence on the extent to which market participants operate across both collateral regimes, and therefore on the degree of segmentation between the two segments.

Security-level breadth. Figure 5 shows substantial overlap between securities traded in both segments and those traded in the security collateral segment only. The number of ISINs lent in both segments on the same day ranges between roughly 1,000 and 2,500 for most of the sample. This intersection set is the largest of the three categories during much of the sample period, indicating that many securities are actively lent against both cash and securities collateral. In fact, on average, around 42% of the cross-section of securities is traded in both markets. This overlap is central to our empirical design, because it allows us to compare cash- and securities-collateralized lending prices for the same underlying security on the same day and to construct the return wedge for a large and growing set of ISIN-day

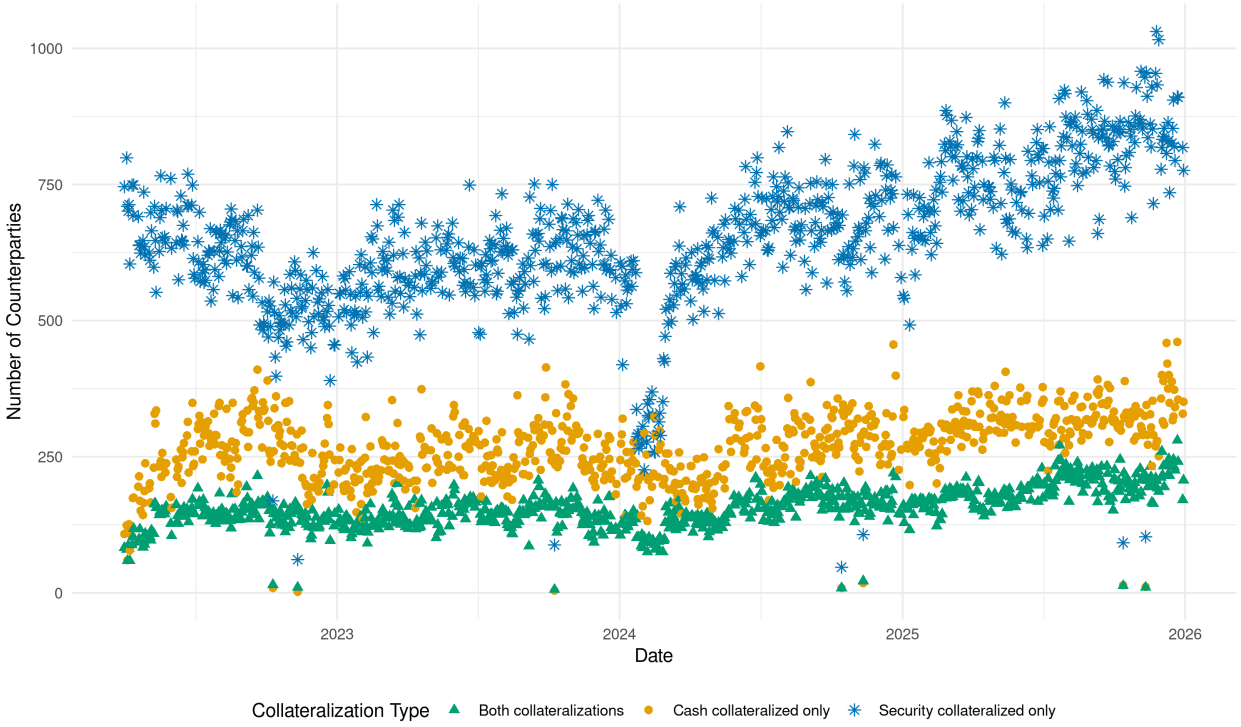
observations.

Figure 5: **Securities by collateral-regime participation.** This figure plots the daily number of distinct ISINs lent in the USD equity securities lending market under three mutually exclusive categories: securities-collateralized only, cash-collateralized only, and both collateral regimes on the same day. The sample period is April 1, 2022 to December 31, 2025.



Counterparty-level breadth. Figure 6 applies the same decomposition to the counterparty dimension, counting the number of distinct entities active in each collateral-regime configuration on a given day. The pattern differs sharply from the security-level evidence. The securities-only group is the largest throughout the sample, increasing from roughly 600 counterparties in 2022 to around 1,000 by 2025. The cash-only group is smaller, ranging between approximately 250 and 500 counterparties. By contrast, the intersection group—counterparties active in both regimes on the same day—is the smallest of the three, typically ranging between 100 and 250 entities.

Figure 6: **Counterparties by collateral-regime participation.** This figure plots the daily number of distinct counterparties active in the USD equity securities lending market under three mutually exclusive categories: securities-collateralized only, cash-collateralized only, and both collateral regimes on the same day. The sample period is April 1, 2022 to December 31, 2025.



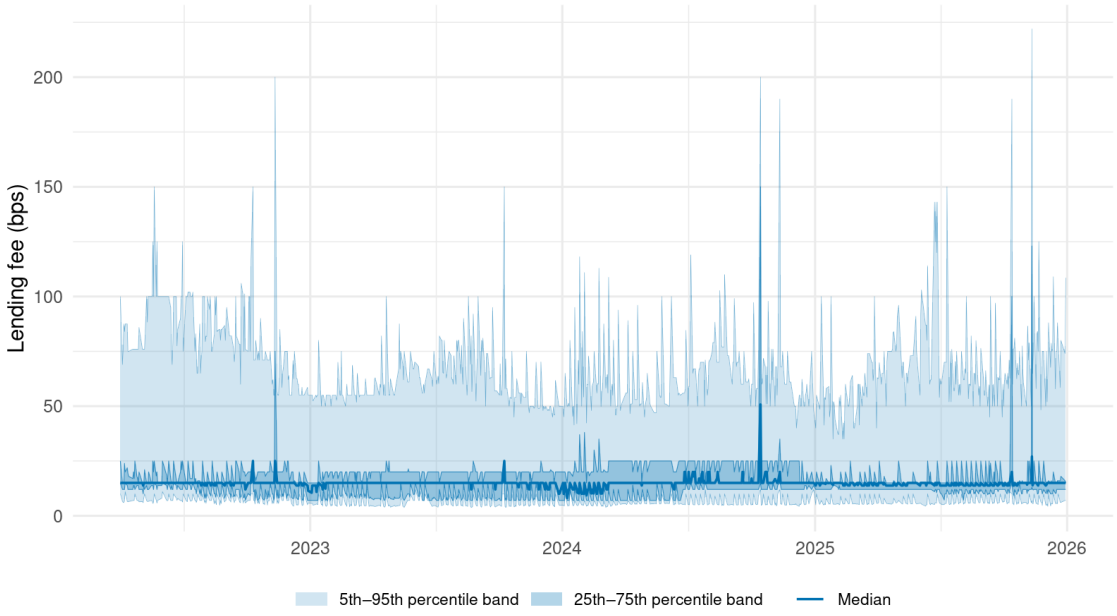
The contrast between the security-level and counterparty-level evidence is economically informative. At the security level, many equities are lent in both collateral regimes, which makes relative pricing comparisons feasible. At the counterparty level, however, participation is much more segmented: most active entities on a given day operate in only one collateral segment. Taken together, these patterns are consistent with a market in which the same securities can be available across both collateral regimes, while many counterparties remain specialized in one regime.

This segmentation provides the empirical motivation for the end-user mobility parameter θ in Section 4. When few non-dealer counterparties are active in both regimes, their ability to reallocate activity across cash- and securities-collateralized lending is limited. As a result, relative pricing differences across collateral regimes may persist even when the same underlying security is lent in both segments on the same day.

Turning to prices, Figure 7 reports the daily cross-sectional distribution of lending fees for securities-collateralized trades. The median lending fee is highly persistent and remains close to 15 basis points throughout the sample. At the same time, the distribution is strongly right-skewed. The 75th percentile rarely exceeds 25 basis points, while the 95th percentile

typically fluctuates between 50 and 100 basis points, with occasional excursions outside this range. Thus, most of the distribution is concentrated at low fee levels, whereas high fees are confined to the upper tail. This pattern is consistent with a securities-collateralized segment dominated by transactions involving readily available securities, alongside a smaller set of securities that are harder to borrow and for which borrowing demand is stronger relative to lendable supply. The stability of the median fee and the limited variation in the interquartile range indicate that aggregate pricing conditions remain largely unchanged over time. Instead, most of the variation in the cross-section of lending fees comes from the upper tail of the distribution, where temporary shortages of lendable supply or surges in borrowing demand can generate substantially higher fees. These findings point to a market in which pricing heterogeneity is largely cross-sectional, reflecting security-specific scarcity rather than broad shifts in market-wide conditions.

Figure 7: **Distribution of lending fees in securities-collateralized trades.** This figure plots the daily median, the 25th–75th percentile band, and the 5th–95th percentile band of lending fees in the USD equity securities lending market for securities-collateralized trades. The sample period is April 1, 2022 to December 31, 2025. Lending fees are measured in basis points.



For cash-collateralized trades, Figure 8 plots the daily distribution of rebate rates together with the Secured Overnight Financing Rate (SOFR), the benchmark rate for overnight secured borrowing of US dollars. The median rebate rate closely tracks the SOFR over the sample period. This close co-movement reflects the fact that rebate rates are naturally anchored to short-term money-market rates, in cash-collateralized securities lending, as rebate rates can be equivalently thought as the cost for borrowing US dollars using as collateral

the lent security. Rebate rates remain below the benchmark by 11 basis points on average as they require compensation for the loan of the security. The distribution is nevertheless visibly left-skewed, indicating that a subset of trades is priced at rebate rates substantially below the median. When a security is more difficult to borrow, borrowers accept a lower rebate rate, thereby increasing the lender's net return on the cash collateral received. Spikes above the median, or even above the SOFR, represent transactions in which funding motives prevail over the lent security: the lender may accept to pay substantially higher rebate rates when they have limited access to funding markets for dollars.

Figure 8: **Distribution of rebate rates in cash-collateralized trades.** This figure plots the daily median, the 25th–75th percentile band, and the 5th–95th percentile band of rebate rates in the USD equity securities lending market for cash-collateralized trades. The dotted-dashed black line reports the Secured Overnight Financing Rate (SOFR). The sample period is April 1, 2022 to December 31, 2025. Rebate rates are measured in percentage points. Vertical dashed lines indicate weeks of FOMC meetings in which the policy rate changed.

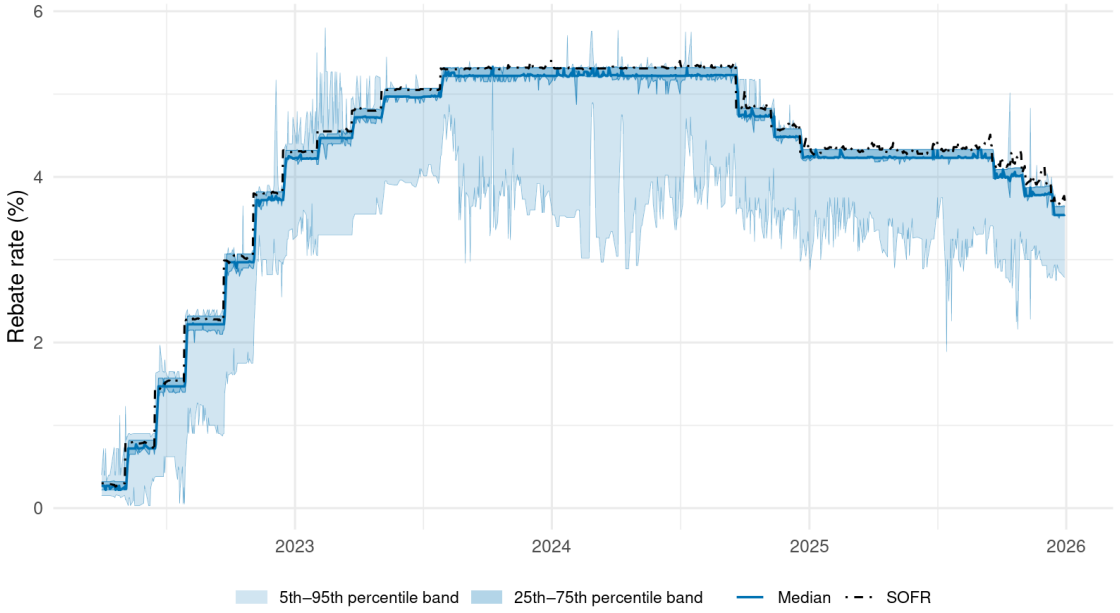
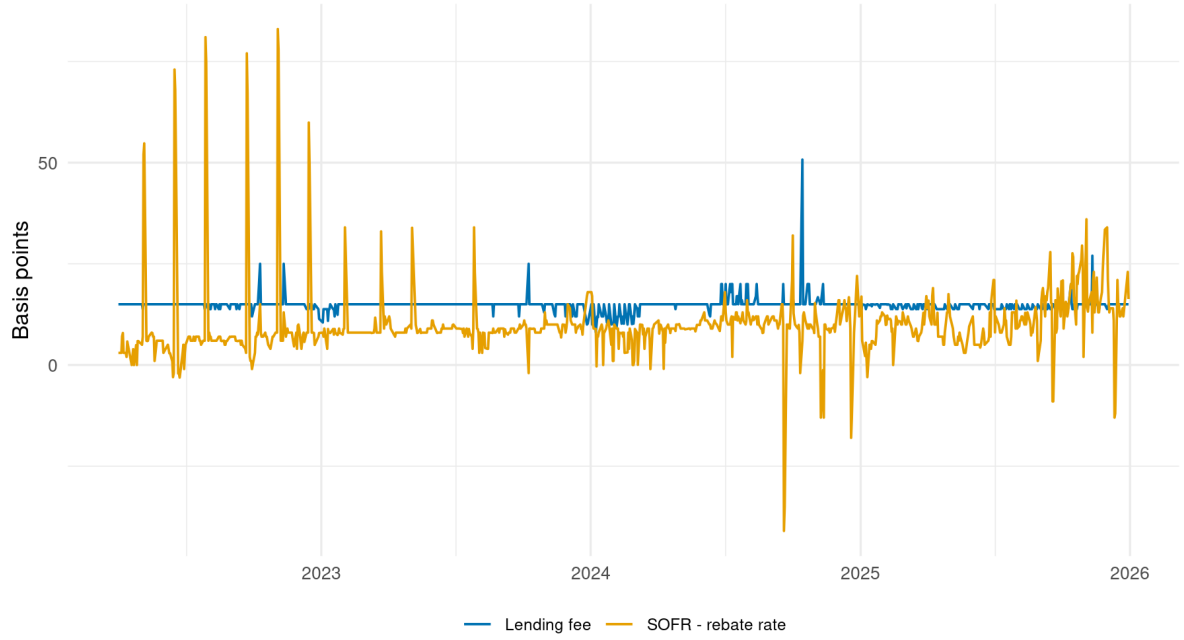


Figure 9 compares the median lending fee in the securities-collateralized segment with the median net return to lenders in the cash-collateralized segment, measured as the difference between the SOFR and the median rebate rate. This spread captures the return a lender would earn by reinvesting the cash collateral at the overnight benchmark rate and paying the rebate rate to the borrower. It is therefore directly comparable to the lending fee, which is the lender's explicit return in securities-collateralized trades.

The median net return on cash-collateralized trades is relatively stable over time, apart from sharp but short-lived spikes around FOMC meeting weeks in which the policy rate

changed. These spikes are consistent with a temporary adjustment lag between changes in the policy benchmark and the resetting of rebate rates. Outside these episodes, the median net cash-collateral return lies persistently below the median lending fee by around 4 to 5 basis points. The two collateral segments therefore display on aggregate similar stability, but different average lender returns.

Figure 9: **Median lender returns across collateral segments.** This figure compares the daily median lending fee in securities-collateralized trades with the difference between the Secured Overnight Financing Rate (SOFR) and the daily median rebate rate in cash-collateralized trades. The sample period is April 1, 2022 to December 31, 2025. Both series are measured in basis points. Vertical dashed lines indicate weeks of FOMC meetings in which the policy rate changed.



Taken together, the statistics presented in this section characterize a large and growing securities lending market segment, dominated by asset managers on the lending side and by dealers, banks, and other intermediaries on the borrowing side. The data also reveal an important contrast: cash- and securities-collateralized lending frequently coexist at the security level, while participation remains segmented at the counterparty level.

The comparison between collateral segments further reveals a systematic difference in pricing across collateral segments, with securities-collateralized trades generating higher returns than comparable cash-collateralized trades over most of the sample. The combination of security-level overlap, counterparty-level segmentation, with persistent differences in lender returns provides the empirical foundation for the analysis that follows.

4 Theoretical Framework

We study a deliberately stylized model of a balance-sheet-constrained dealer intermediating both collateral segments of the securities lending market. Because the dealer's balance-sheet constraint links the two segments, the model explains both segment-level rates — the cash-collateralized return and the securities-collateralized fee — and the wedge between them.

4.1 Setup

Consider the lending of a single security on a single day, and suppress security and date subscripts. The market has two collateral segments, $c \in \{\text{cash}, \text{sec}\}$. Revenues are:

$$\pi_{\text{cash}} = r^{\text{inv}} - r^{\text{reb}}, \qquad \pi_{\text{sec}} = f^{\text{sec}}. \tag{1}$$

Risk and illiquidity: Intermediating either contract requires the dealer to source and hold a position in the underlying security, at an inventory cost split into two additively separable pieces,

$$\psi_\sigma(\sigma) = \psi_1 \sigma, \qquad \psi_s(s) = \psi_2 s, \qquad \psi_1, \psi_2 \geq 0, \tag{2}$$

where σ represents the fundamental risk of the lent security and s its illiquidity. Both components load with segment-specific coefficients, γ_c^σ and γ_c^s: exposure to the security's fundamental risk, like the cost of sourcing it, can differ across segments, since the two contracts typically differ in maturity, in the identity of the marginal counterparty, and in how easily the dealer can hedge or unwind the position. We proxy σ with realized volatility and s with the bid-ask spread.

Segment costs and reuse: Segment costs are:

$$\phi_{\text{cash}} = \gamma^\sigma_{\text{cash}}\, \psi_\sigma(\sigma) + \gamma^s_{\text{cash}}\, \psi_s(s), \qquad \gamma^\sigma_{\text{cash}}, \gamma^s_{\text{cash}} \geq 0, \tag{3}$$

$$\phi_{\text{sec}} = \gamma^\sigma_{\text{sec}}\, \psi_\sigma(\sigma) + \gamma^s_{\text{sec}}\, \psi_s(s) - r^{\text{reuse}} \cdot \mathrm{I}_{[\text{reuse}]}, \qquad \gamma^\sigma_{\text{sec}}, \gamma^s_{\text{sec}} \geq 0, \tag{4}$$

where $r^{\text{reuse}} \geq 0$ is the benefit the dealer obtains from re-pledging securities collateral, conditional on contractual permission and $\mathrm{I}_{[\text{reuse}]}$ is the indicator function, taking value 1 when reuse is allowed in the securities-collateralized segment and 0 otherwise. Granting reuse rights gives the dealer the *optionality* to re-pledge the security elsewhere; the lender is compensated for surrendering this optionality, and a competitive dealer passes part of its value back by lowering ϕ_{sec} – and, as shown below, the securities-collateral fee itself.

Reuse and balance-sheet cost. Intermediaries face a quadratic balance-sheet cost:

$$C(q_{\text{cash}}, q_{\text{sec}}) = \frac{1}{2}\lambda \left(v_{\text{cash}} q_{\text{cash}} + v_{\text{sec}} q_{\text{sec}}\right)^2 . \tag{5}$$

where $\lambda \geq 0$ is the marginal shadow cost of intermediary balance-sheet capacity (He and Krishnamurthy, 2013; Siriwardane, Sunderam, and Wallen, 2023), and $v_c > 0$ is the segment-specific balance-sheet weight. Defining $W \equiv v_{\text{cash}} q_{\text{cash}} + v_{\text{sec}} q_{\text{sec}}$ as total weighted balance-sheet usage, the cost can be written as $C(q_{\text{cash}}, q_{\text{sec}}) = \frac{1}{2}\lambda W^2$. We allow contracts granting reuse rights to have a higher balance-sheet intensity in the securities-collateralized segment:

$$v_{\text{sec}} = v_{\text{sec}}^0 + \Delta v_{\text{reuse}} \cdot \mathrm{I}_{[\text{reuse}]}, \qquad \Delta v_{\text{reuse}} \geq 0. \tag{6}$$

Here, Δv_{reuse} captures the incremental balance-sheet intensity associated with contracts permitting collateral reuse.

Participation: Let $\theta \in [0, 1]$ denote the share of non-dealer counterparties active in both collateral segments on a given ISIN-day — the participation ratio. Participation governs how easily end-users can reallocate activity across segments in response to relative pricing: with $\bar{D}_c$ baseline demand, $\kappa > 0$, and $-c$ denoting the segment other than c,

$$q_c = \bar{D}_c - \theta\kappa \left(\pi_c - \pi_{-c}\right). \tag{7}$$

When $\theta = 1$, end-users freely reallocate across segments in response to price differentials; when $\theta = 0$, segments are perfectly segmented and demand is exogenously fixed at $\bar{D}_c$. This operates on the gap between segments, the source of the wedge compression derived below.

The Dealer's Problem: The representative dealer takes segment-level returns as given and chooses quantities supplied in each segment. Equilibrium returns adjust so that dealer supply satisfies the end-user demand schedules in equation (7). The dealer solves:

$$\max_{q_{\text{cash}},\, q_{\text{sec}} \geq 0} \; \sum_c q_c(\pi_c - \phi_c) - \tfrac{1}{2}\lambda \left(v_{\text{cash}} q_{\text{cash}} + v_{\text{sec}} q_{\text{sec}}\right)^2 .$$

Equilibrium pricing. The first-order condition in segment c is:

$$\pi_c = \phi_c + \lambda v_c W. \tag{8}$$

Equilibrium prices and quantities jointly satisfy the dealer's first-order conditions and the end-user demand schedules in equation (7).

4.2 Segment-Level Pricing

The segment-specific first order conditions give rise to analytical expressions for segment-specific prices in the securities lending market. In particular, the net cash return[8] for the cash-collateralized segment is given by:

$$\boxed{r^{\text{inv}} - r^{\text{reb}} = \gamma^{\sigma}_{\text{cash}}\,\psi_{\sigma}(\sigma) + \gamma^{s}_{\text{cash}}\,\psi_{s}(s) + \lambda v_{\text{cash}} W} \tag{9}$$

whereas the lending fee for the securities-collateralized segment is given by:

$$\boxed{f^{\text{sec}} = \gamma^{\sigma}_{\text{sec}}\,\psi_{\sigma}(\sigma) + \gamma^{s}_{\text{sec}}\,\psi_{s}(s) - r^{\text{reuse}}\mathrm{I}_{[\text{reuse}]} + \lambda\Big(v^{0}_{\text{sec}} + \Delta v_{\text{reuse}}\mathrm{I}_{[\text{reuse}]}\Big)W} \tag{10}$$

Both prices load on fundamental risk and illiquidity through segment-specific coefficients, and share the same balance-sheet functional form $\lambda v_c W$; they differ in how strongly each cost component is priced in each segment, and in the reuse term specific to the securities-collateral segment.

Empirical predictions: segment-level rates. Equations (9)–(10) give four directly testable predictions on the two segment rates:

(P1) **Risk.** Both the cash-collateral return $r^{\text{inv}} - r^{\text{reb}}$ and the securities-collateral fee f^{sec} increase in fundamental risk σ, though the loadings $\gamma^{\sigma}_{\text{cash}}$ and $\gamma^{\sigma}_{\text{sec}}$ need not coincide. As with illiquidity (P2), the model does not take a stance on which segment prices risk more heavily – differences in typical maturity, counterparty composition, or hedging capacity across segments could load either way – and we leave the relative sign of $\gamma^{\sigma}_{\text{cash}} - \gamma^{\sigma}_{\text{sec}}$ to the data.

(P2) **Illiquidity.** Both rates increase in illiquidity s, but the loadings γ^{s}_{cash} and γ^{s}_{sec} need not coincide. Sourcing costs are higher when the security is harder to locate, but the channel differs by segment – continuous reinvestment markets for cash collateral versus bilateral search for securities collateral – so the two segments can load on illiquidity asymmetrically.

(P3) **Balance-sheet constraints.** Both rates increase in the shadow cost of balance-sheet space, $\lambda v_c W$. The economic intuition is that when the dealer's book W is large relative to capacity (high λ), or the segment itself is balance-sheet-intensive (high v_c), the dealer

[8]For the sake of simplicity, rebate and investment rates are reported in basis points throughout this section to make them directly comparable to lending fees. Market participants conventionally quote them in percentage points.

must be compensated for the leverage-ratio space the trade consumes, in the same spirit as the Basel III leverage ratio.

(P4) **Reuse.** Conditional on the lending contract granting the dealer reuse rights over the security – an effective title transfer – the securities-collateral fee moves by

$$\Delta f^{\text{sec}}\Big|_{\text{reuse}} = -\, r^{\text{reuse}} + \lambda\, \Delta v_{\text{reuse}}\, W,$$

negative – a *reuse discount* – whenever $\lambda < \lambda^* \equiv r^{\text{reuse}}/(\Delta v_{\text{reuse}} W)$, and positive otherwise. Reuse is valuable to the dealer, who can monetize the re-pledged collateral elsewhere, and a competitive dealer passes part of that value back to the lender as a lower fee. But title transfer and subsequent reuse also put the security on the dealer's own balance sheet, consuming leverage-ratio capacity; once the dealer is sufficiently constrained ($\lambda > \lambda^*$), this shadow regulatory cost dominates and the discount flips into a premium. The reuse discount is therefore a prediction specific to *unconstrained* dealers.

4.3 The Return Wedge

To study price efficiency in the securities lending market and assess the effects of the various frictions identified so far, we define the *return wedge* as the difference in trading revenues between the cash and securities-collateralized segments:

$$\pi_{\text{cash}} - \pi_{\text{sec}} = r^{\text{inv}} - r^{\text{reb}} - f^{\text{sec}}. \tag{11}$$

The wedge consists of the observable price difference across segments. Conceptually, this difference can either be the result of the value associated with collateral reuse, or of different loadings on fundamental risk and illiquidity across segments, or of intermediation costs and frictions inhibiting arbitrage, or a combination of the above. We can derive an analytical expression for the wedge, using the model elements introduced so far. Define $\Delta\gamma^\sigma \equiv \gamma^\sigma_{\text{cash}} - \gamma^\sigma_{\text{sec}}$, $\Delta\gamma^s \equiv \gamma^s_{\text{cash}} - \gamma^s_{\text{sec}}$, and $\Delta v(\text{reuse}) \equiv v_{\text{cash}} - v_{\text{sec}} = \Delta v^0 - \Delta v_{\text{reuse}} \mathrm{I}_{[\text{reuse}]}$. Subtracting (10) from (9) — since risk now loads segment-specifically, its term no longer cancels and instead enters symmetrically with illiquidity —

$$\pi_{\text{cash}} - \pi_{\text{sec}} = \Delta\gamma^\sigma\, \psi_\sigma(\sigma) + \Delta\gamma^s\, \psi_s(s) + r^{\text{reuse}} + \lambda \Delta v(\text{reuse}) \cdot W \equiv x. \tag{12}$$

Substituting the demand schedule (7) into the definition of W gives $W = \bar{W} - \theta\kappa\Delta v(\text{reuse})\cdot x$, where $\bar{W} \equiv v_{\text{cash}}\bar{D}_{\text{cash}} + v_{\text{sec}}\bar{D}_{\text{sec}}$, exactly as before: the substitution is algebraic in x and

does not depend on what x is composed of. Substituting back into (12) and solving for the signed wedge $\tilde{\delta} \equiv \pi_{\text{cash}} - \pi_{\text{sec}} = (r^{\text{inv}} - r^{\text{reb}}) - f^{\text{sec}}$ gives:

$$\boxed{\tilde{\delta} = \frac{\Delta\gamma^{\sigma}\,\psi_{\sigma}(\sigma) + \Delta\gamma^{s}\,\psi_{s}(s) + r^{\text{reuse}} + \lambda\Delta v(\text{reuse})\cdot\bar{W}}{1 + \theta\kappa\lambda\,\Delta v(\text{reuse})^{2}}} \tag{13}$$

The interpretation of the wedge is sharpest in two limiting cases. If the market is frictionless across collateral regimes (i.e. $\gamma^{\sigma} = \gamma^{s} = \lambda = 0$), the signed wedge reflects the value of collateral reuse ($\tilde{\delta} = r^{\text{reuse}}$). Conversely, if collateral reuse is precluded, the wedge reflects the combined effect of funding, balance-sheet, and segmentation frictions. In particular,

Risk and illiquidity. Risk and illiquidity now enter the wedge symmetrically, through $\Delta\gamma^{\sigma}$ and $\Delta\gamma^{s}$ respectively: each survives only to the extent the two segments' loadings genuinely differ, and vanishes exactly when $\gamma^{\sigma}_{\text{cash}} = \gamma^{\sigma}_{\text{sec}}$ (or $\gamma^{s}_{\text{cash}} = \gamma^{s}_{\text{sec}}$). Since the model does not sign either differential, risk – like illiquidity – can widen or narrow the wedge depending on which segment prices it more heavily; this is a question for the data, not the theory.

Participation. Participation enters the wedge only through the denominator — not through either segment's price level — where it unambiguously compresses $\tilde{\delta}$ as θ rises, since the denominator increases in θ whenever $\Delta v(\text{reuse}) \neq 0$. Because (13) is nonlinear in θ, its effect is better captured as a ratio than by a linear term.

Balance sheet. The block $\lambda\Delta v(\text{reuse})$ captures how much more (or less) balance-sheet space cash-collateralized trades consume relative to securities-collateralized ones. A cash loan mechanically sits on the dealer's balance sheet as borrowed and re-lent funds, whereas a securities-collateralized loan, when structured as a pledge rather than a title transfer, need not: the security stays off the dealer's book. This is precisely the case $\Delta v(\text{reuse}) > 0$, under which a tighter constraint (higher λ) raises the wedge's numerator: the dealer charges relatively more for the segment that consumes more of its scarce leverage-ratio capacity.

Reuse and balance sheet. Comparing the reuse and no-reuse cases in (13), holding $\psi_{\sigma}(\sigma)$, $\Delta\gamma^{\sigma}$, $\psi_{s}(s)$, $\Delta\gamma^{s}$, and $\bar{W}$ fixed at their no-reuse baseline values,[9] and assuming

[9] Strictly, $\bar{W}$ itself depends on reuse status through v_{sec} in eq. (6), so flipping the reuse indicator shifts $\bar{W}$ by $\Delta v_{\text{reuse}}\bar{D}_{\text{sec}}$. We treat this second-order effect as fixed for the purpose of isolating the direct numerator effect of reuse; it does not affect the sign comparison below, which is driven by the two *leading*-order terms.

collateral reuse is possible (i.e. $\mathrm{I}_{[\text{reuse}]} = 1$), isolates the net effect of reuse on the numerator:

$$r^{\text{reuse}} - \lambda \Delta v_{\text{reuse}} \bar{W}. \tag{14}$$

The first term widens the wedge directly through the reuse value; the second narrows it through the higher balance-sheet intensity that title transfer and subsequent reuse induce in the securities-collateralized segment, so the net sign depends on their relative size.

In the general case, both reuse value and market frictions may contribute to the observed return wedge.

Empirical predictions: the wedge. Equation (13) gives five corresponding predictions at the level of the cash-versus-securities wedge $\tilde{\delta}$.

(P5) **Risk.** Risk moves the wedge only through the differential loading $\Delta\gamma^{\sigma}\psi_{\sigma}(\sigma)$: it widens the wedge if $\Delta\gamma^{\sigma} > 0$ (fundamental risk is priced more heavily on the cash-collateral return), narrows it if $\Delta\gamma^{\sigma} < 0$, and leaves it unchanged if the two segments are equally exposed ($\Delta\gamma^{\sigma} = 0$). Only the asymmetric part of risk's cost survives differencing; we take no stand on its sign and let the data speak.

(P6) **Illiquidity.** s moves the wedge only through the differential loading $\Delta\gamma^{s}\psi_{s}(s)$: it widens the wedge if $\Delta\gamma^{s} > 0$, narrows it if $\Delta\gamma^{s} < 0$, and is irrelevant if the two segments' sourcing frictions coincide ($\Delta\gamma^{s} = 0$), mirroring risk's role in P5.

(P7) **Balance-sheet constraints.** The wedge increases in λ whenever cash-collateralized trades are the more balance-sheet-intensive of the two ($\Delta v(\text{reuse}) > 0$), provided $\bar{W}$ is not dominated by the denominator's feedback.[10] This is the natural case when securities-collateralized loans are structured as pledges rather than title transfers: cash sits on-balance-sheet by construction, pledged securities do not, so a more constrained dealer charges a higher relative premium for cash-collateralized trades.

(P8) **Reuse.** Granting the dealer reuse rights widens the wedge by $r^{\text{reuse}} - \lambda \Delta v_{\text{reuse}} \bar{W}$, positive exactly when $\lambda < \bar{\lambda}^{*} \equiv r^{\text{reuse}} / (\Delta v_{\text{reuse}} \bar{W})$ – the analogue, at the baseline balance sheet $\bar{W}$, of the fee-level threshold λ^{*} in P4. This is the mirror image of the fee-level reuse discount: since reuse only lowers f^{sec} (P4) while leaving π_{cash} unchanged,

[10] Explicitly, $\dfrac{d\tilde{\delta}}{d\lambda} = \dfrac{\Delta v(\text{reuse})\big(\bar{W} - \theta\kappa\Delta v(\text{reuse})\, A\big)}{\big(1 + \theta\kappa\lambda\Delta v(\text{reuse})^{2}\big)^{2}}$, where $A \equiv \Delta\gamma^{\sigma}\psi_{\sigma}(\sigma) + \Delta\gamma^{s}\psi_{s}(s) + r^{\text{reuse}}$ is the λ-independent part of the numerator in (13). The stated sign holds whenever $\bar{W}$ dominates the second, basis-point-scale term – the natural case, as $\bar{W}$ is a balance-sheet-scale quantity.

any discount passed to the securities-collateral lender mechanically widens the cash-over-securities wedge. Once the dealer is constrained enough ($\lambda > \bar{\lambda}^*$), the balance-sheet cost of that title transfer dominates the reuse value and the effect reverses: reuse instead narrows the wedge, as the securities-collateral segment itself becomes the more balance-sheet-intensive one.

(P9) **Participation.** A higher participation ratio θ compresses $|\tilde{\delta}|$, since θ enters only the denominator $1 + \theta\kappa\lambda\Delta v(\text{reuse})^2$, strictly increasing in θ whenever $\Delta v(\text{reuse}) \neq 0$. θ measures how easily non-dealer counterparties reallocate across segments in response to relative pricing; better-connected segments arbitrage away any shadow-cost differential, pulling the wedge toward zero regardless of whether it originates from risk (P5), illiquidity (P6), balance-sheet costs (P7), or reuse (P8).

5 Empirical Analysis

We now turn to the empirical analysis. We first define the empirical counterparts of the model's main objects and then test the model's predictions using both trade-level regressions of prices and wedge panel regressions at the security-day level.

5.1 Trade-level Pricing Regressions

We start by testing predictions (P1)-(P4) using our trade-level data on USD security lending transactions for equities.

Given that each market segment features its own price, we estimate, separately for each segment, empirical specifications of the general form:

$$Price_{i,j,s,t} = \boldsymbol{a}' X^a_{s,t-1} + \boldsymbol{b}' X^b_{i,t} + \boldsymbol{c}' X^c_{j,s,t} + \boldsymbol{d}' X^d_t + e_s + \epsilon_{m(t)} + \epsilon_{y(t)} + u_{i,j,s,t} \tag{15}$$

where i denotes the security lender, j denotes the transaction, s denotes the security being lent and t denotes the day of the transaction. In this setup, $Price_{i,j,s,t}$ is either the *Net Cash Return* (for the cash-collateralized segment) or the lending *Fee* (for the securities-collateralized segment). These variables are conditioned on security, trade and lender characteristics with the intention being to match as closely as possible the theoretical predictions of our model. We also include security, month and year fixed effects to account for unobservable effects along the security and time dimensions. Standard errors are clustered at the ISIN and date level.

In particular, the conditioning variables used in each case are:

- $X^a_{s,t-1}$: The natural logarithm of the 21-day rolling average standard deviation of the lent security's daily returns, and the natural logarithm of the 1-day lag of the security's daily relative bid-ask spread. This is intended to capture the effect of the lent security's underlying risk and liquidity on prices and to test predictions **(P1)** and **(P2)**. The variables are lagged to avoid any contemporaneous effect of security lending activity on either the underlying stock volatility or liquidity.

- $X^b_{i,t}$: The lending dealer's book leverage defined as the ratio of the book value of assets over the dealer's book value of equity. This is intended to capture the extent to which a dealer is balance-sheet constrained and thus test prediction **(P3)**.

- $X^c_{j,s,t}$: This includes a dummy as to whether the transaction allows for the reuse of collateral. This variable is only defined for the securities-collateralized segment of the market and is intended to test prediction **(P4)** of our model.

- X^d_t: This vector includes a time dummy intended to capture the effects of FOMC announcements on security lending prices. In particular, our dummy takes the value of 1 when a transaction takes place on the same week as an FOMC announcement and is zero otherwise. This is also used as a control variable, given that rebate rates follow closely policy rates.

We estimate this model using our entire sample of transactions. As a robustness test, we also report (in the Appendix) estimation results based on a subset of transactions that pertain only to those securities traded on both segments of the securities lending market.

Table 1 shows key summary statistics of the variables used in the trade-level regressions.

Table 1: **Trade-level data summary statistics**. This table shows summary statistics for the variables used in regression model (15). The sample period is April 1st 2022 to December 31st, 2025.

	N	Mean	p25	p50	p75	Std	Min	Max
Net Cash Return (bps)	5,613,929	18.587	1.	10.	12.7	44.786	-250.	250.
Fee (bps)	10,931,244	21.484	10.	15.	20.	29.016	0.	250.
Risk	10,278,366	0.025	0.016	0.023	0.034	2.232	0.	65339.983
Illiquidity	9,051,227	0.001	0.	0.001	0.001	3.43	0.	1.304
Intermediary Cost	9,053,729	14.077	11.958	13.489	14.327	2.986	2.28	28.471
Collateral Reuse	16,532,302	0.796	1.	1.	1.	0.403	0.	1.
FOMC	16,545,173	0.167	0.	0.	0.	0.373	0.	1.

Table 2 shows the baseline estimation results of model (15) for both market segments. There are several key results from this table. First, both the underlying security volatility

and illiquidity result in higher lender payoffs in both market segments, confirming predictions **(P1)** and **(P2)** of our model. The economic intuition of this result is that the less liquid and the riskier the lent security is, the costlier it will be for the lending dealer to source it and the riskier it will be to warehouse it. As such, the lending dealer will require compensation in the form of either a higher net cash return or a higher fee.

Second, dealer intermediation costs are also associated with higher payoffs, in both market segments. This is evident from the positive and statistically significant coefficients on *Intermediary Cost* in models 3, 4 of the table. Since our intermediary cost variable is dealer book leverage, our results imply that more constrained dealers demand higher payoffs to act as intermediaries in the securities lending market, when such intermediation is balance-sheet intensive. Thus, the empirical results also lend support to prediction **(P3)** of the model.

Third, we examine how collateral reusability interacts with intermediary costs to determine fees, in the securities-collateralized segment of the market. As explained earlier, securities provided by the borrower as collateral can either be *pledged* to the lender, in which case the lender cannot reuse them in any way, or they can be *transferred* to the lender, in which case the lender can reuse them. Pledged collateral is comparatively less balance-sheet intensive, whereas contracts permitting reuse can impose additional balance-sheet costs, particularly when the dealer exercises the reuse option.

Our theoretical model formalizes this tradeoff and equation (10) suggests that lending fees should increase whenever constrained dealers accept reusable (i.e. transferred) collateral. Indeed, our result in columns 5 shows that the interaction terms of these two variables are associated with significantly higher lending fees. Thus, the data also confirm prediction **(P4)** of our model.

Finally, it is worth pointing out that the FOMC dummy only matters for prices in the cash-collateralized segment of the market. Given that the net cash return earned by security lenders, in that segment, depends directly on the short-term rate and the rebate rate, this finding suggests that the two rates respond asymmetrically to Fed announcements.

5.2 Empirical Estimation of the Return Wedge

In this section, we use our data on security lending transactions to compute the return wedge, introduced in equation (13) of the theory. The model's signed wedge,

$$\tilde{\delta} = (r^{\text{inv}} - r^{\text{reb}}) - f^{\text{sec}},$$

Table 2: **Trade-Level Pricing Regressions**. This table shows the results of the baseline regression model (15). The sample period is April 1st 2022 to December 31st, 2025.

	(1)	(2)	(3)	(4)	(5)
	Net Cash Return	**Fee**	**Net Cash Return**	**Fee**	**Fee**
Log(Risk)	0.8445**	1.8346***	0.0537	1.3983***	0.8576***
	(0.025)	(0.000)	(0.882)	(0.000)	(0.000)
Log(Illiquidity)	1.3419***	0.4004***	0.8008***	0.3383***	0.3956***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Intermediary Cost			3.9392***	3.0515***	-1.4933***
			(0.000)	(0.000)	(0.000)
Collateral Reuse					-36.1319***
					(0.000)
Intermediary Cost					3.6676***
× Collateral Reuse					(0.000)
FOMC	6.6519***	-0.1834	6.7069***	-0.3468	-0.1961
	(0.002)	(0.232)	(0.002)	(0.113)	(0.204)
Intercept	31.8324***	29.9198***	-33.1670***	-16.3831***	38.3164***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.181	0.292	0.248	0.316	0.374
N	3,225,222	5,815,290	2,448,785	2,864,021	2,863,696

p-values in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Controls are ISIN, Month and Year Fixed Effects

has a direct empirical counterpart in the SFTR data. For each ISIN-day pair (j, t) with simultaneous activity in both collateral segments, we compute

$$\widetilde{\delta}_{j,t} = (r_t^{\text{inv}} - \bar{r}_{j,t}^{\text{reb}}) \cdot 100 - \bar{f}_{j,t}^{\text{sec}}, \tag{16}$$

where $\bar{r}_{j,t}^{\text{reb}}$ and $\bar{f}_{j,t}^{\text{sec}}$ are volume-weighted averages of rebate rates and securities-collateralized lending fees, respectively, across transactions in each segment[11]. We proxy the reinvestment rate r_t^{inv} by the Secured Overnight Financing Rate (SOFR). Rebate rates and investment rates are reported in percentage points while lending fees in basis points; we rescale the difference in rates so that the wedge is computed in basis points.

Our baseline empirical measure is the absolute wedge:

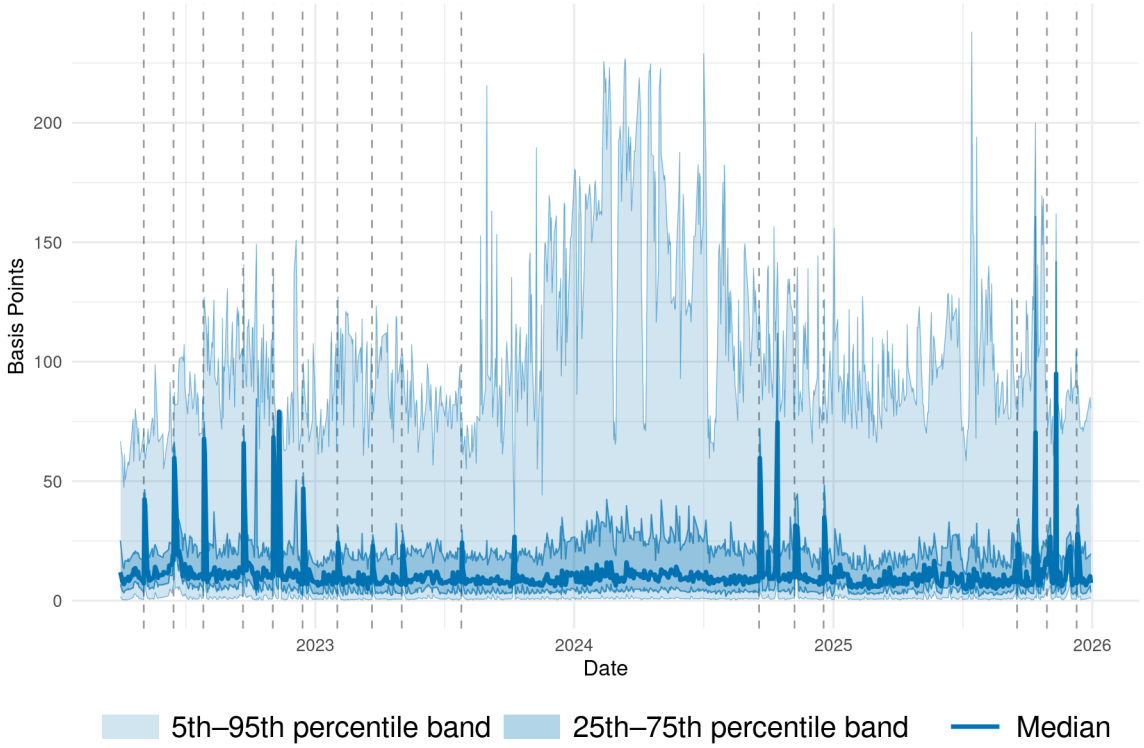
$$\delta_{j,t} = \left| (r_t^{\text{inv}} - \bar{r}_{j,t}^{\text{reb}}) \cdot 100 - \bar{f}_{j,t}^{\text{sec}} \right|. \tag{17}$$

This transformation focuses on the magnitude of relative price differences rather than on their sign. It is conservative in the sense that it treats positive and negative deviations symmetrically and avoids assigning directional economic content to the signed wedge when several forces may operate simultaneously. Figure 10 plots the volume-weighted average and various percentiles of the wedge across securities (ISINs) over time. The chart shows that

[11] If a security is traded in only one of the two collateral segments on a given day, the wedge cannot be constructed for that ISIN-day.

the median wedge fluctuates over our sample period with substantial heterogeneity across securities and noticeable spikes above 50 basis points. For example, at the 95th percentile, the wedge almost always exceeds 75 bps and occasionally, 150 bps.

Figure 10: **Return Wedge**. This figure shows the volume-weighted average (across securities) and several percentile ranges of the wedge (in bps), as defined in equation (17). The time period is April 1, 2022 to December 31, 2025.

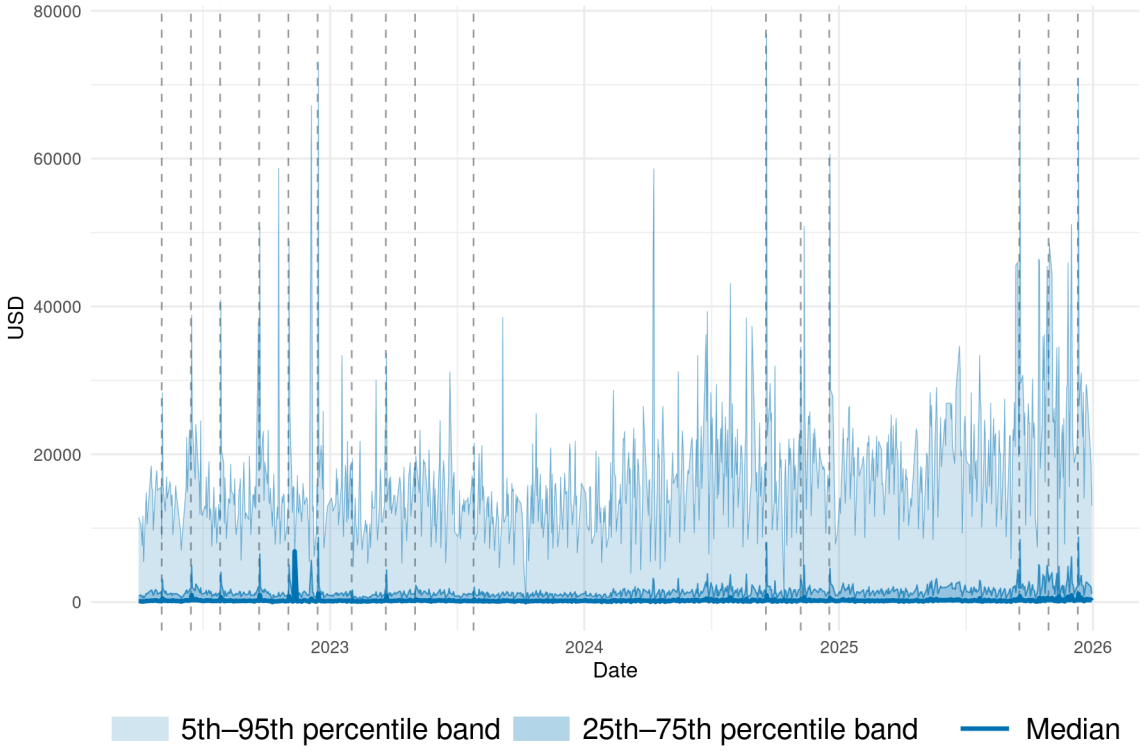


To assess the economic magnitude of the observed deviations, we multiply the absolute wedge by the smaller of the two segments' daily volumes:

$$\text{EconSign}_{j,t} = \delta_{j,t}/100 \cdot \min\{V_{j,t}^{\text{cash}}, V_{j,t}^{\text{sec}}\}. \tag{18}$$

This measure provides a conservative estimate of the dollar value associated with price dispersion across the two collateral segments, since it scales the wedge by the volume that could, in principle, be compared across both segments. Figure 11 reports the resulting time series when averaging and taking percentile ranges across securities (ISINs). The monetary value of the wedge fluctuates around $4,826 USD per security, per day suggesting that it is economically significant. As mentioned earlier, this partly reflects the reuse value of collateral and partly any effects on prices resulting from market frictions.

Figure 11: **Return Wedge Monetary Value**. This figure shows the daily volume-weighted average (across securities) and several percentile ranges of the wedge monetary value in USD, as defined in equation (18). The time period is April 1, 2022 to December 31, 2025.



5.3 Security-Day Wedge Regressions

We next test the theoretical predictions P5-P9 that pertain to the return wedge. We test the model's predictions by regressing the ISIN-day wedge on empirical proxies for equity risk and illiquidity, intermediary costs, collateral reuse and cross-segment integration.

Our baseline specification is:

$$\delta_{s,t} = \alpha\delta_{s,t-1} + \boldsymbol{a}'X^a_{s,t-1} + \boldsymbol{b}'X^b_t + \boldsymbol{c}'X^c_{s,t} + e_s + \epsilon_{m(t)} + \epsilon_{y(t)} + u_{s,t}, \tag{19}$$

where s denotes securities and t denotes days. The vectors in the specification are defined as follows:

- $X^a_{s,t-1}$ contains daily values for the underlying security characteristics, namely risk and illiquidity. In particular, it contains the following variables:
  - **Log(Risk)**$_{s,t-1}$: The natural logarithm of the 21-day rolling average daily standard deviation of returns of security s, as of day $t-1$.
  - **Log(Illiquidity)**$_{s,t-1}$: The natural logarithm of the end-of-day $t-1$ relative spot

quoted bid-ask spread for security s.

The values in this vector are lagged by a day to avoid them being contemporaneously influenced by prices and activity in the securities lending market. These variables are included to test the empirical predictions P5 and P6 pertaining to the wedge.

- X_t^b This vector contains time-specific variables. In particular, it contains the following variables:
  - **Intermediary Cost**$_t$: This is the simple average of dealer book leverage on day t. This is intended to test prediction P7 of our model.
  - **FOMC**$_t$ This is a time dummy which takes the value of 1 when day t is on the same business week as an FOMC policy announcement. This is used as a control variable, given the impact that policy rates have on the security lending rebate rate and net cash return.
- $X_{s,t}^c$ contains variables defined at the ISIN-day level and intended to capture collateral reusability and market segmentation. In particular, it contains the following variables:
  - **Collateral Reuse**$_{s,t}$: This is the share of lending volume in security s on day t associated with transactions that permit securities collateral to be reused.
  - **Participation**$_{s,t}$: This is the percentage of non-dealer market participants (with respect to the overall number of participants) active in both the cash and securities-collateralized segments of the securities lending market for security s, on day t.

  The variables in this matrix are intended to test the empirical predictions **(P8)** & **(P9)** of our model.

We include a lagged value of the wedge $\delta_{s,t-1}$ in our specification to account for persistence in pricing deviations. Our regression model also features security (ISIN), month and year fixed effects. Standard errors are clustered at the ISIN and date level.

Table 3 shows summary statistics of the variables used in the wedge regression model. For the wedge, we also report summary statistics based on the market segments that feature and don't feature collateral reuse respectively. One can see that, for the full sample, the wedge averages 23.09 bps with a median (across days and securities) of 9.54 bps. There is however substantial heterogeneity as indicated by the standard deviation of 37.37 bps.

Table 3: **Security-day dataset summary statistics**. This table shows summary statistics for the variables used in regression model (19). The sample period is April 1st 2022 to December 31st, 2025.

	N	Mean	p25	p50	p75	Std	Min	Max
Wedge	1,459,926.00	23.09	4.16	9.54	22.32	37.37	0.00	475.00
Wedge (Reuse)	1,141,326.00	23.94	6.35	13.02	25.34	33.14	0.00	458.08
Wedge (No Reuse)	957,426.00	21.25	3.14	7.00	17.49	39.00	0.00	475.00
Risk	2,194,826.00	0.03	0.02	0.02	0.04	2.97	0.00	65339.98
Illiquidity	1,896,921.00	0.00	0.00	0.00	0.00	3.93	0.00	1.30
Intermediary Cost	3,484,475.00	16.14	16.00	16.17	16.31	0.31	15.28	16.76
Collateral Reuse	3,484,475.00	37.47	0.00	11.43	93.51	42.64	0.00	100.00
Participation	2,214,198.00	0.33	0.00	0.00	0.00	4.01	0.00	100.00
FOMC	3,484,475.00	0.16	0.00	0.00	0.00	0.37	0.00	1.00

Table 4 presents the baseline estimates of equation (19). Security risk increases the absolute wedge in most specifications, while illiquidity increases it in all specifications. These findings indicate that risk and illiquidity are priced differently across collateral regimes, although the absolute-wedge specification does not identify which segment prices these characteristics more heavily.

Dealer balance-sheet constraints are also associated with a larger absolute wedge. This finding indicates that intermediary constraints reduce price alignment across collateral regimes, consistent with the model's broader mechanism.

Collateral reusability is likewise associated with a larger absolute wedge, indicating that reuse rights affect relative pricing across collateral regimes. This result is consistent with the economic value of reuse being reflected in securities-collateralized lending fees.

Finally, a higher participation ratio reduces the absolute wedge, consistent with prediction **(P9)**. Greater cross-segment participation gives market participants more scope to redirect their activity in response to relative prices, thereby improving price alignment across the two segments.

6 Conclusion

This paper studies price determinants and efficiency in the securities lending market, using transaction-level data from SFTR. We document new stylized facts about the structure of the market, such as segmentation by collateral type and collateral reusability.

We propose a simple model of market intermediation to formalize the effects of these features on securities lending prices, alongside the effects of lent security characteristics such

Table 4: Security-Day Wedge Regressions: This table shows the results of the baseline regression model (19). The sample period is April 1st 2022 to December 31st, 2025.

	(1) **Wedge**	(2) **Wedge**	(3) **Wedge**	(4) **Wedge**	(5) **Wedge**	(6) **Wedge**
Log(Risk)	0.8952***	1.1104***				
	(0.006)	(0.000)				
Log(Illiquidity)	0.9376***	0.8855***				
	(0.000)	(0.000)				
Intermediary Cost			4.2762***	4.0802***		
			(0.000)	(0.000)		
Collateral Reuse					0.0584***	0.0584***
					(0.000)	(0.000)
FOMC		5.2273***		3.7322***		3.7946***
		(0.000)		(0.000)		(0.000)
Intercept	33.3303***	32.8674***	-45.9850***	-43.4384***	20.9302***	20.3034***
	(0.000)	(0.000)	(0.001)	(0.002)	(0.000)	(0.000)
R^2	0.1443	0.1470	0.1709	0.1722	0.1732	0.1746
Within R^2	0.0004	0.0035	0.0006	0.0022	0.0034	0.0050
N	874,914	874,914	1,458,405	1,458,405	1,458,405	1,458,405

	(7) **Wedge**	(8) **Wedge**	(9) **Wedge**	(10) **Wedge**	(11) **Wedge**	(12) **Wedge**
Log(Risk)			0.7044**	0.9186***	0.1588	0.4424
			(0.024)	(0.002)	(0.592)	(0.112)
Log(Illiquidity)			0.8905***	0.8353***	0.5975***	0.5226***
			(0.000)	(0.000)	(0.000)	(0.000)
Intermediary Cost			5.8355***	5.5271***	3.2883***	2.8416**
			(0.000)	(0.000)	(0.005)	(0.014)
Collateral Reuse			0.0707***	0.0703***	0.0636***	0.0631***
			(0.000)	(0.000)	(0.000)	(0.000)
Participation	-0.1605***	-0.1597***	-0.1733***	-0.1722***	-0.1335***	-0.1314***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
FOMC		4.0072***		5.4075***		5.8417***
		(0.000)		(0.000)		(0.000)
Lagged wedge					0.2992***	0.2966***
					(0.000)	(0.000)
Intercept	21.5714***	20.9068***	-66.5633***	-62.0806***	-36.0858*	-29.2891
	(0.000)	(0.000)	(0.000)	(0.001)	(0.063)	(0.120)
R^2	0.1702	0.1719	0.1507	0.1539	0.2267	0.2311
Within R^2	0.0007	0.0028	0.0078	0.0116	0.0966	0.1017
N	1,211,797	1,211,797	727,470	727,470	409,660	409,660

as risk and illiquidity. We also use our model to examine how these effects interact with dealer balance-sheet constraints.

The main contribution of our paper is to take the model's predictions to the data. Consistent with the predictions of our model, the empirical evidence shows that segment-level prices respond to security risk and illiquidity as well as intermediary costs and collateral reusability. Our results further show that dealers price the ability to reuse received collateral, together with the burden that intermediated trades impose on their balance sheets.

To test for price efficiency, we examine the drivers of the return wedge between the observed prices of the cash- and securities-collateralized segments. We find that the wedge widens with the risk and illiquidity of the lent security, with intermediary costs, and when contractual arrangements permit collateral reuse, while it narrows as cross-segment participation increases. These findings indicate that securities lending prices are not seamlessly arbitraged across collateral regimes. Instead, relative pricing reflects the interaction of intermediary constraints, counterparty segmentation, and the economic value of collateral reuse.

Overall, the results show that intermediary balance-sheet constraints are central to understanding limits to arbitrage in collateralized funding markets. Securities collateral is not merely a substitute for cash collateral: its contractual reusability independently affects prices, shaped by the same constraints that govern how dealers intermediate both segments.

References

Basel Committee on Banking Supervision (June 2013). *Revised Basel III Leverage Ratio Framework and Disclosure Requirements*. Consultative Document. Bank for International Settlements. URL: https://www.bis.org/publ/bcbs251.htm.

Chague, Fernando et al. (2017). "Well-Connected Short-Sellers Pay Lower Loan Fees: A Market-Wide Analysis". In: *Journal of Financial Economics* 123.3, pp. 646–670. DOI: 10.1016/j.jfineco.2017.01.002.

D'Avolio, Gene (2002). "The Market for Borrowing Stock". In: *Journal of Financial Economics* 66.2-3, pp. 271–306. DOI: 10.1016/S0304-405X(02)00206-4.

Geczy, Christopher C., David K. Musto, and Adam V. Reed (2002). "Stocks are Special Too: An Analysis of the Equity Lending Market". In: *Journal of Financial Economics* 66.2-3, pp. 241–269. DOI: 10.1016/S0304-405X(02)00225-8.

Gromb, Denis and Dimitri Vayanos (2018). "The Dynamics of Financially Constrained Arbitrage". In: *Journal of Finance* 73.4, pp. 1713–1750. DOI: 10.1111/jofi.12689.

He, Zhiguo and Arvind Krishnamurthy (2013). "Intermediary Asset Pricing". In: *American Economic Review* 103.2, pp. 732–770. DOI: 10.1257/aer.103.2.732.

Infante, Sebastian (2019). "Liquidity Windfalls: The Consequences of Repo Rehypothecation". In: *Journal of Financial Economics* 133.1, pp. 42–63.

Kaplan, Steven N., Tobias J. Moskowitz, and Berk A. Sensoy (2013). "The Effects of Stock Lending on Security Prices: An Experiment". In: *Journal of Finance* 68.5, pp. 1891–1936. DOI: 10.1111/jofi.12051.

Kolasinski, Adam C., Adam V. Reed, and Matthew C. Ringgenberg (2013). "A Multiple Lender Approach to Understanding Supply and Search in the Equity Lending Market". In: *Journal of Finance* 68.2, pp. 559–595. DOI: 10.1111/jofi.12007.

Shleifer, Andrei and Robert W. Vishny (1997). "The Limits of Arbitrage". In: *Journal of Finance* 52.1, pp. 35–55.

Singh, Manmohan (2011). *Velocity of Pledged Collateral: Analysis and Implications*. IMF Working Paper 11/256. International Monetary Fund.

Siriwardane, Emil, Adi Sunderam, and Jonathan Wallen (2023). "Segmented Arbitrage". Working paper, Harvard Business School.

Appendices

A Robustness Tests

A.1 Trade-level Pricing Regressions - Restricted Sample

Here we estimate model (15) using a restricted sample of those transactions that only pertain to securities that are traded on both segments of the market on a given day. That is, the securities are traded both on the cash and securities-collateralized segments on that day. The results are qualitatively and quantitatively similar to those in table 2.

Table 5: **Trade-Level Pricing Regressions - Restricted Sample**. This table shows the results of the baseline regression model (15) from a sub-sample of trades on only those securities traded in both market segments. The sample period is April 1st 2022 to December 31st, 2025.

	(1)	(2)	(3)	(4)	(5)
	Net Cash Return	**Fee**	**Net Cash Return**	**Fee**	**Fee**
Log(Risk)	0.8448**	2.0504***	-0.1648	1.6096***	0.9227***
	(0.035)	(0.000)	(0.666)	(0.000)	(0.000)
Log(Illiquidity)	1.2630***	0.4869***	0.8296***	0.3315***	0.3716***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Intermediary Cost			3.8534***	3.3050***	-1.3523***
			(0.000)	(0.000)	(0.000)
Collateral Reuse					-36.0971***
					(0.000)
Intermediary Cost					3.7242***
× Collateral Reuse					(0.000)
FOMC	6.0866***	-0.2205	6.0899***	-0.3820	-0.2426
	(0.003)	(0.156)	(0.004)	(0.104)	(0.161)
Intercept	29.5739***	31.0031***	-33.5580***	-19.9121***	35.2856***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.151	0.276	0.206	0.327	0.409
N	2,470,188	3,814,532	1,815,374	1,722,190	1,722,014

p-values in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Controls are ISIN, Month and Year Fixed Effects

A.2 Trade-level Fee Regressions by Collateral Reuse

We provide further evidence that collateral reusability, in combination with high intermediary costs, exacerbates lending fees. For this, we estimate model (15) exclusively on the securities-collateralized segment of the market, split by whether the transaction allows for collateral reuse.

Table 6 shows the results of these estimations both for the full sample of trades in the securities-collateralized segment as well as for those trades that pertain to securities traded on both segments of the market. The table confirms that the risk and illiquidity of the

Table 6: **Trade-level Fee Regressions by Collateral Reuse**. This table shows estimation results of model (15) done exclusively on the security collateralized segment of the market and split by whether the transaction allows for collateral reuse. Panel A shows results from the full sample and Panel B shows results from a sub-sample of trades on only those securities traded in both market segments. The sample period is April 1st 2022 to December 31st, 2025.

Panel A: Full sample	(1)	(2)	(3)	(4)
	Reuse	**No Reuse**	**Reuse**	**No Reuse**
Log(Risk)	1.1328***	1.8989***	0.3603**	1.3377***
	(0.000)	(0.000)	(0.023)	(0.000)
Log(Illiquidity)	0.4821***	0.6250***	0.0245	0.6611***
	(0.000)	(0.000)	(0.661)	(0.000)
Intermediary Cost			2.3150***	-4.8809***
			(0.000)	(0.000)
Intercept	30.6703***	26.0412***	-5.3031***	88.3619***
	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.283	0.468	0.292	0.460
N	3,890,458	1,924,006	1,211,986	1,651,377

Panel B: ISIN in both segments	(5)	(6)	(7)	(8)
	Reuse	**No Reuse**	**Reuse**	**No Reuse**
Log(Risk)	1.3956***	2.2579***	0.3831**	1.5425***
	(0.000)	(0.000)	(0.016)	(0.000)
Log(Illiquidity)	0.5755***	0.6541***	0.0069	0.6861***
	(0.000)	(0.000)	(0.880)	(0.000)
Intermediary Cost			2.3923***	-4.5601***
			(0.000)	(0.000)
Intercept	32.2435***	25.9790***	-6.5856***	83.7508***
	(0.000)	(0.000)	(0.000)	(0.000)
R^2	0.289	0.445	0.305	0.460
N	2,653,466	1,160,453	739,235	982,474

p-values in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Controls are ISIN, Month and Year Fixed Effects

underlying security are important determinants of lending fees, whether collateral reuse is allowed or not (models 1, 2 & 5, 6).

However, the key result of this table is that intermediary costs only have a positive effect on fees in the reuse sub-sample of the data. That is, intermediary costs (as captured by dealer book leverage) exacerbate lending fees only if the dealer engages in trades that are balance-sheet intensive (models 3 & 7). This is consistent with constrained dealers demanding a higher fee to bear the associated balance-sheet cost of trades that involve reusable collateral. On the contrary, intermediary costs have a negative impact on fees for contracts that do not allow for reuse (models 4 & 8). This shows that constrained dealers are willing to accept a discount on the fee they receive, in order to trade on a non-reuse basis, which does not burden their balance sheet.

B Data Construction and Cleaning

This appendix describes the construction of the transaction-level dataset used in the empirical analysis. We start from SFTR loan activity records reported as securities lending transactions, obtaining the core information required for our analysis: the transaction identifier, the counterparties, the direction of the report, the lent security, execution and reporting dates, loan values, lending fees and rebate rates as well as additional trade details. We focus on flow information only: the relevant observation for our analysis is the transaction event.

We define a minimum viable transaction record as one that contains sufficient information to identify the event, the counterparties, and the lent security. In the baseline construction, the key identifying dimensions are the execution timestamp, the trade identifier, the counterparties identifiers, and the security identifier (i.e. the ISIN). Observations with missing values in any of these dimensions are excluded.

Correction reports are interpreted as replacements of earlier reports: when a correction is linked to a previous new trade, the corrected record is retained as the relevant observation.

When both counterparties to a securities lending transaction are subject to SFTR reporting requirements, the same economic event may be reported from both sides. Without de-duplication, this would overstate activity. A mirrored pair is identified when two records share the same trade identifier, event timestamp, and lent security, but report the counterparties in opposite roles and the reporting side in opposite directions. In such cases, only one side of the mirrored pair is retained.

We classify transactions into their respective collateral regimes depending on the type of price we observe. A record is classified as cash-collateralized when the rebate rate is non-missing and non-zero, while the lending fee is not a valid non-zero price. A record is classified as securities-collateralized when the lending fee is non-missing and non-zero, while the rebate rate is not a valid non-zero price. Records are excluded when both price fields are missing, both are zero, both are non-zero, or one is missing while the other is zero. After classification, lending fees are expressed in basis points. For rebate-rate transactions, we compute deviations from SOFR, the reference interest rate, in basis points. These transformations place prices on comparable scales and facilitate interpretation of the estimated pricing relationships.

We also clean the dataset along the time dimension by first excluding observations reported on weekends or market holidays. Additionally, SFTR mandates counterparties must report transactions within one working day of execution. Delayed reports can distort daily pric-

ing analysis because market conditions may change between trade execution and reporting. Therefore, we restrict our sample to trades reported within one working day from their initiation.

Extreme prices may arise either from reporting errors or from exceptional transactions: securities lending prices can become extreme precisely when a security is scarce. ISLA classifies trades with lending fees above 150 basis points as special. Using this benchmark as a reference, we exclude securities-collateralized trades with fees exceeding 250 basis points, one percentage point above the specialness threshold. Equivalently, we exclude cash-collateralized trades whose rebate rate deviates more than 250 basis points from the overnight rate benchmark.

The final dataset is a cleaned securities lending flow dataset. Each retained baseline observation is intended to represent one interpretable reported event after harmonization, missing-key filtering, lifecycle handling, mirrored-report de-duplication, pricing-regime classification, timing diagnostics, and outlier flagging.