STATE STREET

THE “SHARPE” POINT OF SECURITIES LENDING

Diversification properties and risk-adjusted performance of securities lending

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Abstract

When institutional investors assess investment opportunities, a key consideration is the expected incremental return relative to the marginal risk and the diversification benefits the investment might bring to the entire portfolio. We take the same approach in evaluating securities lending. This analysis examines the historical performance of more than 5,000 anonymized and aggregated securities lending programs over 15 years (2008 to 2023) to quantify the historical returns relative to losses and compute a reward-risk ratio (e.g., Sharpe ratio). These metrics are evaluated over different market regimes and across regions.

The empirical findings suggest securities lending risk-adjusted performance is significantly higher than that of benchmark stock and bond indices, and improve during periods of market drawdowns (e.g., “crisis periods”) and tightening financial conditions. We also observe securities lending returns having a low or negative correlation with those of other asset classes, suggesting it brings favorable diversification benefits to a theoretical portfolio of traditional asset classes. These findings hold in both the United States and non-United States regions. Additionally, we analyze the Federal (Fed) funds rate and the probability of observing a negative net spread, finding that a one percentage increase in the rate is associated with a 7-basis-point rise in the likelihood of a negative net spread. Lastly, we find an extremely small probability of an event where there is combined borrower default, a collateral mismatch and an indemnification failure.

Introduction

Institutional investors often use securities lending as an investment tool to generate additional alpha and cover investment management costs. Yet, some institutional investors remain skeptical around the practice of lending their securities to borrowers for a fee. Several questions feed into this skepticism, some of which we have already addressed in previous white papers. Notably, in To Lend or Not to Lend we examined the academic evidence on whether securities lending supply negatively impacts asset prices. In this paper, we take on another important consideration: *How does securities lending impact overall portfolio return-risk metrics and diversification characteristics?*

As some investors will point out, the absolute returns generated from securities lending can seem relatively small at first glance. However, this is only part of the picture. To fully consider the question at hand, we look to evaluate the returns relative to risks to form a more holistic view. After all, investment decisions are made on the basis of trade-offs with institutional investors looking for opportunities that earn incremental returns greater than the marginal risk. Additionally, investors prefer assets that are expected to diversify a portfolio's primary growth engine during crisis periods. This analysis provides an empirical basis to make an informed decision on whether to engage in securities lending by evaluating its return-to-risk profile and its diversification properties.

By examining 15 years of historical securities lending performance data (2008-2023) from more than 5,000 anonymized and aggregated programs, we measure the returns and losses generated by securities lending to compute various risk metrics over different market regimes. We find that, on average, the Sharpe ratio of securities lending is 2.6, while its Sortino ratio, which only considers the downside risk, is 7.9. The analysis is then subdivided into various "crisis periods" and risk aversion regimes – securities lending risk metrics improve considerably during these periods. We further analyze the diversification properties of securities lending performance, where we find the correlation between securities lending returns and traditional assets to be low or negative. This profile enables securities lending programs to push out a hypothetical efficiency frontier for institutional investors with a given asset allocation, especially during risk-off regimes.

The analysis also provides a few insights into the implications of monetary policy decisions on reinvestment spreads. These insights enable investors to better understand the impact of rate hikes and cuts on net spreads. Lastly, we examine the joint probability of a black swan-like event in which there is a joint borrower default, collateral mismatch and an agency lending indemnification failure.

Previous literature

Our analysis draws inspiration from Atkins and Horner (2006),[1] as published in *The Risk Management Association Journal*. The authors compute risk-adjusted returns for securities lending across various reinvestment vehicles and benchmark the metrics against other traditional asset classes. They find that “lending returns were smaller than market index returns, but securities lending offered superior risk-adjusted performance”.

Additionally, their analysis shows corresponding risk metrics to various collateral reinvestment strategies. We extend the analysis in the following ways: (1) use more recent data from 2008 to 2023 to test if these findings still hold, (2) examine how securities lending risk metrics evolve during various market and interest rate regimes, (3) analyze key diversification aspects of securities lending and (4) understand monetary policy implications on reinvestment spreads.

Analysis set up

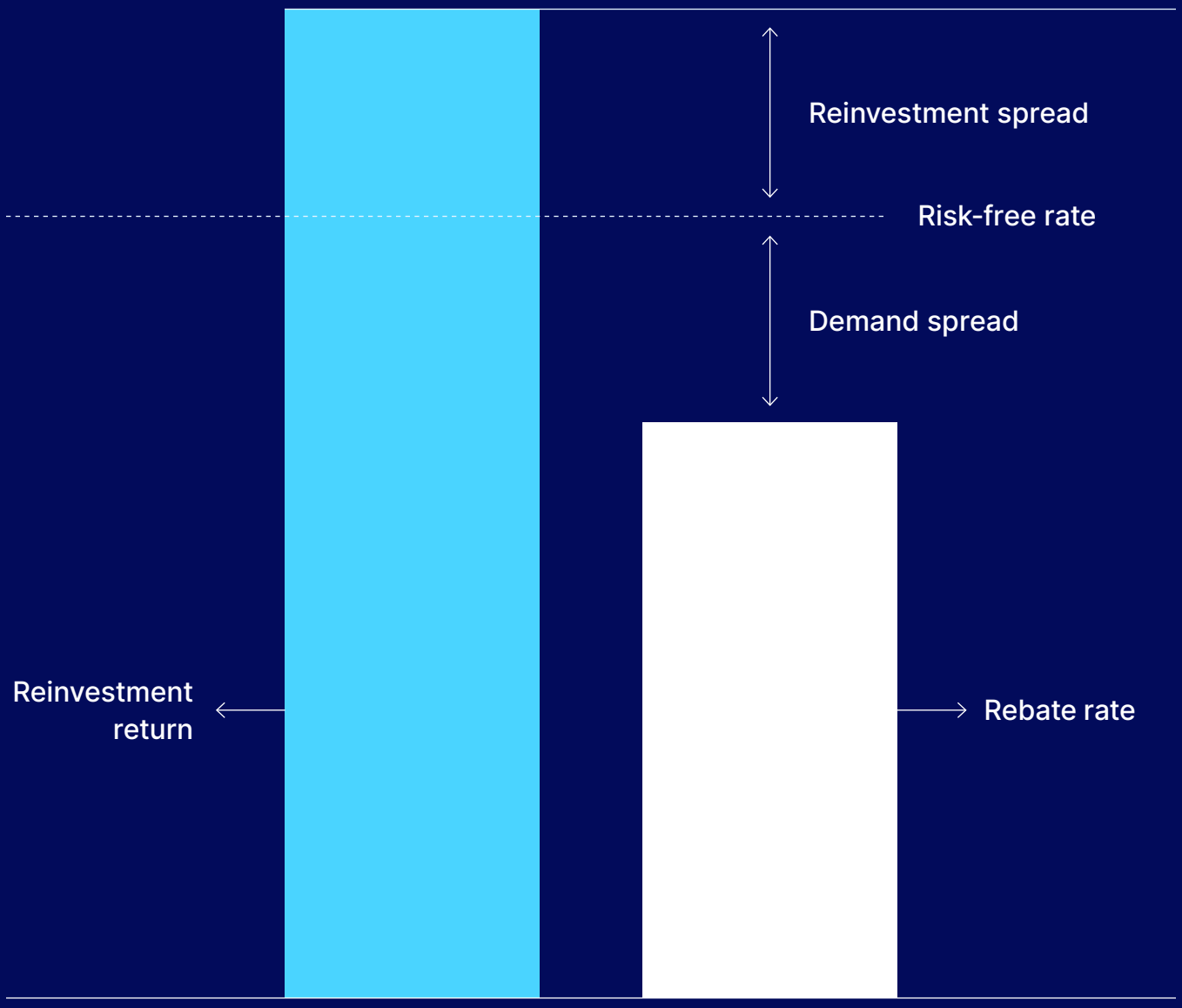
We use State Street's Agency Lending data to conduct the analysis. This provides a holistic representation of the market, given our Agency Lending business is one of the three largest agent lenders globally.[2]

The dataset spans the historical monthly performance of about 5,000 anonymized and aggregated securities lending programs over the last 15 years (January 2008 to June 2023). We divide our sample into two sets — US and non-US securities lending programs — and present both results. The definitions of the absolute and risk-adjusted returns we use are below and **Figure 1** illustrates the decomposition of securities lending returns.

- **Reinvestment spread:** Return obtained by reinvesting collateral provided for securities lending (reinvestment return-risk-free rate)
- **Demand spread:** Return obtained by lending securities (for cash collateral, this is the risk-free rate - rebate rate)
- **Net spread:** Demand spread plus reinvestment spread
- **Risk-free rate:** Effective federal funds rate
- **Rebate rate:** The rate lender pays the borrower for compensation on cash collateral.
- **Reinvestment return:** The rate of return obtained by investing the cash collateral held by the lender. This captures realized losses on the cash reinvestment.[3]
- **Sharpe ratio:** $(R_p - rf) / \sigma_p$ where R_p is the return generated from securities lending, rf is the risk-free rate and σ_p is the standard deviation of excess return $(R_p - rf)$
- **Sortino ratio:** $(R_p - rf) / \sigma_d$ where σ_d is the downside standard deviation of excess return $(R_p - rf)$
- **Off-zero lower bound (Off-ZLB):** Periods where the Fed funds rate was greater than zero and proxies market drawdowns

We calculate the average spread for a given month by taking the weighted average of annualized returns, conditional on contract sizes for that month. The mean spread shown in the tables below is the average spread across months (equally weighted through time).

Figure 1: Decomposition of securities lending returns



Source: State Street Global Markets

Reward-risk ratios of securities lending

We first compare the summary statistics and reward-risk ratios of securities lending returns with that of benchmark stock and bond indexes.

We use the S&P 500, Russell 2000 and MSCI All Country World Index (ACWI) for benchmark stock indexes, and the US Benchmark 10-year Government Total Return Index and the FTSE World Government Bond Index (WGBI) for bond indexes. It is important to note that the returns generated from securities lending can be earned on top of a given portfolio's positions without the opportunity cost of reallocating from one asset to another.

Table 1 shows that the mean excess return of securities lending returns for US and non-US programs are lower, on average, than returns of the benchmark indexes over the full sample.

However, the relative volatility of securities lending returns is much lower, implying higher Sharpe ratios for securities lending returns. Unlike the benchmark stock and bond indexes, the securities lending spread distributions are positively skewed.

Hence, only considering the downside volatility as the risk adjustment, the implied reward-risk ratio (i.e. Sortino ratio, which is the excess return per its downside standard deviation) is even higher for securities lending returns than the benchmark returns. In particular, the Sharpe ratio of securities lending net spreads for the US is 2.6, while its Sortino ratio is 7.9. This high Sortino ratio indicates that the upside volatility is much higher than the downside volatility.

Table 1: Summary statistics and reward-risk ratios

	Mean excess return	Standard deviation	Downside standard deviation	Skewness	Sharpe ratio	Sortino ratio
Securities lending (US securities lending programs)						
Demand spread	37.6	14.8	8.0	0.9	2.5	4.7
Reinvestment spread	28.5	24.7	5.2	5.3	1.2	5.5
Net spread	60.3	23.5	7.7	3.3	2.6	7.9
Securities lending (Non-US securities lending programs)						
Demand spread	19.7	8.7	4.4	1.4	2.3	4.4
Reinvestment spread	33.8	11.5	4.2	3.7	2.9	8.0
Net spread	34.2	12.0	4.5	2.2	2.8	7.6
Bond indexes						
US Gov. 10Y	262.2	887.1	537.1	-0.3	0.3	0.5
FTSE WGBI	160.4	543.4	404.8	-1.5	0.3	0.4
Stock indexes						
S&P 500	1062.3	1739.2	1195.0	-0.7	0.6	0.9
Russell 2000	944.7	2274.6	1254.5	0.4	0.4	0.8
MSCI ACWI	835.9	1658.1	991.9	0.0	0.5	0.8

Source: State Street Global Markets

Note: Units are annualized in basis points. Sample period is from January 2008 to June 2023. MSCI ACWI sample period is from March 2009 to June 2023.

Diversification characteristics of securities lending

Another interesting feature of securities lending returns is their counter cyclical nature. This could partly be captured by its returns' low or negative correlation with that of other asset classes.

Table 2 illustrates the correlation between securities lending spreads and the stock/bond indexes that we use as a benchmark. The correlations depicted in this table are persistent throughout our sample period that spans 15 years.

Such low or negative correlations with these benchmarks suggest that securities lending could bring favorable diversification benefits during large market downturns. This negative relationship is driven both by more profitable demand and reinvestment spreads during equity drawdowns.

Table 2: Correlations of securities lending returns with returns of benchmark indexes

	S&P 500	Russell 2000	MSCI ACWI	US Gov. 10Y	FTSE WGBI	Demand spread	Reinvestment spread	Net spread
S&P 500	100%	92%	97%	-16%	5%	-7%	-58%	-56%
Russell 2000		100%	92%	-24%	0%	0%	-44%	-44%
MSCI ACWI			100%	-14%	8%	-16%	-45%	-40%
US Gov. 10Y				100%	88%	-14%	30%	22%
FTSE WGBI					100%	-9%	22%	18%
Demand Spread						100%	-35%	27%
Reinvestment Spread							100%	79%
Net Spread								100%

Source: State Street Global Markets. Correlation of monthly values.

The diversification characteristics of securities lending could be captured by comparing its reward-risk performance with that of benchmark indexes during periods of higher interest rate (i.e., tighter financial conditions), higher risk aversion or smaller episodes of geopolitical and economic turmoil. **Table 3** shows that the Sortino ratio of all three securities lending spreads improve when the Fed funds rate was above zero (i.e. when financial conditions are tighter) between the sample period from 2008 to 2023.

This result is in contrast with the lower Sortino and Sharpe ratios of all stock and bond benchmark indexes. Similarly, during periods of higher risk aversion by investors, which is captured by the negative territory of our Equity Holdings Behavioral Risk Scorecard (BRS),[4] the securities lending returns' reward-risk ratio performance improves while the same ratios deteriorate for the benchmark indexes. **Table 4** shows that the Sharpe and Sortino ratios of the demand and net spreads, in particular, improve substantially during such periods.

Table 3: Summary statistics and reward-risk ratios during off-ZLB periods

	Mean excess return	Standard deviation	Downside standard deviation	Skewness	Sharpe ratio	Sortino ratio
Securities lending						
Demand spread	38.3	10.0	6.4	-3.5	3.8	6.0
Reinvestment spread	32.2	28.8	4.2	-1.5	1.1	7.6
Net spread	61.9	25.3	5.6	-0.8	2.4	11.1
Bond indexes						
US Gov. 10Y	-133.2	943.8	676.1	-1.2	-0.1	-0.2
FTSE WGBI	-140.1	679.5	557.5	-1.4	-0.2	-0.3
Stock indexes						
S&P 500	483.8	1380.6	1124.6	-1.7	0.4	0.4
Russell 2000	48.9	1689.3	1275.1	-0.7	0.0	0.0
MSCI ACWI	277.2	1277.2	938.5	-0.8	0.2	0.3

Source: State Street Global Markets

Note: Units are annualized in basis points. Sample period is from October 2008 to June 2023. MSCI ACWI sample period is from March 2009 to June 2023.

Table 4: Summary statistics and reward-risk ratios during higher risk aversion periods (negative BRS[4])

	Mean excess return	Standard deviation	Downside standard deviation	Skewness	Sharpe ratio	Sortino ratio
Securities lending						
Demand spread	41.3	12.7	4.5	-2.3	3.3	9.1
Reinvestment spread	23.8	7.5	5.3	-0.1	3.2	4.5
Net spread	59.1	13.0	6.5	-1.2	4.6	9.0
Bond indexes						
US Gov. 10Y	84.7	556.2	371.9	-0.6	0.2	0.2
FTSE WGBI	178.6	346.5	195.6	-1.8	0.5	0.9
Stock indexes						
S&P 500	1554.2	812.9	374.2	-2.3	1.9	4.2
Russell 2000	1507.9	1382.6	653.9	-2.1	1.1	2.3
MSCI ACWI	1187.9	957.5	501.7	-2.0	1.2	2.4

Source: State Street Global Markets

Note: Units are annualized in basis points. Sample period is from October 2008 to June 2023. MSCI ACWI sample period is from March 2009 to June 2023.

The risk-adjusted performance of securities lending also improves substantially during periods of geopolitical conflicts, global pandemics or financial crises. In particular, we examine the following episodes: the 2008-2009 Recession (January 2008 – June 2009), Euro crisis (April 2011 – May 2012), China equity drawdown (May 2015 – February 2016), COVID-19 (March 2020 – December 2020) and Ukraine conflict (September 2021 – October 2022).

Figure 2 and **Table 5** illustrate how the Sharpe ratios of securities lending returns improve during these episodes, while the benchmark indexes perform worse than their average over the full sample during some of these crisis periods. The substantially improved risk-adjusted performance of securities lending during periods of market downturns suggest that it could act as a hedging mechanism and diversify the overall portfolio.

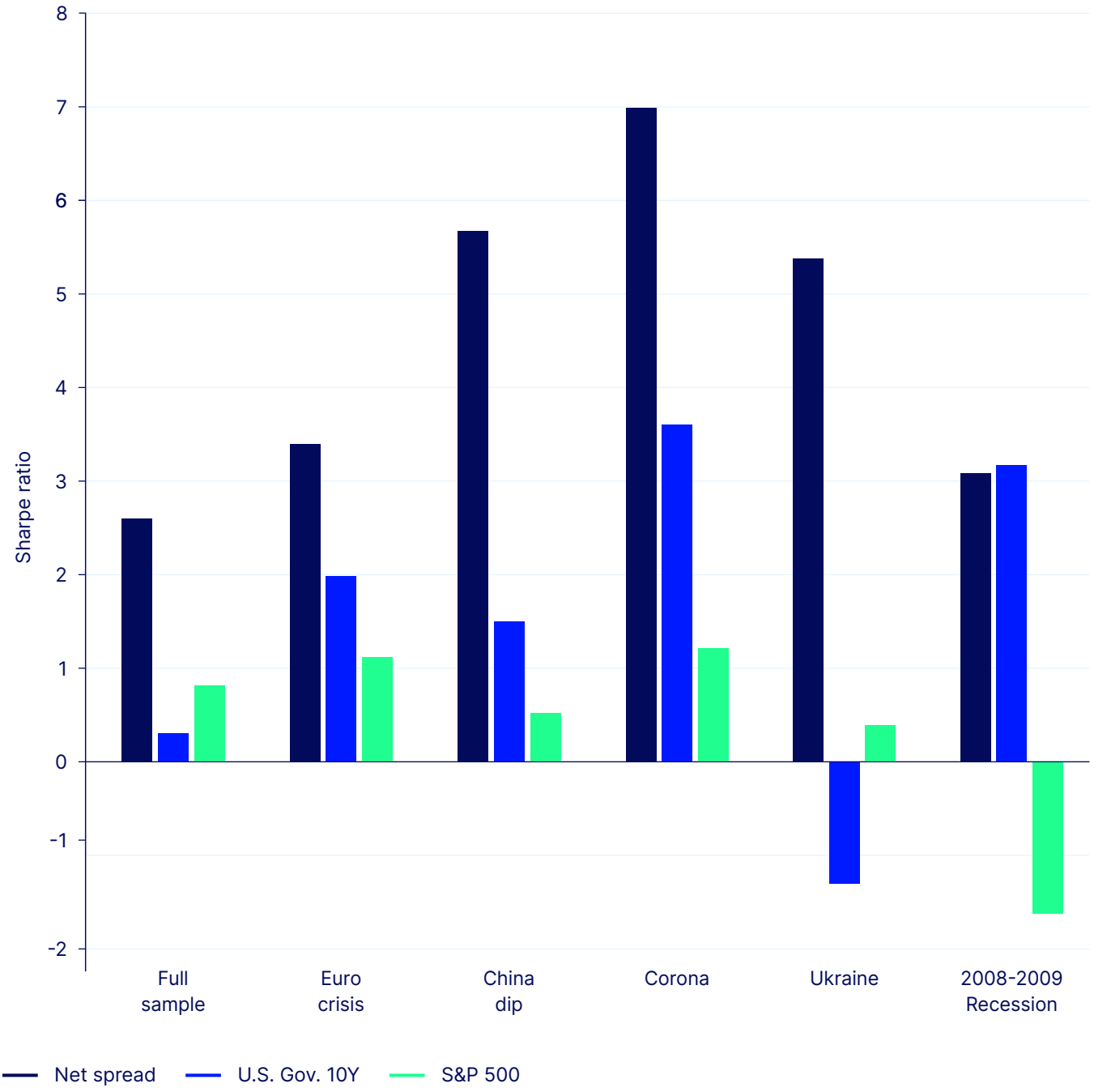
Table 5: Summary statistics and reward-risk ratios during various crisis episodes

	Full sample	Euro crisis	China Dip	Corona	Ukraine	2008-2009 Recession
Securities lending						
Demand spread	2.5	2.3	4.3	4.3	4.3	2.1
Reinvestment spread	1.2	4.6	3.9	1.9	6.3	1.6
Net spread	2.6	3.4	5.7	7	5.4	3.1
Bond indexes						
US Gov. 10Y	0.3	2	1.5	3.6	-1.3	3.2
FTSE WGBI	0.3	1.5	2.2	2.8	-1.4	1.9
Stock indexes						
S&P 500	0.8	1.1	0.5	1.2	0.4	-1.7
Russell 2000	0.5	0.6	0	-0.1	-0.1	-2.1
MSCI ACWI	0.5	0.3	-0.6	0.7	0.1	-6.3

Source: State Street Global Markets

Note: Sample period is from January 2008 to June 2023. MSCI ACWI sample period is from March 2009 to June 2023.

Figure 2: Comparison of securities lending and market benchmark Sharpe ratios



Source: State Street Global Markets

Efficiency frontier expansion by securities lending

The aforementioned stock and bond indexes can be illustrated as benchmark portfolios on a scatter plot, in which the vertical axis is the excess annual return, and the horizontal axis is the annual return volatility.

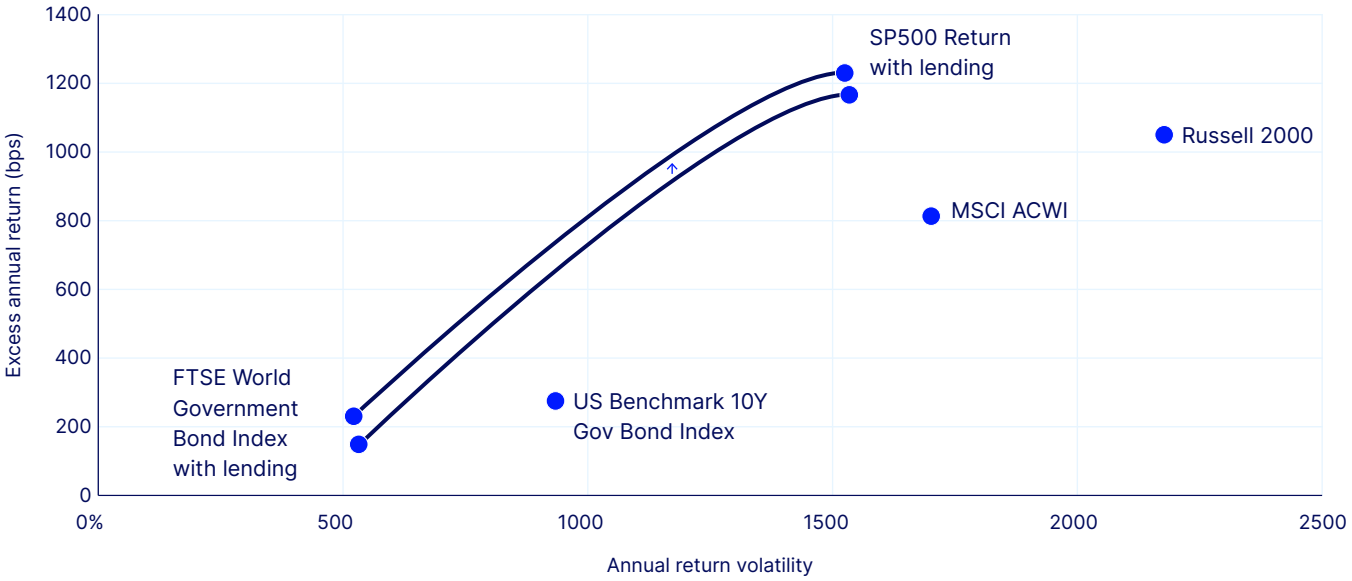
Within our sample space, the S&P 500 and the FTSE WGBI portfolios have higher excess return per volatility (i.e., risk). A hypothetical efficiency frontier between these two portfolios can be drawn as a combination of these two portfolios (i.e., a particular weight, ω, which is between 0 percent and 100 percent, is allocated to one of the corner portfolios while the rest, 1- ω, is allocated to the other, for all possible values of ω).

It is effectively shifted out by lending securities, assuming that the average net spread in our sample is earned upon lending out the securities.

Figure 3 shows the degree to which such an efficiency frontier would shift using our sample period from January 2008 to June 2023 for securities lending programs in the US and **Figure 4** depicts the same result for the non-US securities lending programs.

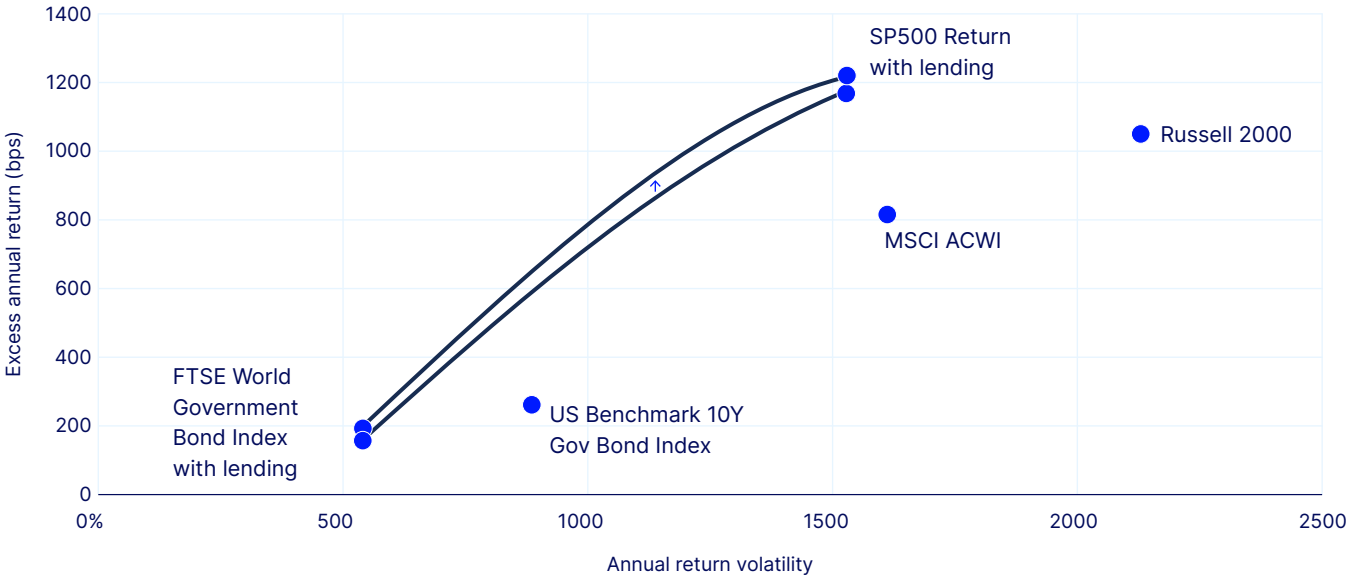
Given the hedging characteristic of securities lending as discussed above, we also show in **Figure 5** that the degree to which such efficiency frontier shifts is higher during off-ZLB periods, which proxies the time intervals with larger market downturns.

Figure 3: Efficiency frontier expansion with securities lending (US lending programs)



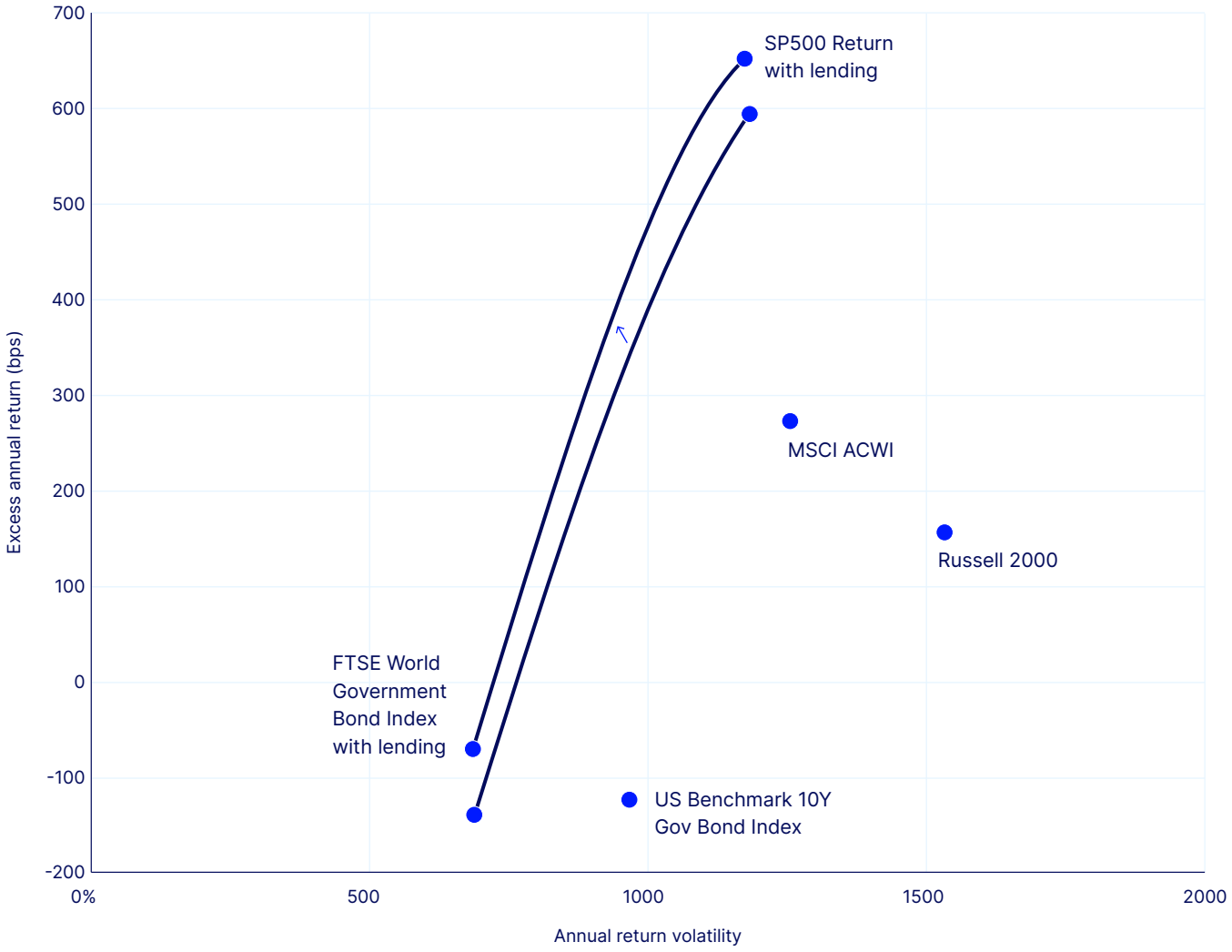
Source: State Street Global Markets

Figure 4: Efficiency frontier expansion with securities lending (non-US lending programs)



Source: State Street Global Markets

Figure 5: Efficiency frontier expansion with securities lending during off-ZLB periods (US lending programs)



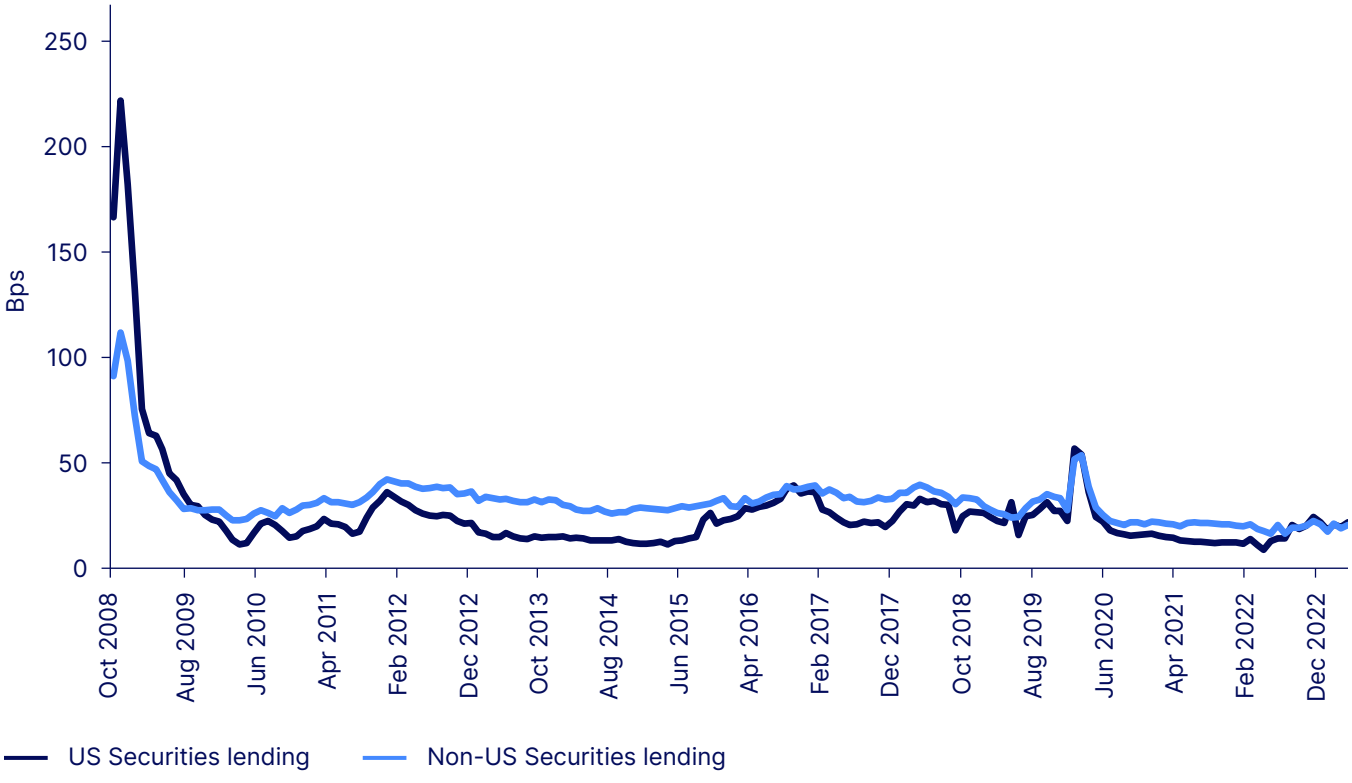
Source: State Street Global Markets

Securities lending spreads over time

Figures 6-8 show that all securities lending spreads are consistently positive for US and non-US lending programs throughout our sample period of 2008-2023 (except for a few months of slightly negative demands spreads during the Global Financial Crisis).

While the reinvestment spreads have systematically been within the range of 20 to 50 basis points over the past 15 years for both US and non-US lending programs, the volatility of the reinvestment spreads has been lower for non-US programs.

Figure 6: Reinvestment spread (weighted average) time series

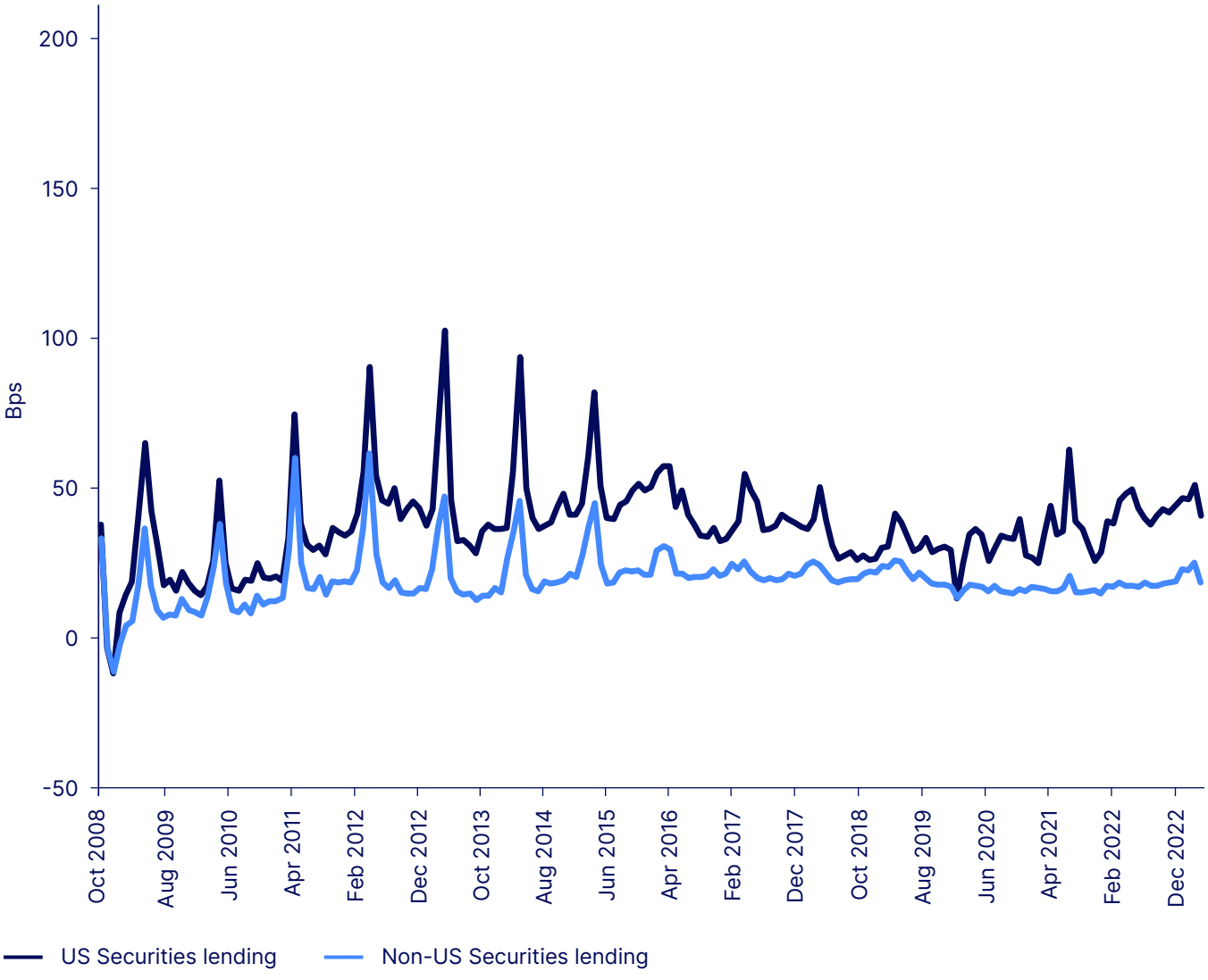


Source: State Street Global Markets

While the demand spreads have been fluctuating around 40 basis points in the US over the past 15 years, its volatility has decreased over time due to evolving borrowing behavior and market standards.

The demand spreads of non-US lending programs on average are slightly lower and have lower volatility. Similar to the US, the volatility of their spreads has also decreased significantly over time.

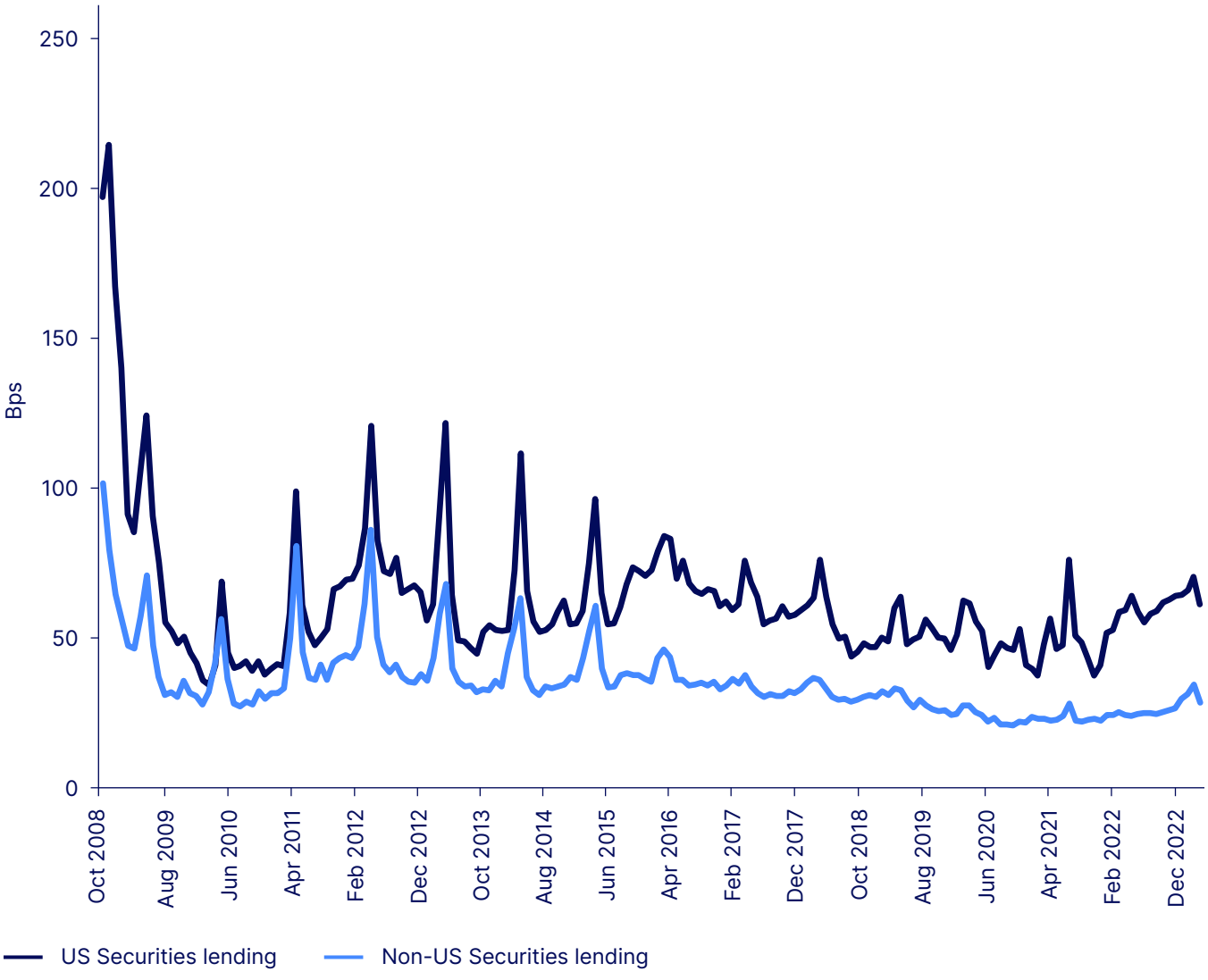
Figure 7: Demand spread (weighted average) time series



Source: State Street Global Markets

Net spreads of US securities lending programs have come down substantially since 2008 but have stabilized around 55 basis points since then. Volatility of net spreads has also come down over the past the decade. Net spreads of non-US lending, on the other hand, have slightly come down since 2008 and have stabilized over the past few years, while their volatility has also decreased. Both the average net spreads of non-US lending programs and their volatility are lower than that of US lending.

Figure 8: Net spread (weighted average) time series



Source: State Street Global Markets

Frequency of negative spreads and risk-free rates

The frequency of negative net and reinvestment spreads over our sample period has been low on average. There is, however, a very significant relationship between such frequencies and the level of risk-free rates.

Figures 9 and 10 show how such frequencies co-move with the 2-year Treasury yield, which is driven by the current and the future path of the Fed funds rate. The negative net spreads are mainly driven by the negative reinvestment spreads, which are more likely to go below zero during times of unexpected rate hikes since the short-term reinvestment strategies could be constrained by the fixed rates on certain short-term instruments during such periods.

This positive relationship between negative spreads and the 2-year yields can be expressed as an increase in the probability of observing negative spreads given a unit increase in the 2-year Treasury yields (often following a change in the Fed funds rate).

During our sample period, a percentage point increase in the 2-year Treasury yield is associated with a 9-basis-point rise in the probability of observing a negative net spread and a 7-percentage-point rise in the probability of observing a negative reinvestment spread. For a given percentage-point hike in the Fed funds rate, the same probability increases are 7 basis points and 6.5 percentage points, respectively.

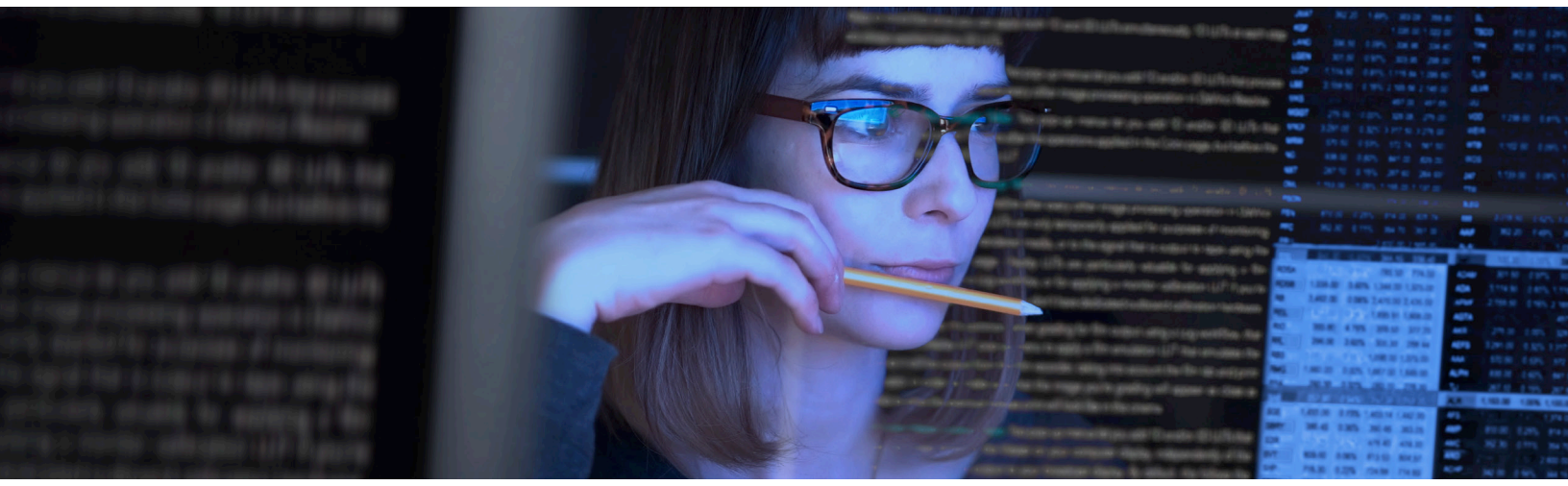
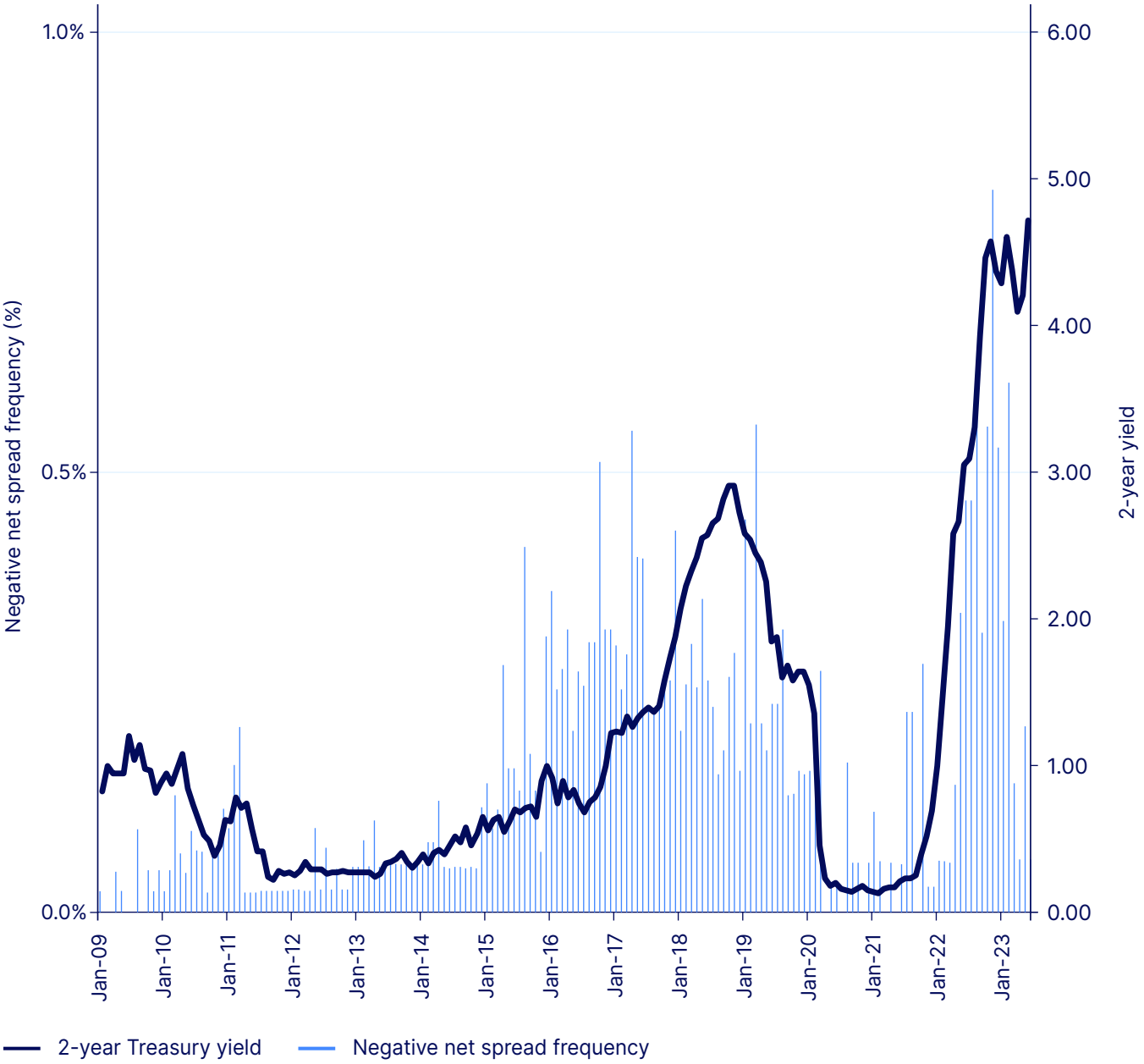
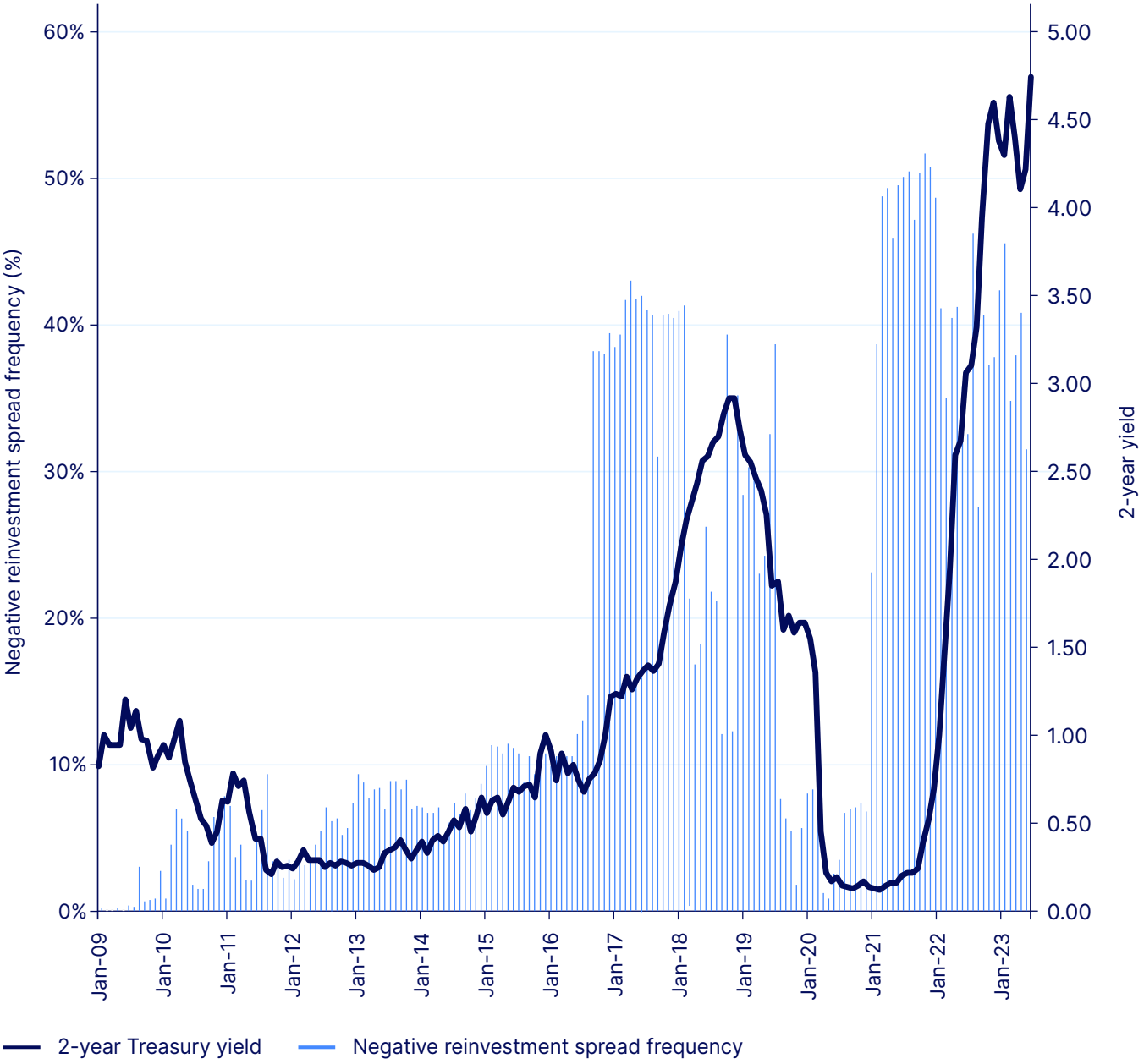


Figure 9: Frequency of negative net spreads with the 2-year treasury yields



Source: State Street Global Markets

Figure 10: Frequency of negative reinvestment spreads with the 2-year treasury yields



Source: State Street Global Markets

Securities lending tail risks

The analysis presented above treats risk as the volatility of returns. An alternate notion of risk for securities lending is the risk of default. However, the probability of a default event that materializes a large lending loss is vanishingly small since it requires the simultaneous occurrence of borrower default, collateral mismatch, and an indemnification failure of their agent lender (assuming indemnification is in place).

The borrower default probability can be quantified as 53 basis points, which is the one-year probability of going from A-[5] to D (i.e., default) given the S&P default history of more than 20 years of data. The probability of collateral shortfall is between 1-2 percent on average across the State Street program by design, while the probability of an Agent Lender, such as State Street (which has a long-term unsecured debt rating of AA-), default over a one-year period is 5-8 basis points. An accurate calculation of a joint probability event occurring requires an estimate of the correlation between these events since all three must happen at the same time for a potential loss. However, given their rarity, we do not have an accurate estimate of the correlations, so we use a conservative assumption that a given borrower's default is 100 percent correlated to a State Street default (an inaccurate assessment of State Street's risk profile). This extremely conservative assumption still yields a joint probability of ***less than 1 basis point*** for a partial loss of lent securities due to a borrower default.

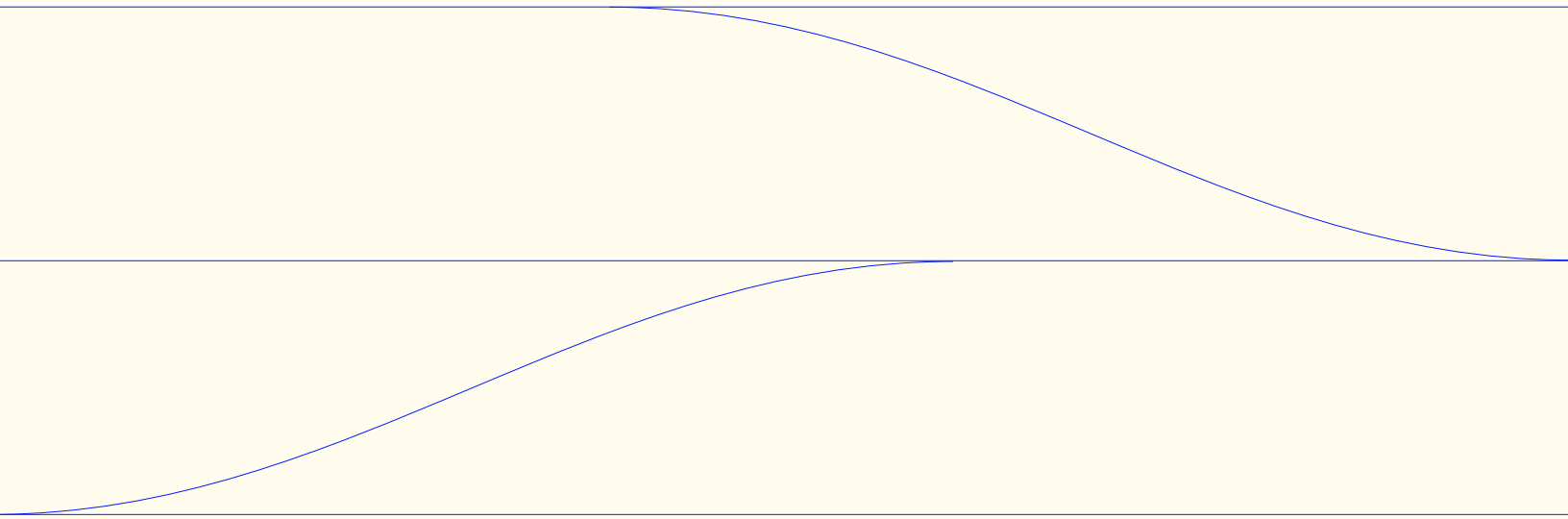
Final thoughts

Securities lending has long attracted the interest of asset owners and managers as a way of generating incremental returns, yet it is not fully embraced by all institutional investors. Some of this hesitation is rooted in the perception that the returns seem small on an absolute basis. However, just like any other investment decision, securities lending should be viewed through the lens of a reward-risk trade-off and its diversification properties. From an empirical perspective, we find that the incremental return from securities lending is well above the marginal risk.

The analysis of more than 5,000 aggregated and anonymized securities lending programs over the last 15 years suggests that the returns generated from securities lending tend to have a low or negative correlation with traditional asset classes. This favorable diversification characteristic pushes out a hypothetical efficiency frontier of investors (even more so during market downturns), improving returns while maintaining the similar levels of risk. While other aspects of securities lending, particularly in the operational space, should also be considered when deciding whether to lend securities, this study provides an empirical basis to make a more informed decision when it comes to understanding the impact of securities lending on an overall portfolio's reward-risk and diversification characteristics.

Endnotes

1. Atkins B. and Horner G., "Assessing Securities Lending Risk-Return Performance in a Portfolio Context," The Risk Management Association Journal (2006).
2. S&P Global Market Intelligence — Securities Finance, as of December 31, 2022.
3. Flows in and out of reinvestment vehicles are managed such that portfolio managers do not have to sell securities (i.e., by putting out new loans, allowing maturities to not be reinvested or reallocating existing loans). If a portfolio manager decides to sell securities (e.g., for liquidity), the realized gains/losses would flow through the reinvestment spread, if they are not offset by opposing gains/losses.
4. State Street Associates' Behavioral Risk Scorecard (BRS) captures the risk sentiment of institutional investors by measuring their positioning across 24 risky vs. non-risky assets (e.g., DM vs EM equities or USD vs EM FX). The methodology is published in Froot, K., et al., "Multi-Asset Sentiment and Institutional Investor Behavior: A Cross-Asset Perspective." Journal of Portfolio Management Vol. 40, Issue 4 (2014). We use the equity holdings sub-score of the BRS.
5. Average credit quality of borrowers in State Street's Agency Lending program as of February 2024.



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