When Funding Markets Move Credit Markets: Foreign Investors and U.S. CLOs*

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Abstract

We show that U.S. leveraged credit markets and global dollar funding markets are jointly determined through the portfolio and funding decisions of Japanese banks, which hold roughly one-quarter of all U.S. CLO AAA tranches. The JPY–USD cross-currency basis, which measures the cost of obtaining dollars via FX swaps and forwards, explains over 60% of the variation in CLO issuance and is a strong predictor of AAA spreads: when dollar funding becomes more expensive, issuance contracts and yields rise. We develop a two-market equilibrium model in which the strength of pass-through from funding conditions to CLO spreads is governed by the aggregate demand elasticity of Japanese banks. We confirm the model's central prediction using three identification strategies: Japan's 2019 Basel III securitization rules, the Bank of Japan's 2023–2024 policy normalization, and quarter-end balance-sheet reporting cycles. Shocks that increase demand elasticity amplify basis pass-through, while shocks that decrease it dampen pass-through. These shocks are typically modeled as demand shifters; instead, we show that they also tilt the demand curve, altering the sensitivity of credit pricing to funding conditions. As a result, foreign market share alone understates domestic credit markets' vulnerability to external funding shocks, as spillovers depend not only on the level of participation but also on the elasticity of foreign investors' demand.

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1 Introduction

Foreign investors hold trillions of dollars of U.S. fixed-income assets and play a central role in global capital markets (e.g., Du and Huber, 2024; Jiang, Krishnamurthy and Lustig, 2021). Because their balance sheets span both dollar funding markets and U.S. credit markets, shocks to funding conditions should, in principle, spill over into domestic credit pricing. Recent work indeed shows that foreign exchange (FX) hedging cost can induce foreign portfolio rebalancing and move U.S. corporate bond yields (e.g., Kubitza, Sigaux and Vandeweyer, 2024). But what governs the strength of this linkage? In particular, when do fluctuations in global dollar funding conditions materially affect U.S. credit market equilibrium, and how does that depend on the identity and constraints of the foreign investors who connect these markets?

Understanding the linkage between these two seemingly distant markets is empirically challenging. Foreign demand is endogenous to US financial conditions, investor identities are often opaque, and plausibly exogenous shifts in FX funding conditions are rare. Credible evidence therefore requires a setting in which foreign investors are concentrated, observable, and exposed to identifiable shocks.

We study precisely such a setting in the market for U.S. collateralized loan obligations (CLOs). The CLO market finances approximately $1 trillion of leveraged loans and represents the largest non-bank source of credit to U.S. corporations. The CLO market also offers an exceptional laboratory because foreign ownership is substantial and concentrated: at its peak in 2019, Japanese banks held approximately 35% of all U.S. CLO AAA tranches. These institutions fund their CLO positions by swapping yen into dollars using FX derivatives, tying their investment decisions to conditions in dollar funding markets while positioning them to influence equilibrium in both the U.S. CLO market and the JPY–USD funding market. We document a strong relationship between CLO issuance quantity and spreads and the JPY–USD cross-currency basis, the equilibrium price of dollar funding in FX markets. We then exploit two quasi-natural experiments to show that, consistent with our model, the sensitivity of CLO spreads to FX funding shocks is endogenous to the constraints facing Japanese investors, increasing when their demand becomes more elastic and decreasing when it becomes more inelastic.

We begin by assembling a unique dataset that links U.S. CLO issuance to holdings by Japanese investors. Using PitchBook data on CLO issuance and proprietary supervisory data from the Bank of Japan, we provide the first direct documentation of Japanese banks' footprint in the CLO market. Their presence is both large and rising. At its peak in 2019, Japanese banks held almost one-quarter of all outstanding U.S. CLOs, and their exposure was concentrated almost entirely in the AAA tranche.

Combining issuance data with prices from FX derivative markets, we document a strong comovement between U.S. CLO activity and FX funding conditions. Over the 2012–2025 period, aggregate CLO issuance volume displays a correlation of 0.82 with the JPY–USD cross-currency basis. The basis measures the cost of obtaining U.S. dollars by pledging yen via FX derivatives, and a higher (less negative) basis corresponds to cheaper dollar funding, which is a primary funding source for Japanese banks' CLO positions.[1] Importantly, the JPY–USD basis is also a statistically significant predictor of CLO AAA issuance spreads (measured relative to LIBOR/SOFR), even after controlling for a broad set of macroeconomic variables. This relationship is not observed for comparable assets such as US Treasury fixed- and floating-rate securities and high-yield bonds, suggesting that the basis–spread linkage is not driven by common factors affecting safe assets, floating-rate instruments, or underlying corporate borrowing conditions.

To understand the economic forces underlying this linkage, we develop a two-market equilibrium model in which CLO spreads and the cross-currency basis are jointly determined by Japanese banks' portfolio and funding decisions, CLO managers' structuring choices, and global dealer intermediation capacity. In the spirit of "market macrostructure" models (Haddad and Muir, 2025), we characterize equilibrium prices as emerging from the institutional constraints and portfolio rules of key market participants. Our framework extends An and Huber (2026) by allowing prices and quantities in both the CLO market and the FX funding market to be jointly determined. In this setting, the sensitivity of CLO spreads to funding conditions is governed by the aggregate demand elasticity of Japanese banks, which in turn, depends on regulatory capital requirements and the composition of active institutions. The model delivers a central result: more elastic aggregate demand is equivalent to stronger pass-through from FX funding conditions to CLO spreads.

We exploit three identification strategies, including two quasi-natural experiments, to test the model's mechanism. The first is the Japanese Financial Services Agency's 2019 implementation of Basel III risk-retention rules, which disproportionately increased the regulatory capital cost of CLO investments for Japanese banks. The second is the Bank of Japan's October 2023 adjustment to yield curve control, which raised domestic yen yields and increased the attractiveness of domestic assets. Both shocks originated in Japan and did not directly alter FX derivatives market structure, CLO supply technology, or

[1] The investor presentation of Norinchukin Bank, the largest Japanese holder of CLOs, notes that its foreign currency investments are "maintained by secured funding mainly, whose collateral is ample JPY deposits from members for currency/FX swaps and high-quality liquid assets for repo transactions." See the 2024 bank company presentation for details.

broader U.S. credit conditions, providing a clean empirical setting. Moreover, the two shocks operate through distinct channels that offer complementary tests of the model mechanism. Basel III raised regulatory costs and, given heterogeneity in shadow costs, induced selective exit of high-cost banks, increasing aggregate demand elasticity among the remaining banks. In contrast, the BOJ normalization improved the domestic outside option, raising the shadow cost of CLO investment for all banks and reducing aggregate demand elasticity. The model therefore predicts amplified pass-through following the first shock and dampened pass-through following the second.

Our main empirical finding is a pronounced regime shift in the relationship between CLO AAA spreads and the JPY–USD cross-currency basis. Before 2019, the sensitivity of AAA spreads to the basis is modest: a 10-basis-point improvement in the basis (cheaper dollar funding) compresses AAA spreads by roughly 7 basis points. After the Basel III reform, this sensitivity roughly triples. Figure 5 illustrates two sharply distinct regimes, with the spread–basis slope considerably steeper after 2019. Following the 2023–2024 BOJ normalization, pass-through weakens, consistent with the model's prediction that a broad-based increase in the shadow cost of CLO investment compresses demand elasticity. Our theoretical and empirical results jointly highlight that regulatory and policy shocks can change the slope, and not merely the level, of demand.

Finally, we examine quarter-ends as a high-frequency shock to Japanese banks' CLO demand. Because regulatory surcharges are assessed using balance-sheet snapshots at quarter-end, the shadow cost of marginal positions rises on these dates. In the model, this increase in marginal regulatory cost reduces aggregate demand elasticity and dampens funding pass-through. Consistent with this mechanism, we find that pass-through from FX funding to both CLO spreads and issuance volume is attenuated at quarter-end. Within deals, this attenuation is concentrated in AAA tranches, where Japanese banks hold their positions.

The paper makes three contributions. First, we provide direct evidence that investor demand elasticity governs not only the equilibrium of a single market but also the transmission of shocks across markets in which those investors are marginal. This extends the growing literature on demand-based asset pricing in individual markets, by showing that the elasticity of key participants shapes joint equilibrium across interconnected markets. Our findings highlight how constrained intermediaries propagate shocks in globally integrated financial systems (An and Huber, 2025), with implications for macroprudential regulation.

Second, we show that demand elasticity is itself endogenous to regulation and outside options. These shocks are often modeled as parallel shifts in demand, but we demonstrate that they can also tilt the demand curve by altering aggregate elasticity. The 2019 regime shift in the CLO spread–basis relationship illustrates this mechanism. After Basel III, U.S. CLO pricing became more sensitive to foreign funding conditions, even as Japanese ownership of AAA tranches declined from approximately 35% to 20%. After the BOJ normalization, pass-through weakened even though the Japanese investor base remained substantial. Our results imply that a market's exposure to foreign capital cannot be inferred from foreign market share alone: what matters is the elasticity of foreign demand, which can be reshaped by regulation and monetary policy in the creditor country.

Third, we highlight the importance of foreign investors for U.S. domestic credit conditions. The leveraged loans underlying CLOs are overwhelmingly domestic, yet their financing costs are materially influenced by external funding conditions. Because AAA CLO tranches resemble other safe and liquid assets widely held by foreign institutions, the mechanism we document likely extends beyond the CLO market to other segments of U.S. credit with substantial foreign ownership.

1.1 Related Literature

Our paper contributes to four strands of the literature: the macroeconomics of foreign safe asset demand, the microstructure of CIP deviations and intermediary constraints, the growing empirical literature on CLO markets, and the emerging "market macrostructure" approach to institutional asset pricing. We discuss each in turn.

First, we extend the literature on foreign safe-asset demand by showing that equilibrium in asset markets is jointly determined with equilibrium in funding markets when marginal investors operate in both. Existing work documents the effects of demand on either asset prices (e.g., Jansen, Li and Schmid, 2024; Bretscher et al., 2026) or exchange rates and funding conditions (e.g., Jiang, Krishnamurthy and Lustig, 2021; Du and Huber, 2024). In contrast, we study how these equilibria are jointly determined by the portfolio and funding decisions of common marginal investors. The CLO AAA market provides a unique setting in which foreign investor identity is observable and policy shocks are identifiable, allowing us to deliver causal evidence. Because AAA CLO tranches are highly rated, historically loss-free, and function as safe dollar assets, our findings on cross-market shock propagation (An and Huber, 2025) are applicable beyond structured credit to other U.S. safe assets with substantial foreign ownership.

Second, we provide direct evidence on how CIP deviations transmit to credit markets and what governs the strength of that transmission. Beginning with Du, Tepper and Verdelhan (2018), a large literature interprets CIP deviations as reflecting the cost of FX intermediation and dollar funding (e.g., Cenedese, Della Corte and Wang, 2021; Du, Hébert and Huber, 2023). Recent work such as Kubitza, Sigaux and Vandeweyer (2024) documents that CIP deviations are linked to U.S. corporate bond yields. We build on these insights and examine the determinants of the magnitude of this linkage using a two-market equilibrium framework. Our modeling approach draws on An and Huber (2026), which emphasizes the joint determination of price and quantity in funding markets. We extend it by showing that commonly studied shocks such as regulatory tightening and changes in outside options can tilt, rather than merely shift, the demand curve.

Third, we identify a new source of fragility in CLO markets. Existing work studies CLOs from within, focusing on securitization and credit supply (Nadauld and Weisbach, 2012; Shivdasani and Wang, 2011), adverse selection in loan pools (Benmelech, Dlugosz and Ivashina, 2012), covenant externalities and fire sales (Kundu, 2024, 2025), and tranche-level risk-adjusted performance (Cordell, Roberts and Schwert, 2023). These studies emphasize internal deal mechanics, i.e., manager selection, covenant structure, and the waterfall allocation of cash flows. In contrast, we ask who the marginal buyers of senior tranches are and how changes in their demand elasticity affect pricing. Because Japanese banks are dominant holders of AAA tranches (DeMarco, Liu and Schmidt-Eisenlohr, 2020) and fund their positions through FX markets, AAA pricing is linked to dollar funding conditions through a channel that is invisible from within the CLO structure itself.

Fourth, our paper applies the "market macrostructure" framework of Haddad and Muir (2025), which studies how institutional structure and key intermediaries shape asset prices. The CLO market provides an ideal setting: key players are identifiable, positions are observable through regulatory disclosures, institutional shocks provide quasi-natural experiments, and the need for FX-derivative enabled synthetic funding creates a second market that disciplines equilibrium pricing. By combining institutional position data, exogenous shocks, and a two-market equilibrium model, we connect the organization of market participants to joint price determination across funding and credit markets.

The remainder of the paper is organized as follows. Section 2 describes the institutional background on the CLO market, Japanese bank investment, and the cross-currency basis as a sufficient statistic for hedging costs. Section 3 describes the data. Section 4 documents the aggregate relationship between the basis and CLO pricing. Section 5 develops the two-market equilibrium model. Section 6 tests the model's predictions using two quasi-natural experiments and quarter-end effects. Section 7 concludes.

2 Institutional Background

This section outlines the institutional environment underpinning our empirical analysis. We begin by characterizing the structure and funding model of the U.S. CLO market, with particular emphasis on tranche design, investor clientele, and the determinants of AAA spreads. We then examine the emergence of Japanese banks as the marginal foreign investors in AAA CLO tranches, highlighting the regulatory, balance sheet, and yield considerations that shaped their demand. A case study of Norinchukin Bank — the single largest institutional holder of CLO AAA tranches globally — illustrates the scale at which a single institution connects the CLO and FX funding markets. Because these institutions typically fund their dollar asset positions by pledging yen through FX swaps and forwards, their required returns are directly linked to conditions in FX derivatives markets. As a result, variation in the cross-currency basis becomes a key state variable influencing equilibrium CLO pricing.

2.1 The US CLO Market

A collateralized loan obligation (CLO) is a securitization vehicle that pools diversified portfolios of senior secured leveraged loans and issues tranched liabilities against the pool's cash flows.[2] A typical CLO capital structure consists of six to eight tranches ranging from AAA (approximately 60-65% of the deal by par value) down through AA, A, BBB, and BB to an unrated equity tranche.[3] AAA tranches absorb losses only after all subordinate tranches are exhausted; they have experienced zero principal losses historically, even through the 2008–2009 financial crisis.[4] AAA tranches are floating-rate instruments, typically paying three-month SOFR (previously LIBOR) plus a spread, known as the discount margin.

CLOs are managed vehicles: a collateral manager actively trades the underlying loan portfolio during a reinvestment period (typically four to five years), after which the deal enters an amortization phase. Total US CLO outstanding grew from approximately $400 billion in 2015 to over $1 trillion in 2024, driven by strong leveraged loan origination and robust investor demand for floating-rate credit exposure.[5]

[2]See Kundu (2023) for a comprehensive overview of CLO market structure, the mechanics of the CLO waterfall, and the role of covenants in governing CLO manager behavior.

[3]Panel (b) of Appendix Figure B.1 plots the AAA share of total CLO issuance over time.

[4]According to Lane, Novell and Rawlings (2024), nearly 7,000 AAA-rated CLO debt tranches were issued between 1993 and 2022 had zero defaults, and even the lowest rated debt tranche had only a 1.8% default rate. See Hu et al. (2006) for Default & Loss Rates of Structured Finance Securities overall from 1993-2005.

[5]We estimate the size of the CLO market based on a perpetual inventory method applied to annual issuance data from our sample, assuming a 13% annual runoff rate consistent with a 7–8 year average CLO life. See Section 3 for details.

The investor base for CLO tranches is segmented by seniority. AAA tranches are held primarily by banks, both domestic US institutions and foreign banks (particularly Japanese), along with a growing share of CLO exchange-traded funds. Mezzanine tranches (AA through BBB) are purchased mainly by insurance companies and asset managers. Equity tranches are retained by CLO managers and held by hedge funds and dedicated CLO equity vehicles (DeMarco, Liu and Schmidt-Eisenlohr, 2020). This investor segmentation by tranche is central to our identification: shocks to Japanese demand affect AAA pricing directly but reach lower-rated tranches only indirectly through the CLO capital structure.

2.2 Japanese Banks as CLO Investors

Japanese banks have been the single largest foreign investor class in US CLO AAA tranches since the mid-2010s. Importantly, their holdings are concentrated almost exclusively at the top of the capital structure. A joint survey by the Bank of Japan and the Financial Services Agency found that more than 99% of major Japanese banks' CLO holdings were rated AAA, compared with 77% for US banks and 50% for UK banks (Financial System and Bank Examination Department of the Bank of Japan, 2020). This near-exclusive concentration in AAA tranches is the foundation of our empirical strategy: shocks to Japanese demand translate directly into movements in AAA pricing, with effects attenuating monotonically down the capital structure.

According to data from the Bank of Japan Financial System Report, Japanese banks' aggregate CLO holdings grew from ¥5.1 trillion ($42 billion) in fiscal year 2015 to ¥19.7 trillion ($131 billion) in fiscal year 2024, a nearly fourfold increase (Financial System and Bank Examination Department, Bank of Japan, 2025). Figure 1 documents this growth. Panel (a) shows the composition of Japanese banks' overseas credit holdings, with CLOs growing from a small fraction to the second-largest category by 2024.[6] Panel (b) indexes each asset class to 100 in 2015, revealing that CLO holdings grew approximately 300% over the decade, far outpacing investment-grade corporates, high-yield bonds, or other structured products. Over this period, CLOs rose from 8.5% to 22.6% of Japanese banks' total overseas credit holdings, shown in Appendix Figure B.3, with year-on-year CLO growth rates reaching nearly 80% in 2018 before decelerating sharply after the 2019 regulatory shock — see Appendix Figure B.4.

At their peak in 2019, we estimate that Japanese banks held over 20% of all outstanding US CLOs and accounted for approximately 35% of new US CLO AAA issuance. Figure 2

[6] See Appendix Figure B.2 for an alternative bar-chart visualization of the composition data.

presents these estimates. Panel (a) plots Japanese banks' CLO holdings in USD billions (left axis) against their share of US CLOs outstanding (right axis), where outstanding is constructed using a perpetual inventory method. Panel (b) plots the Japanese share of total US CLO outstanding alongside their share of US CLO AAA issuance.[7] No other non-U.S. investor bloc approached this market share, implying that Japanese banks constituted the dominant marginal demand for senior CLO securities and were central to the determination of equilibrium AAA spreads.

The concentration of Japanese CLO investment is extreme: Norinchukin Bank, the central cooperative bank for Japan's agricultural and fishery cooperative system, alone accounted for approximately half of all Japanese CLO holdings at its peak. Appendix A provides a detailed case study of Norinchukin's investment strategy, illustrating how a single institution's portfolio decisions connect the CLO and FX funding markets at scale.

2.2.1 The Funding Decision

Japanese banks fund their US CLO holdings primarily with yen-denominated liabilities, most importantly retail and cooperative deposits, creating a currency mismatch between assets (USD) and liabilities (JPY). To eliminate exchange-rate risk, banks fund the dollar cash flows using FX swaps or cross-currency basis swaps. In a standard USD/JPY basis swap, the bank effectively exchanges yen funding for dollar funding: it pays a dollar floating rate (historically LIBOR, now SOFR) plus the cross-currency basis, and receives a yen floating rate (historically JPY LIBOR, now TONA). This transaction synthetically converts the dollar-denominated CLO cash flows into yen.[8]

The cost of FX funding is summarized by the USD/JPY cross-currency basis, defined as the deviation from covered interest parity embedded in FX swap markets. For much of the post-GFC period, the USD/JPY basis has been negative, implying that yen-based investors must pay an additional premium to obtain synthetic dollar funding. A more negative basis, therefore, increases the effective cost of holding hedged dollar assets.

The all-in funding-adjusted return on a CLO AAA position for a Japanese bank can be written as:

$$\text{Funding-Adjusted Return} = \underbrace{s}_{\text{CLO spread}} + \underbrace{\kappa_i x_t}_{\text{funding cost}} - \underbrace{\tau}_{\text{regulatory cost}},$$

[7] The AAA issuance share is estimated by assuming that AAA tranches constitute approximately 65% of each deal's capital structure, consistent with industry averages shown in Appendix Figure B.1.

[8] Norinchukin Bank's investor presentation states explicitly that the bank's foreign currency investment is "maintained by secured funding mainly, whose collateral is ample JPY deposits from members for currency/FX swaps and high-quality liquid assets for repo transactions." See Norinchukin Bank Company Presentation, June 2025, page 15.

where s is the CLO AAA discount margin, x is the cross-currency basis, and τ is the regulatory capital cost of holding securitization exposures. The bank invests in CLOs only when this funding-adjusted return is positive. This decision rule, formalized in Section 5, establishes the direct link between CLO AAA spreads and the cross-currency basis that is the focus of our empirical analysis.

Appendix Figure 4 illustrates the economic significance of this calculation. The figure plots funding-adjusted, yen-equivalent yields on two dollar assets available to Japanese banks: five-year US Treasurys and CLO AAA tranches.[9] During most of our sample period, funding-adjusted Treasury yields hover near or below zero, meaning that after paying for FX funding, a Japanese bank earns little or nothing on what is nominally a risk-free dollar asset. Funding-adjusted CLO AAA yields, by contrast, remain positive throughout, typically 1–3 percentage points above that of Treasurys, reflecting the spread premium that compensates for illiquidity and complexity. This wedge explains why Japanese banks concentrated their dollar allocations in CLOs rather than Treasury.

Two features of this funding arrangement merit emphasis. First, Japanese banks fund a large fraction of their CLO exposure synthetically through FX markets; they do not carry material unhedged dollar risk. CLO demand and FX funding demand therefore move nearly one-for-one: an increase in CLO purchases generates a corresponding increase in demand for FX swaps, pushing the basis more negative and raising funding costs for all yen-based dollar investors. Second, FX funding is rolled at regular intervals (typically quarterly), so the basis enters the investment decision as a flow cost rather than a one-time expense. Changes in the basis have immediate effects on the profitability of existing CLO positions, not just new purchases.

These features imply that the cross-currency basis serves as a sufficient statistic for the funding cost faced by the marginal price-setter in the CLO AAA market. Any shock that affects Japanese demand for CLOs, whether regulatory, monetary, or otherwise, operates through the basis: directly, by changing the cost of synthetic dollar funding, or indirectly, by changing aggregate funding demand, which in turn moves the basis in equilibrium.

3 Data

Our analysis combines five categories of data: (1) CLO market data from PitchBook LCD, (2) cross-currency basis swap rates from Thomson Reuters Datastream, (3) macroe-

[9] Funding-adjusted, yen-equivalent yields are computed as the US dollar yield minus the absolute value of the JPY-USD cross-currency basis at the matching tenor. For Treasurys, we use the five-year constant maturity yield; for CLO AAA tranches, we use the quarterly average AAA discount margin plus the prevailing SOFR (or LIBOR) rate.

conomic and financial controls from FRED and Datastream, (4) Japanese banks' overseas credit holdings from the Bank of Japan, and (5) institution-level CLO holdings from Norinchukin Bank's financial disclosures. The baseline sample spans 2012Q1 through 2025Q4. This section describes each data source, the key variables we construct, and the resulting samples for the aggregate and tranche-level analyses.

3.1 CLO Market Data

Tranche-level CLO data come from PitchBook LCD's Global CLO Databank. For each CLO tranche priced between January 2012 and March 2025, we observe the deal identifier, tranche rating (AAA through B), discount margin over the benchmark floating rate, coupon in basis points, tranche size, total deal size, CLO manager, benchmark rate (LIBOR or SOFR), and pricing date. We restrict the sample to US dollar-denominated tranches in new-issue CLOs, excluding refinancings and resets, with ratings from AAA to B.

The primary dependent variable is the tranche spread, defined as the discount margin at issuance. When the discount margin is missing (as occurs for some fixed-rate tranches), we substitute the coupon in basis points. We construct the tranche share as tranche size divided by total deal size, and use the log of tranche size and log of deal size as additional outcome variables.

PitchBook LCD also provides aggregate quarterly CLO issuance volume (in billions of US dollars), quarterly deal counts, and a quarterly index of US CLO AAA discount margins. These series form the basis for the aggregate regressions. For the cross-market placebo tests, we obtain high-yield bond issuance volume and yield spreads from PitchBook LCD's US High-Yield Bond Volume Report, and auction-level data for Treasury floating-rate notes and two-year fixed-rate notes from the U.S. Department of the Treasury via the TreasuryDirect API. The Treasury FRN discount margin, expressed in basis points over the 13-week Treasury bill rate, is directly analogous to the discount margin on CLO AAA tranches, making it a natural comparator for the specificity tests in Section 4.2.

3.2 Cross-Currency Basis

The key explanatory variable is the five-year JPY-USD cross-currency basis swap rate, obtained as daily bid, ask, and mid-price quotes from Thomson Reuters Datastream. The basis measures the cost of converting yen funding into synthetic US dollars via the FX swap market; a more negative basis indicates higher hedging costs for Japanese investors.

We use the mid-price throughout. For the aggregate regressions, we collapse the daily series to quarterly frequency by averaging within each calendar quarter. For the tranche-level regressions, we collapse to monthly frequency and merge to each tranche's pricing month.

3.3 Macroeconomic and Financial Controls

We further collect data on US financial conditions and macroeconomic fundamentals. From the Federal Reserve Bank of St. Louis (FRED), we obtain the CBOE Volatility Index (VIX), the ten-year minus three-month Treasury term spread, the Moody's BAA minus AAA corporate credit spread, industrial production, the unemployment rate, and the Chicago Fed National Financial Conditions Index (NFCI, weekly frequency). We construct a commercial paper spread as the difference between the three-month AA financial commercial paper rate and the three-month Treasury bill rate, which captures short-term funding stress in money markets.[10] The JPY-USD spot exchange rate (DEXJPUS) controls for the level of the yen.

From Thomson Reuters Datastream, we obtain the ICE BofA MOVE Index, which measures implied volatility on US Treasury options and serves as a proxy for interest rate uncertainty. We also obtain the KBW Nasdaq Bank Index, from which we compute an annualized realized volatility measure.[11] This bank sector volatility measure captures stress in the financial intermediary sector that could independently affect both CLO pricing and the cross-currency basis.

All daily and weekly control variables are collapsed to quarterly frequency by averaging within each calendar quarter before merging with the aggregate CLO data.

3.4 Japanese Banks' Overseas Credit Holdings

Data on Japanese banks' foreign credit portfolios come from the Bank of Japan's *Financial System Report* (October 2025 edition, Chart III-1-17). The BOJ reports major banks' overseas credit product holdings decomposed into four categories: investment-grade corporate bonds, high-yield corporate bonds, CLOs, and other structured products in JPY trillions at fiscal year-end (March of each year). The data span fiscal years 2015 through 2024.

[10] This is sometimes referred to as the CP-Treasury spread. We use the FRED series RIFSPPFAAD90NB (3-month AA financial CP) and DGS3MO (3-month Treasury constant maturity).

[11] Daily returns are calculated from closing prices, and a rolling 30-trading-day standard deviation is annualized by multiplying by $\sqrt{252}$.

To compute Japanese banks' share of the US CLO AAA market, we convert the BOJ's yen-denominated holdings to US dollars using annual average JPY-USD exchange rates from FRED. We then construct a time series of total US CLO AAA outstanding using a perpetual inventory method: starting from 2001, we accumulate annual CLO issuance (from PitchBook) and apply a 13% annual runoff rate, reflecting the approximately 7.5-year average CLO life (five-year reinvestment period plus two to three years of amortization). We estimate AAA outstanding as 65% of total CLO outstanding, consistent with the average AAA tranche share in our sample.

3.5 Norinchukin Bank Holdings

To document the concentration of Japanese CLO investment, we compile a quarterly time series of Norinchukin Bank's CLO holdings from the institution's official financial results disclosures. The data, reported in JPY trillions, are hand-collected from Norinchukin's semi-annual and quarterly capital adequacy reports covering fiscal years 2018 through 2025. Norinchukin is the central bank for Japan's agricultural cooperative system and was, at its peak, the single largest institutional holder of US CLO tranches globally, accounting for approximately half of all Japanese CLO holdings. Appendix Figure B.5 plots this series.

4 The Cross-Currency Basis and CLO Pricing

The institutional background in Section 2 suggests that the JPY-USD cross-currency basis should be a first-order determinant of CLO AAA pricing: it governs the funding cost faced by the dominant marginal investors, and those investors concentrate almost exclusively in the senior-most tranche.

This section documents three empirical patterns that motivate the model and identification strategy that follow. First, the basis is strongly correlated with aggregate CLO issuance volume and spreads, even after controlling for a rich set of macroeconomic variables. Second, this relationship is specific to the CLO market and absent in other fixed-income markets where Japanese banks are not the marginal investor. Third, the relationship between the basis and AAA spreads is not stable over time: it appears to shift dramatically around 2019, a pattern that Section 5 will rationalize and Section 6 will test formally.

4.1 Aggregate Evidence

Figure 3a plots quarterly US CLO new-issue volume alongside the five-year JPY-USD cross-currency basis from 2012 through 2025. The two series co-move closely: quarters in which funding costs are low (the basis is less negative) coincide with elevated issuance, and vice versa. The raw correlation is 0.82, reflecting striking comovement across two distinct markets.[12] Figure 3b plots the corresponding relationship for CLO AAA spreads. The unconditional correlation is comparatively modest, at -0.25, in part because it masks a striking regime shift, which we document in Section 4.4. Indeed, the relationship is substantially stronger within each subperiod than in the pooled sample.

Table 1 formalizes the visual evidence through a regression framework. We find that a 10-basis-point improvement in the basis is associated with approximately 19% higher quarterly issuance volume (column 1), 19% more deals priced (column 2), and a 3.4-basis-point compression of AAA spreads (column 3). The basis alone explains 62% of the variation in log issuance and 67% of the variation in log deal counts.

The joint response of prices and quantities is informative about the underlying mechanism. A purely supply-side explanation, for example, CLO managers timing issuance to favorable funding conditions, would predict higher issuance volumes but ambiguous effects on spreads. In contrast, the finding that a more favorable basis is associated with both higher issuance *and* lower spreads points to a demand-side channel: when funding costs fall, Japanese investors are willing to absorb more AAA paper at tighter spreads, inducing the CLO issuance pipeline to supply additional deals to market.

4.2 Specificity to the CLO Market

The co-movement documented above could reflect common exposure to global financial conditions rather than a direct link from funding costs to CLO pricing. We address this concern in two steps: first by showing that the basis predicts CLO AAA spreads even after absorbing a rich set of macrofinancial controls, and then by showing that this relationship is absent in other fixed-income markets where Japanese banks are not the marginal investor.

Table 2 regresses quarterly CLO AAA spreads on the JPY-USD basis while progressively adding controls for market volatility (VIX, MOVE), the yen-dollar exchange rate,

[12] The comovement between the basis and CLO issuance extends to the AAA tranche. Appendix Figure B.1 shows that AAA tranche volume tracks total issuance closely in Panel (a). Panel (c) shows that the AAA tranche volume exhibits a 0.81 correlation with the basis, nearly identical to the total issuance figure. The AAA share of issuance itself is positively correlated with the basis in Panel (d) with a correlation coefficient of 0.30, suggesting that deal structures tilt toward larger senior tranches when Japanese demand is strong.

short-term funding stress (the commercial paper–Treasury spread), credit conditions (the Moody's BAA-AAA spread and the term spread), bank sector health (KBW index realized volatility), and macroeconomic indicators (industrial production, unemployment, NFCI). The coefficient on the basis remains statistically significant across all specifications, ranging from -0.34 in the most parsimonious regression to -0.55 in the most saturated specification. These estimates imply that a 10-basis-point improvement in the basis is associated with a 3.4 to 5.5-basis-point compression in CLO AAA spreads, even after absorbing variation attributable to broad financial conditions, credit market stress, and the macroeconomy. Notably, the magnitude of the coefficient increases rather than attenuates as controls are added, suggesting that omitted-variable bias, if anything, biases the univariate specification toward understating the true effect. Appendix Table C.1 reports the analogous exercise for log issuance volume; the basis coefficient similarly remains positive and significant through the addition of volatility and exchange rate controls

Table 3 next examines whether the basis-spread relationship is unique to the CLO market. Column (1) reproduces the most saturated CLO AAA specification from Table 2. Columns (2)–(4) estimate the identical regression—same controls, same sample period—on three placebo markets that are, in principle, comparable to CLO AAA but in which Japanese banks are unlikely to be the marginal price-setter. These are the markets for the 2-year Treasury note, Treasury floating-rate note, and high-yield bond.

The Treasury markets provide a natural benchmark, as these are safe assets with substantial foreign participation. Japan's holdings of U.S. Treasuries exceed $1 trillion. Yet, as shown in column (2), the JPY–USD basis is not a significant predictor of the 2-year Treasury yield. One interpretation is that, despite large aggregate holdings, Japanese investors account for only about 4% of Treasury outstanding, compared to 20–35% of CLO AAA tranches (Figure 2b), and are therefore unlikely to be marginal in pricing.

A key difference between CLO AAA tranches and Treasury notes is that the former are floating-rate instruments. To rule out the possibility that the basis primarily affects floating-rate assets, column (3) regresses the Treasury FRN discount margin on the basis. As in column (2), the estimated coefficient is economically small and statistically insignificant.

Column (4) turns to high-yield bonds. CLOs and high-yield bonds share the same underlying borrower base, as CLO collateral pools consist primarily of leveraged loans issued by the same below-investment-grade firms that access the high-yield bond market. If the basis were proxying for credit conditions affecting these borrowers, one would expect similar basis sensitivity across the two markets. Instead, the basis coefficient for high-yield spreads is statistically indistinguishable from zero.

Across all three placebo markets, the cross-currency basis has no predictive power for yields or spreads once macro-financial conditions are controlled for. This stands in sharp contrast to the CLO market. A key distinction is the prominent role of Japanese banks in CLO AAA tranches. Taken together, these results rule out explanations based on global risk appetite, broad dollar funding stress, or credit conditions common to leveraged borrowers, and instead support a demand-side channel operating precisely where Japanese banks link FX funding markets to US credit.

4.3 Comparison of safe asset returns accounting for FX funding cost

Why does the basis move CLO pricing but not Treasury pricing, given that Japanese banks hold both in size? Figure 4 sheds light on this question. The figure plots the yields on five-year US Treasuries and CLO AAA tranches after accounting for FX funding costs. During most of our sample period, FX-funded Treasury yields hover near or below zero. In other words, after paying for synthetic dollar funding, a Japanese bank earns little or nothing on what is nominally a risk-free dollar asset. FX-funded CLO AAA yields, by contrast, remain positive throughout, typically 1–3 percentage points above FX-funded Treasuries. This dynamic explains not only why Japanese banks hold large concentrations of CLOs, but also why they predominantly finance these positions through FX markets. As a result, their demand for AAA-rated CLO tranches is closely linked to conditions in FX markets, whereas their demand for U.S. Treasury securities does not necessarily move in tandem with the basis.

4.4 Preview: A Shifting Relationship

The aggregate regressions in Tables 1 and 2 pool the entire 2012–2025 sample. But the time-series plots hint at a structural break. Figure 5 makes this break visually transparent. A scatter plot of the AAA spread against the basis, with pre-2019 observations in blue circles and post-2019 in red triangles, reveals two sharply distinct regimes. Before 2019, the slope is relatively flat: a 10-basis-point basis improvement compresses spreads by about 7 basis points. After 2019, the slope is visibly steeper, nearly a threefold increase in sensitivity, and the post-2019 observations cluster more tightly around their regression line.

This regime shift poses a puzzle. If the basis merely proxied for omitted macroeconomic conditions, one would expect a stable relationship over time. The abrupt change in sensitivity at a specific date instead points to a change in market structure, specifically, in how funding costs transmit into CLO pricing. The model in Section 5 generates this regime shift as an endogenous consequence of shocks to the demand elasticity of Japanese investors. Section 6 tests this prediction formally, exploiting two quasi-natural experiments that enter the two-market system at different points.

5 Model

We develop a two-market equilibrium model that links the pricing of CLO AAA tranches to the cross-currency basis through the portfolio decisions of Japanese banks. The model features two interconnected markets, the CLO AAA market and the FX funding market, and three classes of agents whose interactions determine equilibrium prices in both markets simultaneously.

Our approach draws on the "market macrostructure" concept of Haddad and Muir (2025), which characterizes equilibrium asset pricing through the institutional constraints and portfolio rules of key market participants. Our key innovation is to model a marginal investor that is common to two seemingly distant markets. Our modeling of that linkage follows framework developed in Du and Huber (2024) and An and Huber (2026) for FX funding, where funding prices and quantities are jointly determined in equilibrium.

5.1 Setup

Agents. Three classes of agents participate across two markets.

Japanese banks invest in dollar-denominated CLO AAA tranches funded with yen liabilities. They can obtain the dollar required for the CLO purchase either by borrowing directly in dollar, or synthetically by swapping yen into dollar through the FX swaps or forwards. Empirically, Japanese banks are predominantly funded using synthetic FX funding. The economic cost of using yen to fund dollar is the difference between these two funding technologies, and is precisely the negative of the cross-currency basis that we have defined. Japanese banks' decision to invest in CLO thus depends on the return from CLO and the cost of FX funding.

CLO managers supply AAA tranches by structuring pools of leveraged loans. Although the size of an individual CLO conforms to industry standard and does not vary over time, managers nonetheless have discretion over whether or not to issue and the relative share of the AAA tranche within an individual CLO. A portion of the total CLO supply is absorbed by domestic US investors such as local banks, insurance companies, and CLO exchange-traded funds, whose decisions are independent of FX funding conditions.

Global dealers intermediate the FX derivatives market, warehousing the currency mismatch between yen-funded and dollar-funded counterparties. Intermediation is costly as dealers face leverage constraints, capital requirements, and balance-sheet capacity limits. These costs create deviation from covered interest-rate parity (CIP) and creates a non-zero economic cost of synthetic FX funding.

Markets. The two markets are:

(i) The *CLO AAA market*, which clears at issuance spread s (the discount margin over the benchmark floating rate). A wider spread corresponds to a lower price and more favorable returns to investors.

(ii) The *FX funding market*, which clears at cross-currency basis x. The basis summarizes the all-in cost of converting yen funding into dollars and the *lower* the x, the more of a *premium* Japanese banks pay to obtain synthetic dollar funding.

5.2 Demand and Supply in CLO and FX Funding

Japanese banks' demand. Consider a Japanese bank i that chooses its holdings $q_{it} \geq 0$ of U.S. CLO AAA tranches. Taking into account the cost of synthetically funding dollars using FX derivatives, bank i's profit per unit of CLO exposure is

$$m_{it} \equiv s_t + \kappa_i x_t, \tag{1}$$

where $\kappa_i \in [0, 1]$ captures bank i's FX funding intensity. Recall that x_t is the incremental cost of obtaining dollars synthetically by swapping yen rather than funding directly in dollar markets, thus a higher x_t corresponds to cheaper synthetic dollar funding. For simplicity, we assume that non-FX funding costs co-moves with the dollar risk-free rate and are therefore normalized to 0, as the CLO return is stated also as a spread over the dollar risk-free rate.

CLO exposure consumes regulatory capital. Let ω_t denote the relevant regulatory risk weight applied to CLO AAA tranches. The bank faces a shadow cost of regulatory capital λ_{it}, which is increasing in its CLO exposure as higher exposure pushes the bank closer to binding regulatory constraints. We capture this with

$$\lambda_{it}(q_{it}) = \bar{\lambda}_{it} + \psi_i \, \omega_t q_{it}, \qquad \psi_i \geq 0, \tag{2}$$

where ψ_i is the bank-specific shadow cost for each unit of CLO so that overall regulatory shadow cost (λ_{it}) rises as CLO investments (q_{it}) increase.

The bank solves

$$\max_{q_{it}\geq 0} \; m_{it}\, q_{it} \;-\; \frac{1}{2} a_i q_{it}^2 \;-\; \omega_t q_{it}\, \lambda_{it}(q_{it}), \tag{3}$$

where $a_i > 0$ captures increasing marginal balance-sheet or portfolio-management costs such as internal risk limits, liquidity management, or other convex intermediation frictions. This is in the spirit of the quadratic "capacity constraint" in An and Huber (2026).

Substituting (1) and (2) into (3), the objective becomes

$$\max_{q_{it}\geq 0} \; (s_t + \kappa_i x_t)\, q_{it} \;-\; \frac{1}{2}\big(a_i + 2\psi_i \omega_t^2\big) q_{it}^2 \;-\; \omega_t \bar{\lambda}_{it}\, q_{it}. \tag{4}$$

The first-order condition for an interior solution is

$$s_t + \kappa_i x_t - \omega_t \bar{\lambda}_{it} - \big(a_i + 2\psi_i \omega_t^2\big) q_{it} = 0, \tag{5}$$

yielding individual demand

$$q_{it}^{*} = \frac{s_t + \kappa_i x_t - \omega_t \bar{\lambda}_{it}}{a_i + 2\psi_i \omega_t^2}. \tag{6}$$

Equation (6) shows that changes in risk weights ω_t affect the level of demand through the intercept term $-\omega_t \bar{\lambda}_{it}$. Moreover, through the denominator $a_i + 2\psi_i \omega_t^2$, risk weights could also alter the effective curvature, or the sensitivity of demand to both the spread and the basis. Crucially, this sensitivity is governed by the interaction among risk weights, shadow cost (ψ_i) and convexity cost (a_i).

Aggregation and composition of demand. Let A_t denote the set of Japanese banks active in the CLO AAA market at time t. Aggregate Japanese demand is

$$Q_t^{JP} = \sum_{i \in A_t} q_{it}. \tag{7}$$

Using (6), aggregate demand can be written as

$$Q_t^{JP} = \alpha_t + \eta_t s_t + \kappa_t x_t, \tag{8}$$

where

$$\eta_t \equiv \sum_{i \in A_t} \frac{1}{a_i + 2\psi_i \omega_t^2}, \tag{9}$$

$$\kappa_t \equiv \sum_{i \in A_t} \frac{\kappa_i}{a_i + 2\psi_i \omega_t^2}, \tag{10}$$

$$\alpha_t \equiv - \sum_{i \in A_t} \frac{\omega_t \bar{\lambda}_{it}}{a_i + 2\psi_i \omega_t^2}. \tag{11}$$

Equations (9)–(11) show that the aggregate demand sensitivity to spread, η_t, and aggregate demand sensitivity to basis, κ_t, are both functions of institution-level sensitivities. Changes in regulation that affect ω_t alter these sensitivities mechanically, while shocks that shift participation or composition (changes in A_t) modify η_t and κ_t by changing which institutions are marginal in the market.

We note that while banks in the model have similar baseline preferences over the spread they earn on CLOs, they could differ in the regulatory shadow cost they attach to CLO holdings (ψ_i). The model illustrates that differences in shadow cost translate to differences in effective demand sensitivity for CLOs.

For expositional simplicity, we assume a common FX-funding intensity across active banks, $\kappa_i = \bar{\kappa}$. This assumption abstracts from cross-sectional variation in funding mix but preserves the central mechanism, which operates through changes in aggregate demand responsiveness η_t. Under this simplification, the reduced-form sensitivity of CLO demand to funding conditions satisfies $\kappa_t = \bar{\kappa}\eta_t$.

Residual CLO supply. CLO managers issue AAA tranches based on the spread they can offer relative to the benchmark floating rate. The lower the spread, the more profitable the CLO is for the manager, and the more willing the manager is willing to supply. Residual supply, the quantity available to Japanese banks after domestic US demand is absorbed, is therefore

$$Q_t^{CLO} = \bar{Q}_t^{CLO} - \xi s_t, \tag{12}$$

where $\xi \geq 0$ captures the responsiveness of issuance to spreads.

We note that the residual supply curve features only s and not x. This reflects that CLO managers' issuance decisions are directly driven US credit market conditions and not FX funding conditions. However, FX funding conditions can still affect CLO quantities in equilibrium through market clearing.

Residual FX funding supply. Japanese banks must also obtain dollar funding from global FX intermediaries. Let the residual supply of dollar funding via FX derivatives, after netting out other market participants, be:

$$Q_t^{FX} = \bar{Q}_t^{FX} - \nu_t x_t, \tag{13}$$

where $\nu_t > 0$ captures the responsiveness of intermediaries' funding supply to funding conditions. Because higher x_t corresponds to cheaper funding, funding supply decreases in x_t when funding becomes cheaper.

5.3 Equilibrium and Pass-through

An equilibrium is a pair (s^*, x^*) such that the CLO market and the FX funding market both clear:

$$Q_t^{JP} = Q_t^{CLO} = Q_t^{FX}/\bar{\kappa}. \tag{14}$$

Using equations (6) and (12), equilibrium in the CLO market implies:

$$\alpha_t + \eta_t s_t + \kappa_t x_t = \bar{Q}_t^{CLO} - \xi s_t. \tag{15}$$

Solving yields the equilibrium spread as a function of funding conditions:

$$s_t(x_t) = \frac{\bar{Q}_t^{CLO} - \alpha_t}{\eta_t + \xi} - \frac{\bar{\kappa}\eta_t}{\eta_t + \xi} x_t. \tag{16}$$

The implied equilibrium quantity in the CLO market is thus

$$Q_t(x_t) = \bar{Q}_t^{CLO} - \xi\, s_t(x_t) \tag{17}$$

$$= \bar{Q}_t^{CLO} - \xi \frac{\bar{Q}_t^{CLO} - \alpha_t}{\eta_t + \xi} + \xi \frac{\bar{\kappa}\,\eta_t}{\eta_t + \xi}\, x_t. \tag{18}$$

Equations (16) and (18) show how, because of Japanese banks' demand in both the CLO market and the FX funding market, the equilibrium price and quantity in CLO is intimately connected to the equilibrium price in FX funding.

Differentiating (16) and (18), we obtain

$$\frac{\partial s_t}{\partial x_t} = -\frac{\bar{\kappa}\,\eta_t}{\eta_t + \xi}, \tag{19}$$

$$\frac{\partial Q_t}{\partial x_t} = \xi \frac{\bar{\kappa}\,\eta_t}{\eta_t + \xi}. \tag{20}$$

As $\bar{\kappa} > 0$, $\xi \geq 0$, and $\eta_t > 0$, the model directly predicts that CLO spreads decline but quantities increase when funding becomes cheaper (higher x_t).

5.4 Strength of pass-through and its determinants

To examine how the magnitude of pass-through from funding conditions to CLO spreads and quantities is governed by η_t, the Japanese banks' demand sensitivity for CLO, we derive the following mixed partials:

$$\frac{\partial^2 s_t}{\partial x_t \, \partial \eta_t} = -\bar{\kappa} \, \frac{\xi}{(\eta_t + \xi)^2} \leq 0, \tag{21}$$

$$\frac{\partial^2 Q_t}{\partial x_t \, \partial \eta_t} = \bar{\kappa} \, \frac{\xi^2}{(\eta_t + \xi)^2} \geq 0. \tag{22}$$

Thus, stronger funding pass-through to spreads (a more negative $\partial s / \partial x$) is equivalent to higher aggregate demand elasticity η_t.

We summarize how FX funding and US CLO are connected in equilibrium in the following proposition.

Proposition 5.1 (Aggregate determinants of funding pass-through to spreads and quantities)**.** *Assume $\bar{\kappa} > 0$, $\xi \geq 0$, and $\eta_t > 0$.*

1. *CLO spreads are decreasing in funding conditions:*

$$\frac{\partial s_t}{\partial x_t} = -\frac{\bar{\kappa} \, \eta_t}{\eta_t + \xi} < 0.$$

2. *CLO quantities are increasing in funding conditions:*

$$\frac{\partial Q_t}{\partial x_t} = \xi \, \frac{\bar{\kappa} \, \eta_t}{\eta_t + \xi} \geq 0,$$

   with strict inequality when $\xi > 0$.

3. *The magnitude of spread pass-through weakly increases with demand elasticity:*

$$\frac{\partial}{\partial \eta_t} \left| \frac{\partial s_t}{\partial x_t} \right| = \bar{\kappa} \, \frac{\xi}{(\eta_t + \xi)^2} \geq 0.$$

   Equivalently, $\partial^2 s_t / (\partial x_t \, \partial \eta_t) \leq 0$.

4. *The quantity sensitivity to funding conditions also weakly increases with demand elasticity, albeit at a slower rate when $\xi < 1$:*

$$\frac{\partial^2 Q_t}{\partial x_t\, \partial \eta_t} = \bar{\kappa}\, \frac{\xi^2}{(\eta_t + \xi)^2} \geq 0.$$

Proposition 5.1 illustrates that the pass-through from FX funding conditions to US CLO pricing need not be stationary but are shaped by Japanese banks' CLO demand sensitivity, η. Specifically, assuming a constant issuance responsiveness ξ, observing stronger spread pass-through implies a larger η_t.

Importantly, η_t is the aggregate demand sensitivity of Japanese banks (Equation (9)), and it is therefore changed when individual institutions that comprise the banking sector are affected. Specifically, although all banks have the same baseline preference over the spread they can earn on CLOs, differences in their regulatory shadow cost and/or convexity cost would lead to differences in their demand sensitivity. When, for example, regulatory cost on CLO rises, banks with steep marginal costs (high ψ_i, high α_i) are likely to exit the market, leaving banks with more scalable balance-sheet capacity and reduces the aggregate η_t.

We derive further results on how shocks to individual banks affect the strength of funding pass-through.

Proposition 5.2 (Determinants of η_t and strength of pass-through to spread)**.** *Let η_t be defined by* (9)*, and define spread pass-through*

$$\Pi_t \equiv \frac{\partial s_t}{\partial x_t} = -\frac{\bar{\kappa}\, \eta_t}{\eta_t + \xi}, \qquad \bar{\kappa} > 0,\ \xi \geq 0,\ \eta_t > 0.$$

Then:

1. *(*Primitives.*) For any active bank $i \in A_t$, the individual spread elasticity satisfies*

$$\frac{\partial}{\partial a_i}\left(\frac{1}{a_i + 2\psi_i \omega_t^2}\right) < 0, \quad \frac{\partial}{\partial \psi_i}\left(\frac{1}{a_i + 2\psi_i \omega_t^2}\right) < 0, \quad \frac{\partial}{\partial \omega_t}\left(\frac{1}{a_i + 2\psi_i \omega_t^2}\right) < 0.$$

   Accordingly, holding the active set A_t fixed, η_t is decreasing in each of a_i, ψ_i, and ω_t.

2. *(*Composition.*) A change in the active set A_t alters η_t through the entry/exit of banks with different denominators $(a_i + 2\psi_i \omega_t^2)$. In particular, composition shifts that increase the weight of banks with lower $(a_i + 2\psi_i \omega_t^2)$ increase η_t.*

3. (Equivalence with stronger pass-through.) *Holding $\bar{\kappa}$ and ξ fixed, the magnitude of pass-through is strictly increasing in η_t when $\xi > 0$:*

$$\frac{\partial}{\partial \eta_t}|\Pi_t| = \bar{\kappa}\,\frac{\xi}{(\eta_t + \xi)^2} > 0.$$

Therefore, for any two regimes with (η_t, ξ) and $(\tilde{\eta}_t, \xi)$,

$$|\tilde{\Pi}_t| > |\Pi_t| \quad \Longleftrightarrow \quad \tilde{\eta}_t > \eta_t.$$

Equivalently, observing stronger pass-through implies that aggregate demand became more elastic, which requires a change in primitives and/or composition that increases η_t.

As Proposition 5.1 shows, the effect of demand sensitivity on the strength of pass-through to quantity is qualitatively similar to the effect on the strength of pass-through to price. Proposition 5.2 therefore also applies to quantity passthrough, albeit at a possibly different intensity if $\xi \neq 1$.

6 Identification

The aggregate evidence in Section 4 documents a strong positive correlation between the cross-currency basis and CLO AAA spreads, and reveals a striking structural break: the sensitivity of AAA spreads to the basis triples after 2019. The model in Section 5 generates testable predictions to explain this regime shift: shocks that make Japanese banks' CLO demand more elastic should increase the sensitivity of CLO spread to cross-currency basis.

This section brings three identification strategies to test the relationship between aggregate demand elasticity and strength of cross-market pass-through. We first exploit two quasi-natural experiments: Japan's implementation of Basel III securitization risk weights in 2019 plausibly increased the aggregate demand elasticity (Section 6.1), and the Bank of Japan's November 2023 policy normalization plausibly reduced the elasticity (Section 6.2). We then use quarter-end assessment of regulatory capital to conduct a higher-frequency test of the effect of aggregate demand elasticity (Section 6.3). All three tests identify the same underlying mechanism of demand elasticity modulating the strength of pass-through between two distant markets.

6.1 Natural Experiment 1: JFSA Basel III Securitization Rules (March 2019)

6.1.1 Institutional Background

In December 2018, the Japan Financial Services Agency published draft amendments to its banking capital requirements implementing the Basel III securitization framework. After a public comment period, the JFSA adopted the final rules on March 15, 2019, effective March 31, 2019.[13] The regulation imposed two distinct cost increases on Japanese banks holding CLO positions: a risk retention requirement backed by punitive risk weights, and heightened due diligence obligations that substantially increased the operational burden of CLO investment.

Under the revised framework, Japanese banks investing in securitization exposures were required to verify that the *originator* of the underlying assets, or a sponsor or arranger "deeply involved" in the securitization process, had retained at least 5% of the credit risk of the securitized pool, in vertical, horizontal, or L-shaped form. For exposures that failed this verification, the JFSA tripled the applicable risk weights.[14]

For US CLOs, compliance with the originator retention requirement was difficult as CLO managers are not the originators of the underlying leveraged loans. CLOs acquire loans in the secondary market on behalf of the CLO issuing entity. In the United States, the Dodd-Frank Act's risk retention rules had briefly required CLO managers to retain a 5% interest, but the D.C. Circuit's February 2018 ruling in *Loan Syndications and Trading Association v. SEC* held that open-market CLO managers are not "securitizers" under the statute and therefore have no retention obligation.[15] The US risk retention regime for open-market CLOs was thus effectively vacated one year before the JFSA rule took effect, creating a sharp divergence: at the moment Japan imposed its retention requirement, no analogous obligation existed in the United States.

The JFSA rule did provide an exception for cases where the bank could demonstrate, through independent analysis of the underlying assets and the manager's investment cri-

[13]The JFSA simultaneously published responses to public comments and a series of Q&As providing interpretive guidance. See Nolan and Sako (2019) and Williams et al. (2019) for detailed analyses of the rule.

[14]Specifically, the risk weight for non-compliant securitization exposures was multiplied by a factor of three. For a AAA-rated CLO tranche that would otherwise receive a risk weight of approximately 15–20% under the internal ratings-based approach, the penalty risk weight rose to 45–60%, still well below the maximum 1,250% risk weight applied to unrated or re-securitization exposures, but a substantial increase in required capital. For lower-rated tranches, the penalty could bind more tightly.

[15]No. 17-5004 (D.C. Cir. Feb. 9, 2018). The court found that CLO managers, who direct asset acquisitions on behalf of the issuing entity through open-market purchases, do not "sell or transfer" assets to the issuer and therefore fall outside the statutory definition of securitizer. The government did not appeal.

teria, that "no improper original assets are structured." In practice, however, satisfying this exception required Japanese banks to conduct loan-level reviews of the CLO's collateral portfolio, a substantial due diligence burden given that a typical BSL CLO holds 200–300 individual leveraged loans originated by dozens of arranging banks.[16]

Motivating evidence. The regulation's impact is visible in aggregate quantities. Japanese banks' CLO holdings, which had grown at a compound annual rate of approximately 36% between fiscal years 2015 and 2018 (from ¥5.1 to ¥12.8 trillion), decelerated to approximately 6% per year after 2019, a sixfold slowdown shown in Figure 1 and Appendix Figure B.4.[17] The Japanese share of US CLO AAA tranches declined from its 2019 peak of approximately 35% to roughly 20% by 2024, as domestic US institutions and CLO ETFs absorbed the margin (Figure 2). We now examine whether this demand shift altered the transmission from funding costs to CLO pricing.

6.1.2 Relevance and identification properties

Two aspects of the rule's scope are important for the design of our test. First, the regulation applied only to securitization exposures *acquired after* March 31, 2019; it was not retroactive to existing portfolio holdings. The cost increase thus operated primarily on the flow of new Japanese demand, directly affecting the CLO issuance market that we study. Second, the regulation applied uniformly to all Japanese banks supervised by the JFSA, including the megabanks (MUFG, SMFG, Mizuho), trust banks, and the cooperative banking system (Norinchukin). Regional banks with smaller compliance teams found the due diligence requirements particularly burdensome, and many appear to have curtailed CLO purchases entirely, leading to heterogeneous exit of marginal investors that have higher regulatory shadow cost and thus more inelastic demand.

Several additional features of the March 2019 shock make it attractive for identification. First, the timing is sharp: the draft rule was published in December 2018, finalized on March 15, 2019, and took effect on March 31, 2019, providing clean pre-announcement and post-implementation event dates. Appendix Figure B.6 confirms that the 2019 break observed in Figure 5 is unique. We estimate the Post $\times$ Basis interaction for every candi-

[16] Unlike the EU risk retention regime, which requires the *originator* (or sponsor or original lender) to retain a 5% interest and places the compliance burden primarily on the sell side, the JFSA rule placed the verification burden squarely on the *investing* bank. The consequence of non-compliance was also harsher under the Japanese framework: risk weight tripling, versus potential regulatory sanction but no automatic capital penalty under the EU approach.

[17] Investment-grade corporate bond holdings, which were not subject to the risk retention or due diligence requirements, decelerated far less, from roughly 6% to 2% annual growth, confirming that the shock was specific to securitization exposures.

date break year from 2014 to 2023. The coefficient is largest and most precisely estimated at 2019, with a monotonic decline from earlier candidate dates and flattening thereafter. A quarterly version pinpoints 2019Q1, the quarter of the Basel III effective date, as the sharpest break, with some anticipatory movement at 2018Q4 consistent with the draft rule's circulation in December 2018.

Second, the regulation was specific to Japanese prudential policy, driven by the Basel III implementation calendar and JFSA's supervisory stance, and plausibly exogenous to conditions in the US leveraged loan and CLO markets. As such, the regulation plausibly operated *exclusively* through the demand side: it raised the cost of holding CLOs for Japanese banks but did not affect CLO supply, which is determined by leveraged loan origination, warehouse financing, and structuring economics. Third, the regulation was specific to holdings of CLO and likely did not directly alter conditions in FX swap markets, which are governed by global intermediaries' balance sheet constraints and global dollar funding dynamics. These features allow us to directly test the model, which links the strength of pass-through between FX funding and the CLO market to the demand sensitivity of Japanese banks.

6.1.3 Tranche-Level Evidence

Table 4 exploits cross-sectional variation across AAA tranches issued in a five-year window around the Basel III implementation (2017–2021). The estimating equation is:

$$y_{i,t} = \beta_1 \,\text{Basis}_t + \beta_3 \,(\text{Basis}_t \times \text{Post}_t) + \mathbf{X}_{i,t} + \varepsilon_{i,t}, \tag{23}$$

where $\text{Post}_t = \mathbf{1}[t \geq 2019]$ corresponds to the JFSA's Basel III effective date, and $\mathbf{X}_{i,t}$ denotes progressively richer sets of fixed effects. Year fixed effects absorb the Post main effect along with all annual macroeconomic variation. Column (1) includes year and benchmark rate fixed effects. Column (2) adds manager fixed effects. Column (3) adds arranger fixed effects.

Panel A reports spread results. The coefficients on the basis are negative and significant across all specifications: cheaper FX funding compresses AAA spreads, consistent with Proposition 5.1. The interaction coefficients range from -1.50 to -1.91 and are significant at the 1% level throughout. In the preferred specification (column 3), a 10-basis-point improvement in the basis is associated with an additional 19 basis points of spread response after 2019, on top of the pre-2019 baseline sensitivity of approximately 2.7 basis points. The strengthening of pass-through from funding conditions to CLO spreads is consistent with Proposition 5.2: the exit of high-cost banks increased the aggregate demand elasticity of the remaining investor base, amplifying how funding shocks transmit into CLO pricing. The insensitivity of the interaction to the inclusion of manager and arranger fixed effects rules out the possibility that the regime shift reflects changes in the composition of CLO issuers rather than a change in investor demand.

Panel B reports results for log AAA tranche size. The interaction is positive and significant in columns (2) and (3), indicating that tranche sizes also became more responsive to funding conditions after the regulatory shock. The direction is consistent with the spread result: both prices and quantities exhibit amplified pass-through when demand is more elastic. The main effect of the basis on quantity is statistically indistinguishable from zero in this specification, in contrast to the positive and significant relationship in Table 1. One interpretation is that issuance responsiveness to spreads (ξ) is limited at the tranche level and over shorter horizons, so that the quantity response is attenuated even when demand elasticity increases.

6.2 Natural Experiment 2: BOJ Policy Normalization (2023–2024)

6.2.1 Institutional Background

Between October 2023 and March 2024, the Bank of Japan undertook a fundamental shift in monetary policy. In October 2023, the BOJ effectively abandoned its yield curve control (YCC) policy by redefining the 1% cap on 10-year JGB yields as a "reference point" rather than a rigid ceiling.[18] In March 2024, the BOJ raised the policy rate for the first time in 17 years, ending the negative interest rate regime. Together, these actions represented the most significant tightening of Japanese monetary policy in a generation.

By raising domestic yen bond yields, the policy normalization increased the attractiveness of the outside option for Japanese banks. Yen-denominated government bonds, which had offered near-zero or negative yields for nearly a decade, suddenly became a viable alternative to dollar-denominated CLO investments that require costly FX funding. Unlike the Basel III shock, which raised regulatory costs heterogeneously and induced selective exit by high-cost banks, the BOJ normalization raised the opportunity cost of CLO investment across all Japanese institutions. In the model, this increase of opportunity cost raises ψ_i and lowers aggregate demand elasticity η_t (Proposition 5.2). Thus, the

[18]The BOJ had introduced YCC in September 2016, initially targeting the 10-year JGB yield at approximately 0%. The cap was gradually loosened: from $\pm 0.25\%$ in December 2022, to $\pm 0.50\%$ in July 2023, and then effectively removed in October 2023 when the BOJ characterized the 1% level as a reference rather than a ceiling. The 10-year JGB yield subsequently rose above 0.9% and has traded between 0.8% and 1.1% since.

model predicts that the BOJ shock should *weaken* the pass-through from funding conditions to both CLO spreads and quantities.

6.2.2 Difference-in-Differences

Table 5 reports difference-in-differences estimates in a five-year window (2021–2025), with Post equal to one from November 2023 onward. The sample is AAA-rated US CLO tranches. The estimating equation follows equation (23), with $\text{Post}_t = \mathbf{1}[t \geq \text{Nov } 2023]$. Because the BOJ's normalization started in October 2023, year fixed effects do not absorb the Post main effect in this specification. Column (1) includes year and benchmark rate fixed effects. Column (2) adds manager fixed effects. Column (3) adds arranger fixed effects.

Panel A reports spread results. The main effect of the basis is negative and strongly significant, with a magnitude of approximately -2.1, larger than the Basel III pre-period coefficient of -0.37, reflecting the already-steepened post-2019 regime that serves as the baseline for this test. The interaction coefficient is positive and significant across all specifications, ranging from 0.42 to 0.48. The positive sign indicates that basis pass-through to spreads *weakened* after the BOJ shock: the post-normalization slope, while still strongly negative, is approximately 20% shallower than the pre-normalization slope. This is the mirror image of the Basel III result, where the interaction was negative (stronger pass-through), and is precisely what the model predicts when demand becomes more inelastic. Basel III induced selective exit of high-cost banks, leaving a more elastic residual investor base and amplifying pass-through. The BOJ normalization, by contrast, raised the outside option uniformly, increasing the shadow cost of CLO investment across all Japanese banks and compressing aggregate demand elasticity.

Panel B reports results for log AAA tranche size. The main effect of the basis is positive and significant: cheaper funding is associated with larger tranches, consistent with Proposition 5.1. The interaction is negative and significant across all specifications, indicating that tranche sizes also became less responsive to funding conditions after the BOJ shock. Both price and quantity pass-through weakened in the same direction, consistent with a reduction in aggregate demand elasticity η_t.

The two natural experiments thus move the same structural parameter, aggregate demand elasticity η_t, in opposite directions through distinct mechanisms. The model's predictions are thus confirmed in both directions: stronger pass-through when demand is more elastic, weaker pass-through when demand is more inelastic.

6.2.3 Event-Study Evidence

Figure 6 provides dynamic evidence on the timing of the BOJ effect. We estimate expanding-window regressions of AAA spreads on the basis around November 2023. Pre-event estimates use expanding backward windows $[k, -1]$ for $k \in \{-12, \ldots, -2\}$, each normalized by subtracting the full pre-event slope, so that the series is centered around zero and measures deviations from the baseline sensitivity. The hollow circle at month -1 denotes the omitted base period ($\beta = 0$ by construction). Post-event estimates report difference-in-differences interaction coefficients from regressions on the combined pre- and post-event samples $[-12, -1] \cup [0, k]$ for $k \in \{0, \ldots, 12\}$, measuring the change in basis sensitivity relative to the pre-event baseline.

The pre-event coefficients are flat and centered near zero, indicating a stable spread-basis relationship in the months leading up to the policy change; there is no evidence of pre-trends. The slope shifts at the event date, and the estimates remain statistically significant through the end of the post-event window. The absence of pre-trends and the break at the event date supports the interpretation that the BOJ policy normalization caused the change in basis transmission, rather than reflecting a pre-existing trend or coincident shock.

6.3 Quarter-End Effects

The two quasi-natural experiments exploit discrete regulatory and policy shocks that permanently altered the demand elasticity of the Japanese investor base, with the Basel III implementation increasing it, and the BOJ normalization decreasing it. We now turn to a source of variation that operates at higher frequency: predictable within-year cycles in regulatory costs driven by balance-sheet reporting.

Japanese banks' regulatory capital is assessed using quarter-end balance-sheet snapshots. As a result, the shadow cost of regulatory capital (ψ_i) spikes at quarter-ends. In the model, a higher ψ_i reduces each bank's demand sensitivity to the spread, lowering the aggregate demand elasticity η_t (Equation **??**). Proposition 5.2 then predicts that the magnitude of basis pass-through to both spreads and quantities weakly declines. Intuitively, when the marginal regulatory cost is elevated, a larger increase in expected return is required to induce the same quantity of CLO investment, muting the responsiveness of both prices and quantities to funding conditions.

6.3.1 Tranche-Level Evidence

Table 6 reports tranche-level regressions of CLO AAA outcomes on the cross-currency basis, a quarter-end indicator, and their interaction, with progressively saturated fixed effects.

Panel A reports spread results. The main effect of the basis is negative and significant across all specifications: cheaper FX funding compresses AAA spreads, consistent with Proposition 5.1. The interaction term is positive and significant in columns (1) and (2). The coefficient continues to be significant in column (3), where we replace year and quarter fixed effects with year-quarter fixed effects to absorb all quarterly-level variation in the basis. Identification in this specification comes exclusively from within-quarter differences between quarter-end and non-quarter-end months. Together, the evidence shows that the spread-basis relationship is attenuated at quarter-ends. In the preferred specification of column 3 (with year-quarter, and benchmark rate fixed effects), a 10-basis-point improvement in the basis compresses spreads by approximately 3.7 basis points in non-quarter-end months but only by approximately 2.9 basis points at quarter-ends, a roughly 20% reduction in pass-through.

Panel B reports results for log AAA tranche size. The interaction is negative and significant across all three specifications, indicating that the positive relationship between the basis and tranche size is also attenuated at quarter-ends. At quarter-ends, both the price and quantity channels of basis pass-through are dampened, consistent with a temporary reduction in aggregate demand elasticity. Appendix Table C.2 confirms that the attenuation extends to the extensive margin: the number of CLO deals priced per month is also less responsive to the basis at quarter-ends.

6.3.2 Within-Deal Evidence

Appendix Table C.3 exploits variation across tranches of the same CLO issued in the same month to test whether the quarter-end effect is concentrated in AAA, where Japanese banks are marginal. With CLO$\times$month fixed effects absorbing all deal-level and time-varying heterogeneity, the triple interaction AAA$\times$Basis$\times$Quarter-End is significant for both spreads and tranche size. The quarter-end attenuation thus operates precisely at the top of the capital structure, where Japanese banks concentrate their holdings, and not in mezzanine tranches where other investor classes are marginal. Any explanation based on broad seasonal patterns in CLO issuance would affect all tranches symmetrically and be absorbed by the deal-time fixed effects.

Taken together, the quarter-end results reinforce the mechanism identified by the two natural experiments. All three tests point to the same structural parameter: the aggregate demand elasticity η_t of Japanese banks governs the strength of pass-through from FX funding conditions to CLO pricing. Basel III increased η_t permanently through compositional selection; the BOJ shock and quarter-end reporting cycles decrease η_t through elevated shadow costs. The model's predictions are confirmed across all three settings.

7 Conclusion

This paper studies how foreign investor demand transmits across asset and funding markets, using the CLO market as a laboratory in which the marginal investors, their constraints, and the shocks they face are all observable. Japanese banks hold roughly one-quarter of all US CLO AAA tranches and fund these positions by swapping yen into dollars in FX derivative markets. Their joint presence in both markets creates an equilibrium linkage: the JPY-USD cross-currency basis, determined in the FX funding market, shapes the pricing and issuance of US structured credit. The basis alone explains over 60% of the quarterly variation in CLO issuance volume, and its effect on AAA spreads remains robust to a comprehensive set of US macrofinancial controls.

Our central finding is that the strength of this cross-market transmission is governed by the demand elasticity of the marginal investor, and that this elasticity is itself endogenous to policy. Two quasi-natural experiments demonstrate the mechanism. Japan's 2019 Basel III implementation raised the regulatory cost of CLO investment heterogeneously, driving out banks with high shadow costs and leaving a more elastic residual investor base and strengthened the pass-through from funding conditions to CLO spreads and quantities. The Bank of Japan's 2023–2024 policy normalization operated in the opposite direction: by raising domestic yen returns, it increased the opportunity cost of CLO investment across all Japanese banks, compressing aggregate demand elasticity and weakening pass-through. The two shocks thus move the same structural parameter in opposite directions, and in both cases the model's prediction is confirmed. Quarter-end balance-sheet reporting cycles corroborate the mechanism at high frequency, as the temporary spike in regulatory shadow costs dampens pass-through within the year.

These findings yield three insights. First, asset market equilibrium and funding market equilibrium are jointly determined when common investors are marginal in both. The literature has largely studied these markets in isolation, documenting the effects of foreign demand on either asset prices or funding conditions, but not the feedback between them. Our two-market framework shows that shocks entering at either node propagate to both prices through the portfolio and funding decisions of Japanese banks. CLO spreads are therefore not determined solely by US credit conditions: the cross-currency basis originating entirely outside the US credit system, exerts explanatory power that rivals conventional domestic risk factors.

Second, regulatory and monetary policy shocks do not merely shift demand curves; they tilt them. After Basel III, US CLO pricing became *more* sensitive to foreign funding conditions even as Japanese ownership of AAA tranches declined from approximately 35% to 20%. After the BOJ normalization, pass-through weakened even though Japanese banks remained substantial holders. This implies that a market's exposure to foreign capital cannot be inferred from foreign ownership shares alone: what matters is the elasticity of foreign demand, which is itself endogenous to regulation and monetary policy in the creditor country.

Third, the mechanism we document is not specific to CLOs. AAA CLO tranches are highly rated, historically loss-free, floating-rate instruments that function as safe dollar assets for foreign institutions. The same logic, that elasticity of foreign demand governs transmission of shocks from FX funding to domestic credit supply, should apply to other segments of US fixed income with substantial and concentrated foreign ownership. Whether Treasuries, agency MBS, or investment-grade corporate bonds exhibit similar joint determination with funding markets, and whether regulatory or monetary shocks in creditor countries reshape their pricing sensitivity, are questions our framework is designed to address.

The policy implications follow directly. Changes in Japanese prudential regulation, BOJ monetary policy, or balance-sheet capacity reshape how forcefully funding shocks transmit to the pricing of new US CLO deals. The post-Basel III regime, in which AAA spreads became substantially more sensitive to the basis, represented a period of heightened exposure of US leveraged credit to shocks originating in the Japanese financial system. The subsequent BOJ normalization partially reversed this sensitivity, illustrating that the exposure is not fixed but fluctuates with the constraints and opportunities facing the marginal investor.

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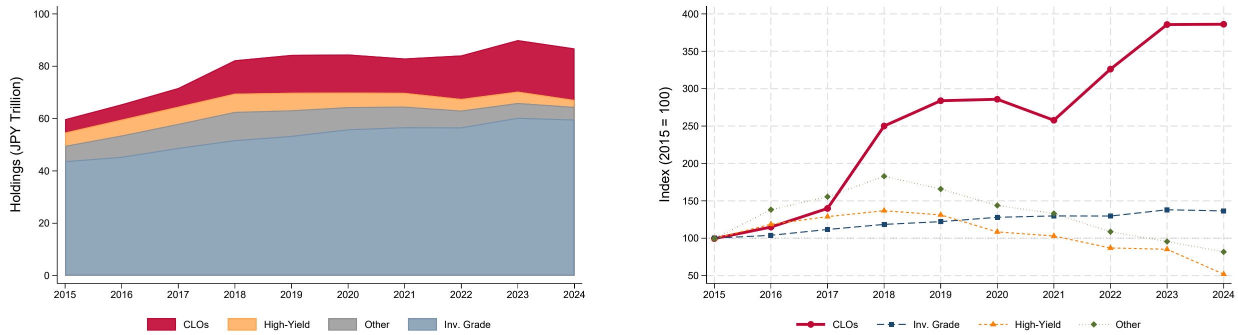
Figures and Tables

Figure 1: Japanese Banks' Overseas Credit Holdings and CLO Growth

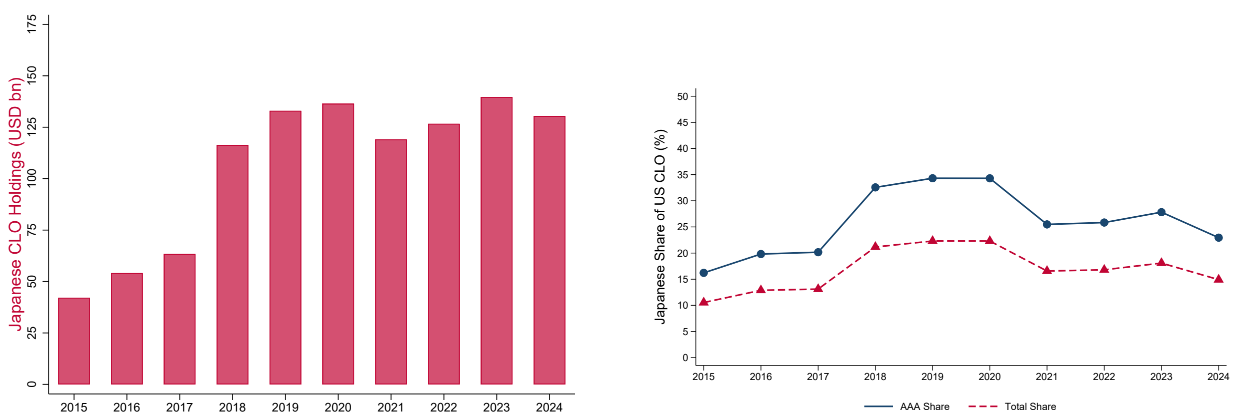


(a) Composition of Overseas Credit

(b) Growth by Asset Class (2015 = 100)

Notes: This figure presents Japanese banks' overseas credit holdings using data from the Bank of Japan Financial System Report. Panel (a) shows the composition of holdings across four categories: investment-grade corporates, high-yield corporates, CLOs, and other structured products. Panel (b) indexes each category to 100 in 2015. The dashed vertical line marks Japan's implementation of Basel III risk retention requirements in March 2019.

Figure 2: Japanese Banks' Share of the US CLO Market and Concentration of AAA Tranche

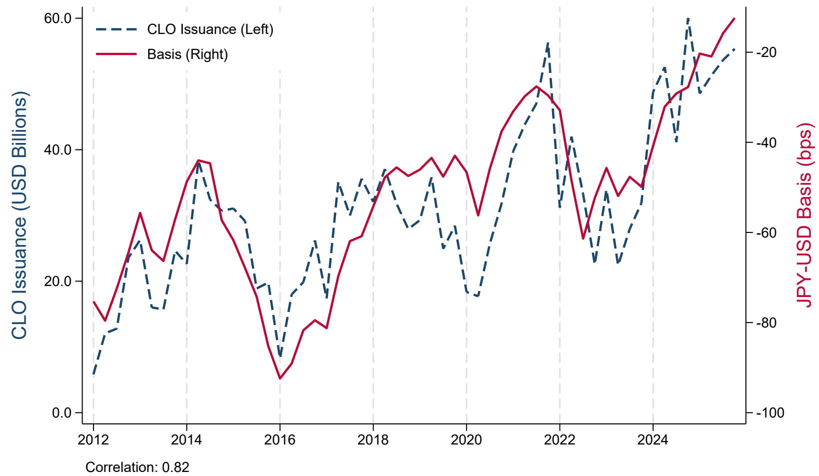


(a) Holdings vs. Market Size

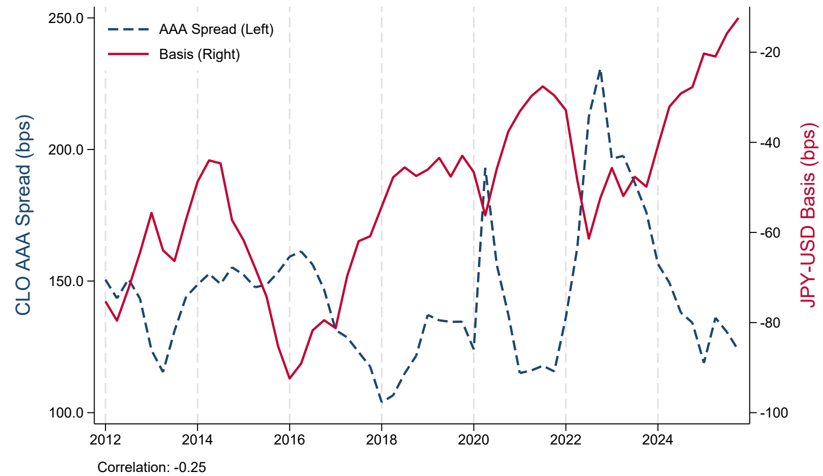
(b) Share of US CLO AAA Outstanding

Notes: Panel (a) plots Japanese banks' CLO holdings in USD billions, where outstanding is constructed using a perpetual inventory method with a 13% annual runoff rate applied to issuance data. Panel (b) plots the Japanese share of US CLO AAA outstanding, alongside their share of total US CLO issuance. The solid line adjusts for the fact that Japanese banks also hold European CLOs (estimated at 5–25% of total CLO holdings depending on year); the dashed line shows the unadjusted upper bound.

Figure 3: CLO Market Activity and JPY-USD Cross-Currency Basis



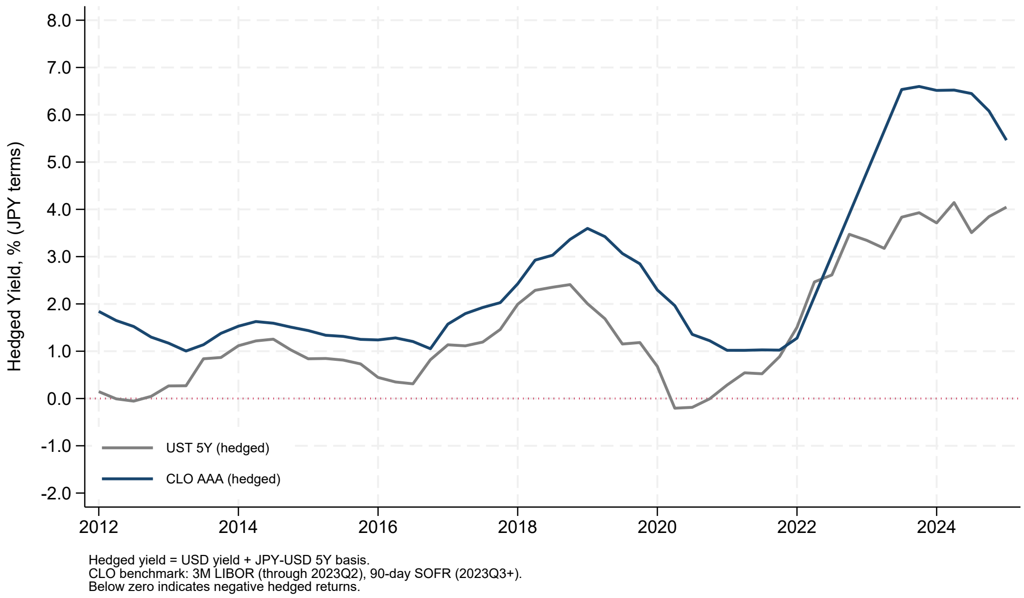
(a) Issuance Volume



(b) AAA Spreads

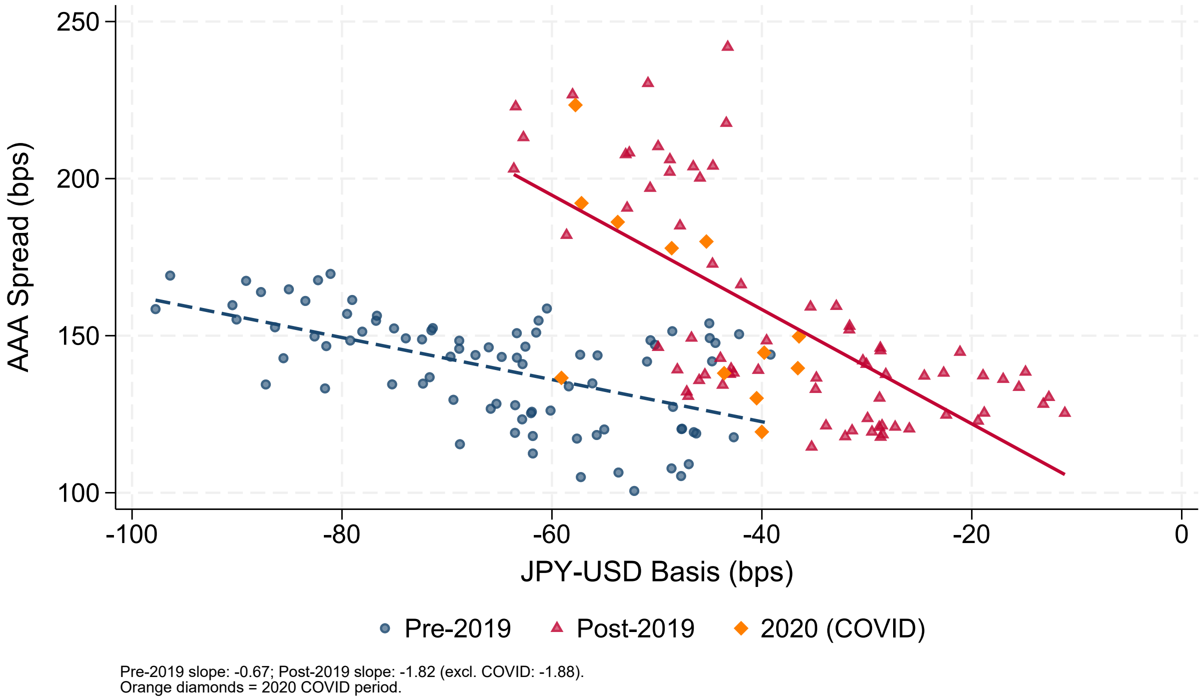
Notes: This figure plots quarterly CLO market outcomes against the 5-year JPY-USD cross-currency basis swap mid price (basis points, right axes) from 2012Q1 to 2025Q1. Panel (a) shows US CLO issuance volume in USD billions (left axis). Panel (b) shows the average US CLO AAA discount margin in basis points (left axis). The cross-currency basis measures the cost for Japanese investors to hedge dollar-denominated CLO exposure back to yen; a more negative basis indicates higher hedging costs.

Figure 4: FX-Funded Yields for Japanese Investors



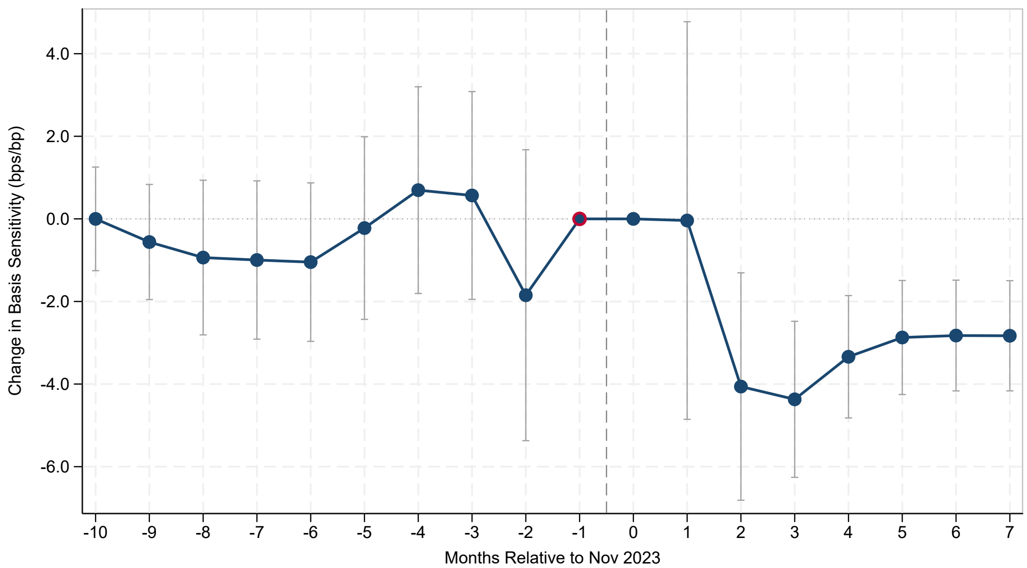
Notes: This figure plots the yield, after accounting for FX funding, on two dollar assets available to Japanese banks: five-year US Treasuries (gray) and CLO AAA tranches (navy). FX-funded yields are computed as the dollar yield plus the five-year JPY–USD cross-currency basis swap rate, which captures the cost of obtaining yen-funded dollars using FX swaps. The CLO AAA yield is the three-month floating-rate benchmark (LIBOR through 2023Q2, 90-day average SOFR thereafter) plus the AAA discount margin at issuance. The dashed horizontal line marks zero: observations below this line indicate that FX-funded returns are negative, implying that Japanese investors pay more to fund their positions than they earn on the underlying dollar asset. The sample is quarterly, 2012Q1–2025Q1.

Figure 5: AAA Spread vs. JPY-USD Basis: Pre- and Post-2019



Notes: This figure plots mean AAA tranche discount margins against the JPY-USD cross-currency basis, separately for the pre-2019 (circles) and post-2019 (triangles) periods. Observations are collapsed by unique basis–period pairs. Orange diamonds indicate 2020 (COVID) observations. OLS regression lines are shown for each subperiod; the post-2019 line includes COVID observations. The sample includes all US CLO AAA tranches issued between 2012 and 2025. All specifications include manager and benchmark rate fixed effects.

Figure 6: Recursive Window Analysis: AAA Spread Sensitivity to JPY-USD Basis Around BOJ Normalization



Notes: This figure plots expanding-window estimates of the sensitivity of AAA discount margins to the JPY-USD basis around the Bank of Japan's yield curve control adjustment (event month: November 2023). Pre-event estimates use expanding backward windows $[k, -1]$ for $k \in \{-10, \ldots, -2\}$, each normalized by subtracting the full pre-event slope. The hollow circle at month -1 denotes the omitted base period ($\beta = 0$ by construction). Post-event estimates report difference-in-differences interaction coefficients from regressions on the combined pre- and post-event samples $[-10, -1] \cup [0, k]$ for $k \in \{0, \ldots, 7\}$, measuring the change in basis sensitivity relative to the pre-event baseline. The sample window spans January 2023 through June 2024 and is restricted to AAA-rated US CLO tranches. Vertical bars denote 95% confidence intervals based on robust standard errors.

Table 1: JPY-USD Basis and CLO Issuance Activity

	(1)	(2)	(3)
	ln(Volume)	ln(Deals)	AAA Spread
JPY-USD Basis	0.0194***	0.0189***	-0.3402***
	(0.0023)	(0.0020)	(0.0892)
Constant	4.3433***	5.0502***	126.7134***
	(0.0980)	(0.0887)	(5.5740)
N	56	56	56
R^2	0.6163	0.6665	0.0612

Notes: This table reports OLS regressions of quarterly CLO market outcomes on the 5-year JPY-USD cross-currency basis swap mid price. The dependent variables are the log of quarterly CLO issuance volume in USD billions (column 1), the log of the number of CLO deals priced per quarter (column 2), and the average AAA discount margin in basis points (column 3). The sample consists of 56 quarterly observations from 2012Q1 to 2025Q1. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 2: JPY-USD Basis and US CLO AAA Spreads

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
JPY-USD Basis	-0.3402***	-0.5478***	-0.9032***	-0.6654***	-0.5113*	-0.6417**	-0.6417**	-0.5516*
	(0.0892)	(0.1358)	(0.1631)	(0.2100)	(0.2728)	(0.3017)	(0.3017)	(0.3089)
VIX		1.1984	1.7062***	1.1244	0.0346	0.0181	0.0181	-0.1828
		(0.8455)	(0.5819)	(0.6832)	(1.3851)	(1.4465)	(1.4465)	(1.4395)
MOVE		0.6742***	0.4859***	0.4922***	0.5403***	0.5685***	0.5685***	0.4221*
		(0.1748)	(0.1575)	(0.1583)	(0.1485)	(0.1664)	(0.1664)	(0.2265)
JPY-USD		0.0670	0.0760	0.0899	0.0689	0.1290	0.1290	0.0153
		(0.1730)	(0.1641)	(0.1778)	(0.1721)	(0.1525)	(0.1525)	(0.2236)
Commercial Paper Spread			-82.6641***	-64.9017**	-54.2949*	-31.1587	-31.1587	-57.7742
			(23.0664)	(28.3436)	(28.3045)	(40.7694)	(40.7694)	(53.0167)
BAA-AAA Spread				21.0682	25.9816*	14.8212	14.8212	4.2999
				(14.2509)	(15.4167)	(18.1476)	(18.1476)	(20.6223)
Term Spread				-0.3207	0.9038	-3.4200	-3.4200	0.8460
				(3.0855)	(3.4214)	(4.5394)	(4.5394)	(6.1757)
Bank Volatility					0.5384	0.7895	0.7895	0.7225
					(0.5531)	(0.6741)	(0.6741)	(0.6826)
IP Growth						3.4104	3.4104	4.0372*
						(2.0793)	(2.0793)	(2.1613)
Unemployment						5.1650	5.1650	4.4968
						(3.4628)	(3.4628)	(3.3657)
NFCI								59.3814
								(62.0608)
N	56	56	56	56	56	56	56	56
R^2	0.061	0.583	0.668	0.679	0.685	0.700	0.700	0.709

Notes: This table reports OLS regressions of the quarterly average US CLO AAA discount margin (basis points) on the 5-year JPY-USD cross-currency basis swap mid price and progressively richer sets of controls. The estimating equation is $s_t = \alpha + \beta\,\text{Basis}_t + \mathbf{X}_t'\gamma + \varepsilon_t$, where $\mathbf{X}_t$ is a vector of macrofinancial controls added progressively across columns. The sample consists of 56 quarterly observations from 2012Q1 to 2025Q1. VIX is the CBOE Volatility Index. MOVE is the Merrill Lynch Option Volatility Estimate index for Treasury markets. Commercial Paper Spread is the 3-month AA commercial paper minus 3-month Treasury spread. BAA-AAA Spread is the Moody's corporate bond credit spread. Term Spread is the 10-year minus 2-year Treasury yield. Bank Volatility is the KBW Bank Sector Volatility Index. IP Growth is industrial production growth. Unemployment is the civilian unemployment rate. NFCI is the Chicago Fed National Financial Conditions Index. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Cross-Market Placebo: JPY-USD Basis and Spreads

	(1) CLO AAA	(2) Treasury Fixed	(3) Treasury Floating	(4) HY
JPY-USD Basis	-0.5516*	0.0133	-0.0894	-0.0000
	(0.3089)	(0.0106)	(0.1487)	(0.0001)
VIX	-0.1828	-0.0463	-0.5875	-0.0002
	(1.4395)	(0.0420)	(0.4715)	(0.0005)
MOVE	0.4221*	0.0054	0.1983**	0.0002**
	(0.2265)	(0.0060)	(0.0874)	(0.0001)
JPY-USD	0.0153	0.0257***	0.3469***	0.0000
	(0.2236)	(0.0070)	(0.1102)	(0.0001)
Commercial Paper Spread	-57.7742	0.2139	61.0255***	-0.0085
	(53.0167)	(1.5829)	(20.1038)	(0.0185)
BAA-AAA Spread	4.2999	-0.5079	25.4356***	-0.0039
	(20.6223)	(0.5874)	(7.3114)	(0.0062)
Term Spread	0.8460	-0.4946**	-9.3435***	-0.0018
	(6.1757)	(0.1910)	(2.4216)	(0.0019)
Bank Volatility	0.7225	-0.0207	0.1874	-0.0003
	(0.6826)	(0.0222)	(0.2988)	(0.0003)
IP Growth	4.0372*	0.2031**	-0.7069	0.0029***
	(2.1613)	(0.0953)	(0.7165)	(0.0010)
Unemployment	4.4968	0.1363	1.9424	0.0043***
	(3.3657)	(0.1406)	(1.4502)	(0.0014)
NFCI	59.3814	4.6548***	-78.9243***	0.0497***
	(62.0608)	(1.2879)	(20.6022)	(0.0136)
N	56	56	48	56
R^2	0.709	0.928	0.639	0.759

Notes: This table reports OLS regressions of quarterly spreads or yields on the 5-year JPY-USD cross-currency basis swap mid price and the full set of macrofinancial controls. Column (1) reports the CLO AAA discount margin (basis points). Column (2) reports the 2-year Treasury yield (percent). Column (3) reports the Treasury floating-rate note discount margin (basis points). Column (4) reports the high-yield bond spread (percentage points). The sample consists of 56 quarterly observations from 2012Q1 to 2025Q1, with the exception of Treasury floating-rate notes, which begin in 2014Q1 (48 observations). VIX is the CBOE Volatility Index. MOVE is the Merrill Lynch Option Volatility Estimate index for Treasury markets. Commercial Paper Spread is the 3-month AA commercial paper minus 3-month Treasury spread. BAA-AAA Spread is the Moody's corporate bond credit spread. Term Spread is the 10-year minus 2-year Treasury yield. Bank Volatility is the KBW Bank Sector Volatility Index. IP Growth is industrial production growth. Unemployment is the civilian unemployment rate. NFCI is the Chicago Fed National Financial Conditions Index. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 4: JFSA Basel III Securitization Rules and Issuance of CLO AAA Tranches

Panel A: Spread			
	(1)	(2)	(3)
JPY-USD Basis × Post	-1.5019***	-1.8998***	-1.9101***
	(0.3000)	(0.2603)	(0.2609)
JPY-USD Basis	-0.3706**	-0.2818**	-0.2671**
	(0.1665)	(0.1150)	(0.1202)
N	1,121	1,121	1,121
R^2	0.4439	0.7301	0.7412
Panel B: ln(Tranche Size)			
	(1)	(2)	(3)
JPY-USD Basis × Post	0.0048	0.0074**	0.0079***
	(0.0034)	(0.0029)	(0.0030)
JPY-USD Basis	-0.0034	-0.0026	-0.0027
	(0.0022)	(0.0020)	(0.0020)
N	1,121	1,121	1,121
R^2	0.0966	0.4975	0.5194
Year FE	✓	✓	✓
Benchmark FE	✓	✓	✓
Manager FE		✓	✓
Arranger FE			✓

Notes: This table reports regressions of AAA tranche characteristics on the JPY-USD basis interacted with a post-2019 indicator. The estimating equation is $y_{i,t} = \beta_1 \, \text{Basis}_t + \beta_3 \, (\text{Basis}_t \times \text{Post}_t) + \mathbf{X}_{i,t} + \varepsilon_{i,t}$, where $\text{Post}_t = \mathbf{1}[t \geq 2019]$ corresponds to the implementation of Basel III risk retention requirements by Japan's Financial Services Agency (effective March 31, 2019). The Post main effect is absorbed by year fixed effects. Panel A reports spreads (discount margin over the benchmark rate in basis points). Panel B reports log AAA tranche size. Column (1) includes year and benchmark rate fixed effects. Column (2) adds manager fixed effects. Column (3) adds arranger fixed effects. The sample spans 2017 through 2021 and is restricted to AAA-rated US CLO tranches. The cross-currency basis is measured at monthly frequency and merged to each tranche's pricing month. Standard errors clustered by manager in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: BOJ Policy Normalization and Issuance of CLO AAA Tranches

Panel A: Spread			
	(1)	(2)	(3)
JPY-USD Basis × Post	0.4827***	0.4572***	0.4157***
	(0.1712)	(0.1424)	(0.1458)
JPY-USD Basis	-2.1051***	-2.0585***	-2.0505***
	(0.1391)	(0.1195)	(0.1188)
Post	14.6728*	9.8913	8.3449
	(7.6347)	(6.8441)	(6.9594)
N	1,572	1,572	1,572
R^2	0.6508	0.8180	0.8250
Panel B: ln(Tranche Size)			
	(1)	(2)	(3)
JPY-USD Basis × Post	-0.0034**	-0.0041**	-0.0041**
	(0.0017)	(0.0016)	(0.0017)
JPY-USD Basis	0.0052***	0.0050***	0.0051***
	(0.0014)	(0.0013)	(0.0014)
Post	-0.1520**	-0.1578**	-0.1530**
	(0.0720)	(0.0702)	(0.0734)
N	1,572	1,572	1,572
R^2	0.0284	0.3928	0.4180
Year FE	✓	✓	✓
Benchmark FE	✓	✓	✓
Manager FE		✓	✓
Arranger FE			✓

Notes: This table reports difference-in-differences regressions around the Bank of Japan's policy normalization. The estimating equation is $y_{i,t} = \beta_1 \,\text{Basis}_t + \beta_2 \,\text{Post}_t + \beta_3 \,(\text{Basis}_t \times \text{Post}_t) + \mathbf{X}_{i,t} + \varepsilon_{i,t}$, where $\text{Post}_t = \mathbf{1}[t \geq$ Nov 2023$]$. The BOJ effectively abandoned yield curve control in October 2023 and raised the policy rate for the first time in 17 years in March 2024, increasing the attractiveness of domestic yen assets as an outside option for Japanese banks. Panel A reports spreads (discount margin over the benchmark rate in basis points). Panel B reports log AAA tranche size. Column (1) includes year and benchmark rate fixed effects. Column (2) adds manager fixed effects. Column (3) adds arranger fixed effects. The sample spans 2021 through 2025 and is restricted to AAA-rated US CLO tranches. The cross-currency basis is measured at monthly frequency and merged to each tranche's pricing month. Standard errors clustered by manager in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 6: Quarter-End Effects on CLO AAA Tranches

	(1)	(2)	(3)
Panel A: Spread			
JPY-USD Basis × Quarter-End	0.1486***	0.1540***	0.0746*
	(0.0392)	(0.0388)	(0.0405)
JPY-USD Basis	-1.2102***	-1.2504***	-0.3695***
	(0.0752)	(0.0765)	(0.1191)
Quarter-End	5.3879***	6.0616***	1.4386
	(1.9160)	(1.8765)	(1.9798)
N	3,319	3,319	3,319
R^2	0.581	0.588	0.694
Panel B: ln(Tranche Size)			
	(1)	(2)	(3)
JPY-USD Basis × Quarter-End	-0.0012**	-0.0012**	-0.0011**
	(0.0005)	(0.0005)	(0.0005)
JPY-USD Basis	0.0045***	0.0047***	0.0036**
	(0.0007)	(0.0008)	(0.0014)
Quarter-End	-0.0636**	-0.0662**	-0.0604**
	(0.0262)	(0.0266)	(0.0265)
N	3,319	3,319	3,319
R^2	0.057	0.058	0.073
Year FE	✓	✓	
Quarter FE		✓	
Year-Quarter FE			✓
Benchmark FE	✓	✓	✓

Notes: This table reports tranche-level regressions of CLO AAA outcomes on the JPY-USD cross-currency basis (5-year) and a quarter-end indicator. Quarter-end equals one for tranches priced in March, June, September, and December. Panel A reports spreads (discount margin over the benchmark rate in basis points). Panel B reports log AAA tranche size. Column (1) includes year and benchmark rate fixed effects. Column (2) adds quarter fixed effects. Column (3) replaces year and quarter fixed effects with year-quarter fixed effects, which absorb all quarterly-level variation in the basis; identification in this specification comes from within-quarter differences between quarter-end and non-quarter-end months. The sample includes all US CLO AAA tranches issued between 2012 and 2025. The cross-currency basis is measured on each tranche's pricing date. Standard errors clustered by manager in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Online Appendix for:

"When Funding Markets Move Credit Markets: Foreign Investors and U.S. CLOs"

Appendix A Norinchukin Bank: The CLO Whale

The concentration of Japanese CLO investment is extreme. Norinchukin Bank, the central cooperative bank for Japan's agricultural, forestry, and fishery cooperative system, alone accounted for approximately half of all Japanese CLO holdings at its peak.[19] Appendix Figure B.5 plots Norinchukin's CLO holdings from 2018 through 2025. Other significant Japanese CLO holders include the megabanks (MUFG, SMFG, and Mizuho) and several regional banks, but none approach Norinchukin's scale. This concentration means that the portfolio decisions of a single institution have outsized effects on CLO AAA demand and, through the hedging channel we model, on equilibrium pricing.

Norinchukin's business model differs fundamentally from that of a conventional commercial bank. With a relatively small lending portfolio, its ¥56 trillion ($\approx$ \$357 billion) investment portfolio constitutes the bulk of its assets. The bank collects yen deposits from Japan's approximately 600 agricultural, forestry, and fishery cooperatives and deploys them into global securities, historically emphasizing US and European government bonds and CLO AAA tranches. This structure makes Norinchukin uniquely sensitive to the interaction between global interest rates and FX hedging costs: its entire business model rests on earning a positive hedged spread on foreign-currency assets funded with yen liabilities.

The bank's recent experience illustrates the mechanisms central to our paper. When the Federal Reserve's aggressive rate hikes in 2022–2023 pushed short-term dollar rates above the yields on Norinchukin's legacy bond holdings, the bank's foreign-currency funding costs surged beyond what it earned on those securities. By March 2024, unrealized losses on its bond portfolio had reached ¥2.2 trillion ($\approx$ \$14.5 billion). In June 2024, Norinchukin announced plans to sell approximately ¥10 trillion ($\approx$ \$63 billion) of US and European sovereign bonds, nearly a sixth of its global portfolio, to stem the losses (Uranaka and Scanlan, 2024). The bank ultimately posted a net loss exceeding ¥1.7 trillion ($\approx$ \$11.2 billion) for fiscal year 2024, the largest in its century-long history.[20]

[19] Norinchukin's CLO holdings reached ¥8.0 trillion (approximately \$74 billion) in June 2019, according to the bank's official financial results. See Financial Summary for Fiscal Year 2020, page 11. At this point, total Japanese bank CLO holdings stood at approximately ¥14.5 trillion, implying a Norinchukin share of roughly 55%.

[20] The bank subsequently raised capital from its member cooperatives (see Norinchukin Capital Enhancement an-

Importantly for our analysis, Norinchukin's reallocation away from sovereign bonds flowed *toward* CLOs, not away from them. The bank's CLO holdings, which had dipped to ¥6.5 trillion ($\approx$ \$45 billion) in September 2024 as redemptions ran off, rebounded sharply to ¥8.2 trillion ($\approx$ \$53 billion) by December 2024 and ¥9.7 trillion ($\approx$ \$65 billion) by September 2025 – a new all-time high. The bank's revised strategy would reduce sovereign interest rate risk and diversify into assets involving corporate and individual credit risks, explicitly including CLOs as a target asset class.[21] Consistent with this strategy, Norinchukin's bond holdings (predominantly sovereign) declined, while credit and other investments grew from 2024 through 2025 (see Norinchukin Bank, FY2025 First Half Financial Summary).

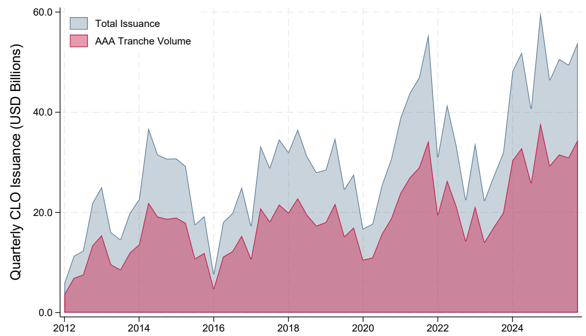
This episode demonstrates two key points. First, CLO AAA tranches occupy a distinct position in Japanese banks' asset allocation: they offer a hedged yield premium unavailable in sovereign bonds, shown in Figure 4, making them a preferred destination when banks reallocate within their dollar portfolios. Second, the scale of Norinchukin's portfolio adjustments is large enough to move market equilibrium; a single institution's decision to increase CLO holdings by ¥3 trillion over three quarters represents a meaningful demand shock in a market with approximately \$500 billion in AAA outstanding.

nouncement, March 31, 2025), echoing a similar recapitalization during the 2008–2009 financial crisis when the bank incurred significant losses on asset-backed securities.

[21] Deutsche Bank estimated that if 25% of the ¥10 trillion earmarked for reallocation were channeled toward CLOs, it would represent approximately \$16 billion of net new demand for AAA CLO paper (Kollmorgen and Kramer, 2024).

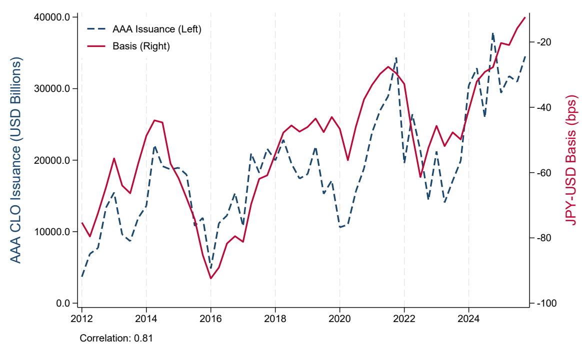
Appendix B Additional Figures

Figure B.1: AAA CLO Issuance and the Cross-Currency Basis

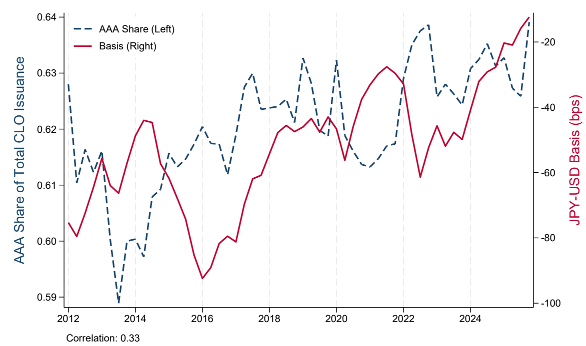


(a) Total vs. AAA Issuance

(b) AAA Share of Total Issuance



(c) AAA Issuance and JPY-USD Basis



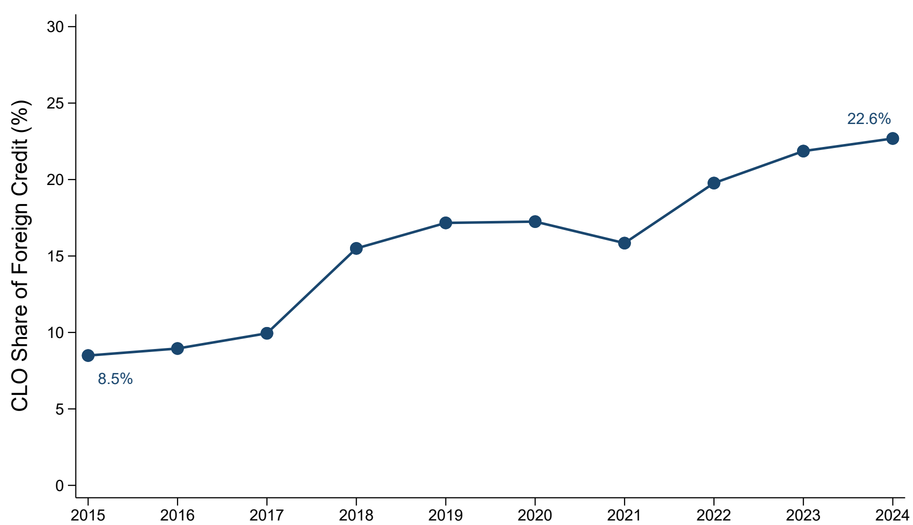
(d) AAA Share and JPY-USD Basis

Notes: Panel (a) plots quarterly total CLO issuance and AAA tranche volume (USD millions), 2012Q1–2025Q4. Panel (b) plots the AAA share of total CLO issuance by volume. Panels (c) and (d) overlay the JPY-USD 5-year cross-currency basis (right axis, bps; more negative = higher hedging cost). AAA tranche volume is the sum of all AAA-rated tranche sizes within each deal, aggregated to the quarter.

Figure B.2: Japanese Banks' Overseas Credit Holdings (Bar Chart)

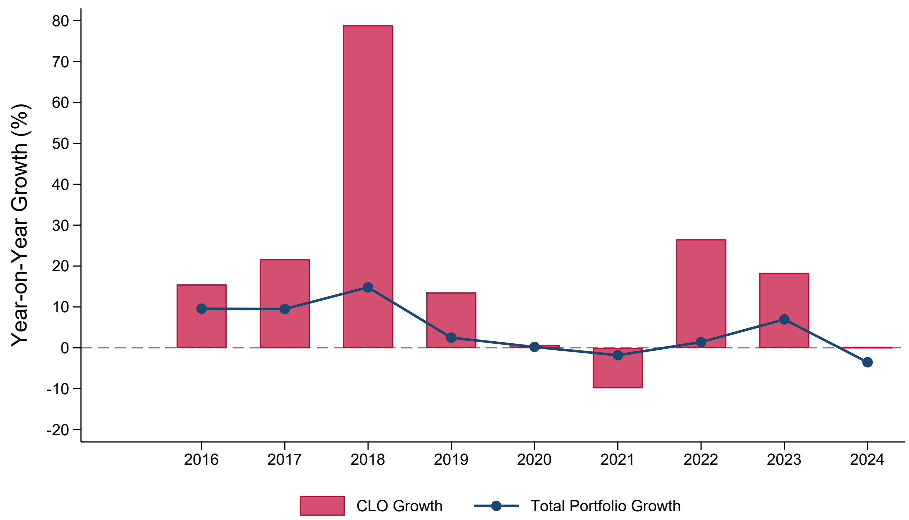
Notes: This figure presents an alternative visualization of the data shown in Figure 1a Panel (a), using stacked bars rather than a stacked area chart. Data are from the Bank of Japan Financial System Report. Categories are CLOs, high-yield corporates, other structured products, and investment-grade corporates.

Figure B.3: CLO Share of Japanese Banks' Overseas Credit Portfolio



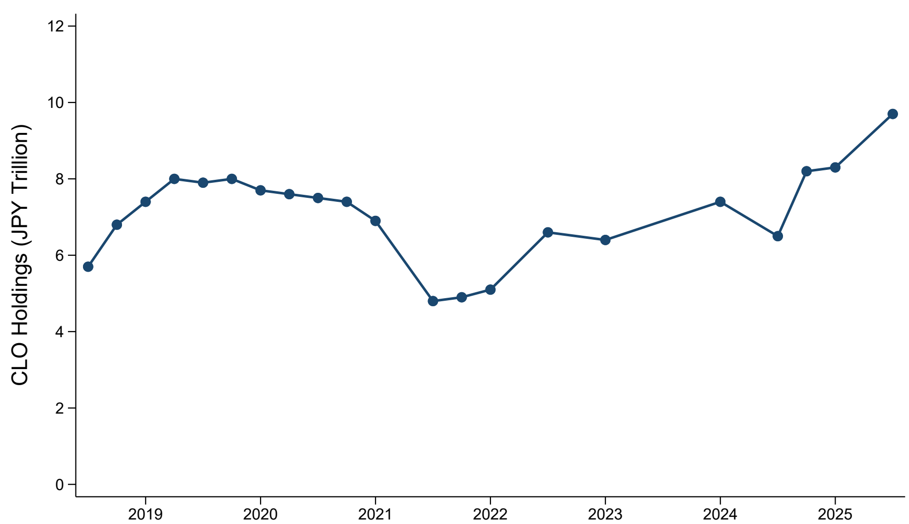
Notes: This figure plots CLOs as a share of Japanese banks' total overseas credit holdings, using data from the Bank of Japan Financial System Report.

Figure B.4: Year-on-Year Growth in Japanese Banks' CLO Holdings



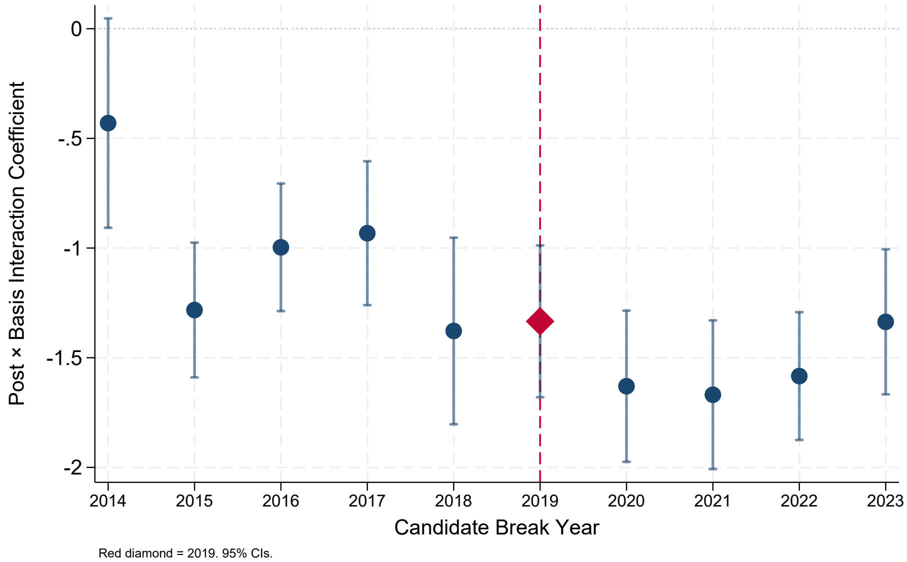
Notes: This figure plots year-on-year growth rates for Japanese banks' CLO holdings (solid line) and total overseas credit portfolio (dashed line), using data from the Bank of Japan Financial System Report.

Figure B.5: Norinchukin Bank CLO Holdings

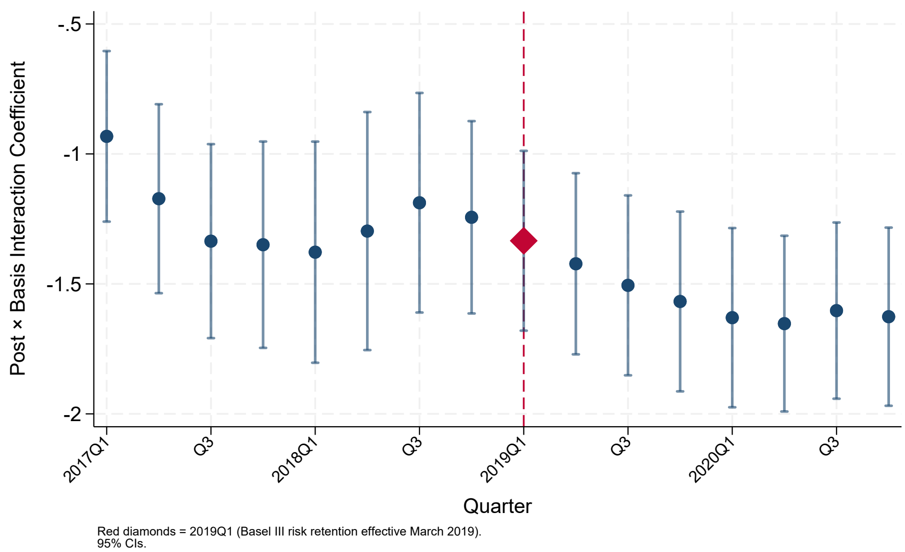


Notes: This figure plots Norinchukin Bank's CLO holdings in JPY trillions at quarterly frequency, using data from the bank's official financial results presentations (FY2018–FY2025 H1). The dashed vertical lines mark Japan's Basel III implementation (March 2019) and the Bank of Japan's yield curve control adjustment (October 2023).

Figure B.6: Rolling Break-Year Test



(a) Annual Break Years



(b) Quarterly Break Points (2017–2020)

Notes: This figure reports the coefficient on the Post $\times$ Basis interaction from regressions of AAA discount margins on the JPY-USD basis interacted with candidate break indicators. In Panel (a), the break year varies annually from 2014 to 2023; in Panel (b), the break quarter varies from 2017Q1 to 2020Q4. The red diamond marks 2019, corresponding to Japan's implementation of Basel III risk retention requirements (effective March 2019). All specifications include manager and benchmark rate fixed effects. Standard errors are two-way clustered by manager and month. Vertical bars denote 95% confidence intervals.

Appendix C Additional Tables

Table C.1: JPY-USD Basis and CLO Issuance Volume

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
JPY-USD Basis	0.019***	0.015***	0.018***	0.012***	0.011**	0.010*	0.010*	0.011*
	(0.002)	(0.003)	(0.003)	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)
VIX		-0.016**	-0.021***	-0.005	0.001	0.000	0.000	-0.001
		(0.006)	(0.006)	(0.008)	(0.018)	(0.017)	(0.017)	(0.018)
MOVE		-0.004	-0.003	-0.003	-0.003	-0.005	-0.005	-0.006**
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
JPY-USD FX		0.011**	0.010**	0.010**	0.010**	0.008**	0.008**	0.007
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Commercial Paper Stress			0.724**	0.257	0.194	-0.479	-0.479	-0.704
			(0.336)	(0.356)	(0.379)	(0.659)	(0.659)	(0.668)
BAA-AAA Spread				-0.565*	-0.594*	-0.518	-0.518	-0.607*
				(0.295)	(0.316)	(0.329)	(0.329)	(0.312)
Term Spread				0.006	-0.001	0.070	0.070	0.106
				(0.045)	(0.049)	(0.076)	(0.076)	(0.100)
Bank Volatility					-0.003	0.001	0.001	0.001
					(0.006)	(0.009)	(0.009)	(0.009)
IP Growth						-0.019	-0.019	-0.014
						(0.029)	(0.029)	(0.028)
Unemployment						-0.081	-0.081	-0.087
						(0.059)	(0.059)	(0.060)
NFCI								0.500
								(0.799)
N	56	56	56	56	56	56	56	56
R^2	0.616	0.744	0.764	0.787	0.787	0.797	0.797	0.799

Notes: This table reports OLS regressions of the log of quarterly CLO issuance volume (USD billions) on the 5-year JPY-USD cross-currency basis swap mid price and progressively richer sets of controls. The estimating equation is $\ln(\text{Volume}_t) = \alpha + \beta\,\text{Basis}_t + \mathbf{X}_t'\gamma + \varepsilon_t$, where $\mathbf{X}_t$ is a vector of macrofinancial controls defined as in Table 2. The sample consists of 56 quarterly observations from 2012Q1 to 2025Q1. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table C.2: Quarter-End Effects on Monthly CLO Deal Counts

	(1) ln(Deals)	(2) ln(Deals)	(3) ln(Deals)
JPY-USD Basis × Quarter-End	-0.0104***	-0.0103***	-0.0098***
	(0.0031)	(0.0029)	(0.0032)
JPY-USD Basis	0.0181***	0.0165***	0.0014
	(0.0065)	(0.0058)	(0.0091)
Quarter-End	-0.4997***	-0.4923***	-0.4652***
	(0.1625)	(0.1622)	(0.1701)
Year FE	✓	✓	
Quarter FE		✓	
Year-Quarter FE			✓
N	168	168	168
R^2	0.543	0.588	0.702

Notes: This table reports monthly regressions of the log number of CLO deals priced on the JPY-USD cross-currency basis (5-year) and a quarter-end indicator. Quarter-end equals one for March, June, September, and December. Column (1) includes year fixed effects. Column (2) adds quarter fixed effects. Column (3) replaces year and quarter fixed effects with year-quarter fixed effects. The interaction coefficient indicates that the positive relationship between the basis and deal counts is attenuated at quarter-ends, consistent with reduced demand elasticity when Japanese banks face balance-sheet reporting requirements. The cross-currency basis is measured on each tranche's pricing date. The sample covers 168 months from 2012 to 2025. Robust standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table C.3: Quarter-End Effects: Within-Deal Cross-Tranche Falsification

	(1) Spread	(2) ln(Tranche Size)
AAA × Basis × Quarter-End	-0.2071***	-0.0007*
	(0.0794)	(0.0004)
AAA × Basis	1.4204***	0.0025***
	(0.0742)	(0.0003)
AAA × Quarter-End	-8.7783**	-0.0329
	(3.5051)	(0.0209)
CLO × Month FE	✓	✓
Rating FE	✓	✓
N	17,253	17,253
R^2	0.937	0.945

Notes: This table reports within-deal regressions testing whether the quarter-end attenuation of basis pass-through is concentrated in AAA tranches. The sample includes all US CLO tranches rated AAA through BB/B issued between 2012 and 2025. The triple interaction AAA × Basis × Quarter-End measures whether AAA tranches experience a differential change in basis sensitivity at quarter-ends relative to lower-rated tranches within the same deal. Both columns include CLO × month fixed effects, which absorb all deal-level and time-varying heterogeneity, and rating fixed effects. Identification comes from within-deal, across-tranche variation. Column (1) reports discount margins in basis points. Column (2) reports log tranche size. The cross-currency basis is measured on each tranche's pricing date. Standard errors clustered by manager in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.