When Delayed Spotting Meets Delayed Reporting: Distortions in the Corporate Bond Index Close*

Andreas C. Rapp† Sean Seunghun Shin‡ Xing (Alex) Zhou§ Qifei Zhu¶

March 2026

Abstract

This paper provides the first systematic evidence that delayed Treasury spot trades (DTSTs) interacting with delayed trade reporting distort corporate bond pricing at the index close. Using proprietary MarketAxess data that identify DTSTs and record spread-agreement timestamps, we show DTSTs execute at stale prices, deviating from contemporaneous non-DTSTs by 19 bps. These trades mechanically bias end-of-day close-price estimates, with distortions that intensify with intraday volatility and comove across bonds. The resulting mispricing passes through to evaluated prices produced by leading bond index providers. Moreover, delayed reporting of DTSTs impairs price discovery, both after spread agreement and after the close.

JEL classification: G10, G11, G12, G14, G18, G23.

Keywords: delayed Treasury spotting, delayed reporting, corporate bond market, index close, price distortion, price discovery, investment fund, index provider, benchmark valuation

*We have benefited from helpful comments from Julien Alexandre, Hank Bessembinder, Katie Gouinlock, Stacey Jacobsen, Maureen O'Hara, Damian Park, Sinem Uysal, David Xu, Jinming Xue, Haoxiang Zhu, and seminar participants at the Federal Reserve Board of Governors and MarketAxess. The analysis and conclusions expressed herein are those of the authors and do not necessarily reflect those of the Board of Governors of the Federal Reserve System or any other person associated with the Federal Reserve System.

†Federal Reserve Board of Governors. Email address: andreas.c.rapp@frb.gov

‡KAIST College of Business, KAIST. Email address: sean.shin@kaist.ac.kr

§Cox School of Business, Southern Methodist University. Email address: axzhou@smu.edu

¶NUS Business School, National University of Singapore. Email address: qifeizhu@nus.edu.sg

I. Introduction

Index closing prices play a central role in the corporate bond market. They underpin benchmark construction, determine mutual fund and ETF net asset values (NAVs), and support a range of risk-management and oversight applications. Yet producing a reliable "close" for corporate bonds is inherently difficult. Unlike equities, most corporate bonds trade infrequently and largely through bilateral, over-the-counter (OTC) negotiation, and the market often provides few near-synchronous transactions from which to infer a representative end-of-day price.[1] Although benchmark-tracking mandates and index-based investing have pushed more trading into index-close windows,[2] illiquidity and decentralized trading still complicate the measurement of closing prices.

This paper shows that a specific feature of corporate bond market structure further undermines the reliability of end-of-day prices and can induce systematic mismeasurement. A common trading convention, delayed Treasury spotting (DTS), interacts with TRACE reporting rules so that trades may be recorded at the close even when the economically relevant component of pricing was determined earlier in the day. In investment-grade (IG) corporate bonds in particular, market participants often negotiate a transaction during the day as a spread to a benchmark Treasury, but postpone "spotting" the Treasury (and thus finalizing the dollar price) until the index close to mitigate benchmark-tracking concerns.[3] Under current TRACE conventions, these trades are reported only when the benchmark Treasury is spotted and the dollar price is finalized, and in the public TRACE feed, they are observationally indistinguishable from trades whose terms were negotiated at the close. Delayed spotting therefore meets delayed reporting. As a result, closing prints can mechanically mix stale and contemporaneous information while appearing identical in standard data.

[1] For research on how search frictions in OTC markets shape price formation and liquidity, see Duffie, Gârleanu, and Pedersen (2005, 2007), Vayanos and Wang (2007), Vayanos and Weill (2008), Zhu (2012), among others.

[2] See Shin, Zhou, and Zhu (2025).

[3] Duffie, Dworczak, and Zhu (2017) show that benchmarks can reduce search costs and improve transparency in opaque OTC markets.

Against this backdrop, we ask a simple but fundamental question: To what extent do these hidden timing frictions distort corporate bond prices, and what are the implications for benchmark construction and investment fund valuation? We answer this question using proprietary transaction data from a leading electronic trading platform, MarketAxess, that identify delayed-Treasury-spot trades (DTSTs) and record when the yield spread is initially set.[4] Because delayed spotting is predominantly executed on electronic venues,[5] these data provide a rare opportunity to disentangle when a trade is recorded from when its spread terms are set. This distinction allows us to quantify the resulting distortions in commonly used measures of closing prices and assess how delayed reporting of DTSTs affects price discovery.

Our analysis shows that DTSTs account for a significant share of trading at the index close. Over the sample period from March 2021 through December 2024, 26% of IG bond trading volume reported to TRACE in the 15-minute window starting at 4:00 PM reflects DTSTs negotiated earlier in the day but reported near the close.[6] In contrast, DTST activity in high-yield (HY) bonds is limited, representing only 2% of trading volume.

DTST pricing deviates materially from the pricing of non-DTST at the index close. At 4:00 PM, the within-bond difference in yield spreads between DTST and non-DTST averages 2.59 basis points (bps). Because both trades reference the same benchmark Treasury yield at 4:00 PM, this spread difference translates into an economically substantial price gap of roughly 19 bps. We further show that the pricing gap between DTSTs and non-DTSTs moves closely with intraday yield-spread volatility leading up to the close and widens during periods of elevated market stress, including the onset of the Fed's monetary policy tightening

[4]MarketAxess reports in its 2024 Form 10-K that its platform handled an estimated 19.0% of total U.S. investment-grade corporate bond trading volume and 13.2% of total U.S. high-yield corporate bond trading volume. Coalition Greenwich estimates that MarketAxess accounted for approximately 37% of U.S. corporate bond electronic trading volume in 2024. See https://www.fi-desk.com/coalition-greenwich-e-trading-boom-to-outpace-market-growth-in-2025/.

[5]See public commentary by the Bond Dealers of America (BDA): www.finra.org/sites/default/files/NoticeComment/Bond%20Dealers%20of%20America_22-26_1.30.23_Delayed_Spot_Trades.pdf for reference.

[6]All times reported in this paper are in Eastern Time.

cycle and the banking stress episode in March 2023 following the failure of Silicon Valley Bank (SVB).

The pricing gap varies with trade direction. For customer buys, DTSTs occur at higher yield spreads (lower prices) than non-DTSTs at the close, whereas for customer sells the relationship reverses. We show that this asymmetry reflects intraday movements in corporate bond yield spreads: DTS buys are more likely to take place on days when yield spreads decline (prices rise), while DTS sells are more likely to take place on days when yield spreads increase (prices fall). In contrast, intraday movements in the benchmark Treasury yield have little explanatory power for DTST incidence.

As a sizable fraction of TRACE prints at the index close are DTSTs, differences in pricing between DTSTs and non-DTSTs distort measured closing prices whenever closing metrics are computed using all prints. We quantify this distortion as the absolute difference between the trade-size weighted average yield spread (or price) based on all TRACE disseminated prints and the same measure computed using only non-DTST prints. This simple metric indicates economically meaningful effects of mixing DTST and non-DTST prints. Yield-spread distortions average 1.17 bps, and price distortions average 8.67 bps. The magnitude of these distortions increases during periods of elevated volatility.

Importantly, pricing distortions exhibit a substantial systematic nature. Distortions measured at the bond level comove strongly with market-level distortions, a pattern that holds for both customer buys and customer sells and is evident in both yield spreads and prices. This systematic behavior is particularly concerning. If distortions were largely idiosyncratic, their aggregate impact would be limited, especially for users of TRACE prints who focus on broad corporate bond market movements or on well-diversified portfolios. Instead, the systematic comovement we document implies that these distortions are pervasive and can have broad market-wide effects.

Consistent with this interpretation, DTST-induced distortions appear to propagate into evaluated prices used for index construction and benchmarking. We compare daily corporate

bond evaluated bid prices from Bloomberg's BVAL (Bloomberg Valuation) and Intercontinental Exchange (ICE) with trade-size-weighted average bid prices at the index close computed both including and excluding DTSTs. Both Bloomberg and ICE pricing track more closely the closing prices implied by pooled prints that include stale DTSTs than the closing prices constructed solely from contemporaneous non-DTSTs. This alignment is stronger when DTSTs account for a larger share of closing prints or when our distortion measure is larger.

Delayed reporting of DTSTs not only distorts closing-price estimates, but also impedes the incorporation of information into corporate bond prices. Because market participants cannot distinguish DTSTs from non-DTSTs in real time, stale DTST prints at the index close can meaningfully influence subsequent price formation. This effect persists overnight and carries into the next trading day. We find some evidence consistent with opportunistic trading that exploits the resulting distortions: larger closing gaps are followed by faster price correction, driven especially by customer buys.

Delayed reporting also hinders price formation immediately after spread negotiation of DTSTs. When the agreed-upon spread is not disclosed promptly, investors face an avoidable information deficit that can spill over into the pricing of subsequent trades. Consistent with this mechanism, trades executed shortly after the spread-agreement time exhibit larger deviations from the CP+ benchmark, which incorporate negotiated DTST spread information immediately.

Our paper speaks to the growing literature on indexing and investment funds in the corporate bond market. The mechanisms through which indexing and asset-management activity affect credit markets in this literature predominantly operate relative to closing prices and benchmark index levels. Shin, Zhou, and Zhu (2025) show that the rapid growth of assets seeking to track benchmark indexes has concentrated a growing share of trading volume at index-closing times and altered the liquidity profile of corporate bonds. Using mechanical index rebalancing and eligibility rules as quasi-experiments, Dick-Nielsen and

Rossi (2019) and Bretscher, Schmid, and Ye (2023) document that index-induced demand shocks move bond prices and affect liquidity. In the literature on fragility in corporate bond mutual funds, a central mechanism is that stale end-of-day NAVs, combined with illiquid underlying assets, create a first-mover advantage for investors.[7] Other work shows that bond ETFs seek to reduce tracking error through creation and redemption activity (Shim and Todorov 2021) and principal trading (Huang, O'Hara, Xue, and Zhou 2025), and that they actively manage their baskets to facilitate liquidity transformation (Koont, Ma, Pástor, and Zeng 2025).

These indexing and intermediation processes rely critically on bond closing prices and end-of-day valuations. Several papers document sizable dispersion in the values that different investment funds assign to the same bond, arising from differences in benchmark indexes, which typically supply distinct daily closing prices for NAV calculations, as well as from valuation conventions and fund managers' strategic behavior (Cici, Gibson, and Merrick 2011; Choi, Kronlund, and Oh 2025; and Huang, Wermers, Xue, and Zhou 2024). Our paper adds a new dimension to this literature by focusing on the determinant of the construction of corporate bond index closing prices. Whereas existing work typically takes benchmark index levels as given, we endogenize them by linking index closes to the microstructure of DTSTs. We show that the opacity surrounding DTSTs can systematically distort closing prices and, in turn, the levels of benchmark indices. This mechanism provides a common channel through which frictions in delayed trades propagate, via benchmark construction, to benchmark-tracking funds and other index-based investors in the corporate bond market.

Our findings carry important implications for the ongoing policy debates about the transparency of DTSTs. We show that DTSTs can materially distort index closing prices and impair price discovery. By doing so, our study speaks directly to the recent efforts by

[7]See for example, Chernenko and Sunderam (2016), Goldstein, Jiang, and Ng (2017), Choi, Hoseinzade, Shin, and Tehranian (2020), Falato, Hortacsu, Li, and Shin (2021), Jiang, Li, Sun, and Wang (2022), Jin, Kacperczyk, Kahraman, and Suntheim (2022), Ma, Xiao, and Zeng (2022), Giannetti and Jotikasthira (2024), Anand, Jotikasthira, and Venkataraman (2021), Kuong, O'Donovan, and Zhang (2024), Li, O'Hara, and Zhou (2024).

Securities and Exchange Commission (SEC) and Financial Industry Regulatory Authority (FINRA) to improve DTST transparency and proposals that would flag DTSTs and disclose spread-agreement times in TRACE reporting. While market participants have highlighted the operational complexity of enhanced reporting, our evidence shows that the associated costs, in terms of distorted prices, biased benchmarks, and valuation errors for investors, can be substantial.

Our paper thus contributes to the literature examining how regulation of the corporate bond market affects market quality. Several studies examine how the phased introduction of TRACE reporting and public dissemination of corporate bond transactions starting in July 2002 improved liquidity (Bessembinder, Maxwell, and Venkataraman 2006; Goldstein, Hotchkiss, and Sirri 2007; Edwards, Harris, and Piwowar 2007; and Asquith, Covert, and Pathak 2013). Subsequent work shows that expanding TRACE to Rule 144A bonds in 2014 further enhanced liquidity (Jacobsen and Venkataraman 2018; and Han, Huang, Kalimipalli, and Wang 2022), and that FINRA's 2018 requirement that dealers explicitly disclose markups on retail corporate bond trades reduced those markups, especially for smaller and presumably less sophisticated investors (Cuny, Even-Tov, and Watts 2021). Our paper contributes to this literature by showing that a remaining pocket of opacity, DTSTs, can distort daily closing prices for corporate bonds and, in turn, the benchmarks used by institutional investors, thereby lending support to further improvements in transparency around DTSTs.

More broadly, our analysis speaks to the evolution of corporate bond trade-reporting regulation from whether transactions should be publicly disseminated to how promptly they should be disclosed. TRACE launched in 2002 with a 75-minute reporting window, but regulators quickly tightened standards to 45 minutes, then 30 minutes, and ultimately 15 minutes by mid-2005. Recent rulemakings push further. The SEC has approved (though not yet implemented) one-minute reporting, emphasizing that the value of transparency hinges on timeliness.[8] DTSTs run counter to this regulatory direction by creating a distinct and

[8]See https://www.finra.org/media-center/blog/updating-trace-reporting-timeframes.

largely unmeasured delay. On average, the volume-weighted "excess delay" relative to the 15-minute benchmark is 3.41 hours, highlighting DTSTs' importance in ongoing debates over optimal reporting speed.

A natural caveat of our study is that our DTST measures are constructed using data from a single electronic trading platform. Although this venue is the leading electronic platform, DTSTs may also occur on other electronic platforms as well as in voice-based trading. Accordingly, our estimates should be interpreted as a lower bound on the overall prevalence of DTST activity in the market. Expanding coverage across venues would further sharpen inference about DTST incidence and its implications for valuation, benchmark construction, and price discovery.

The remainder of the paper is organized as follows. Section II provides institutional background and motivates the empirical analysis. Section III describes the data and sample construction. Section IV characterizes DTST activity at the index close, examines pricing differences between DTSTs and non-DTSTs, and relates these differences to market conditions. Section V quantifies DTST-induced pricing distortions, documents their systematic nature, and links them to evaluated prices used by index providers. Section VI analyzes how delayed DTST reporting affects price discovery, both after spread determination earlier in the day and after price determination at the index close. Section VII concludes.

II. Institutional Background

In this section, we provide institutional details that motivate our empirical analysis. We begin with the mechanics of DTSTs and how they are treated under FINRA's TRACE reporting rules. We then summarize recent regulatory efforts to enhance the transparency of DTSTs.

A. DTSTs and FINRA's TRACE Reporting

In the U.S. corporate bond market, many transactions are negotiated on a spread to a benchmark Treasury yield rather than directly on a dollar price. For example, a dealer and an investor may agree to trade a corporate bond at a spread of 150 bps over the on-the-run 10-year Treasury. The agreed spread is then combined with the Treasury yield to determine the bond's yield and dollar price by "spotting" the relevant benchmark Treasury. This spread-based convention is particularly prevalent in the IG market, where bond prices are primarily driven by interest-rate movements rather than firm-specific news.

Spotting may occur immediately when the spread is set or at a later, predetermined time. Many index-oriented investors, including mutual funds and ETFs, choose to delay spotting until the index closing time (typically 4:00 PM) so that the executed price reflects the same Treasury curve used in their end-of-day valuations. Delayed spotting thus reduces tracking error and better aligns executed trades with benchmark levels.

Under FINRA's current TRACE rules, the time of execution is defined as the time when all terms necessary to compute the dollar price of a trade are known.[9] For corporate bond DTSTs, this time is not when the spread is negotiated earlier in the day, but when the benchmark Treasury is finally spotted and the price becomes fully determined. TRACE requires that trades be reported within 15 minutes after this execution time, and disseminates the information immediately.[10] Consequently, a trade whose spread is agreed in the morning but spotted at 4:00 PM enters the public tape as a 4:00 PM transaction.

The final price of a DTST reflects two distinct components: an interest-rate component, which is current because the Treasury yield used for spotting is the prevailing rate at the spotting time; and a bond-specific yield-spread component, which, by contrast, is determined earlier in the day. This spread reflects credit risk and market conditions (e.g., liquidity and supply–demand) at the time the spread is set, and may therefore be stale by the time the

[9] See FINRA Rule 6710(d): https://www.finra.org/rules-guidance/rulebooks/finra-rules/6710.
[10] See FINRA Rule 6730: https://www.finra.org/rules-guidance/rulebooks/finra-rules/6730.

trade is disseminated. Importantly, the potential staleness arises solely in the yield-spread dimension. The interest-rate portion of the price is always contemporaneous at the time of spotting.

A key institutional feature is that public TRACE data do not identify DTSTs or record the time at which the spread was negotiated. Market participants observing the TRACE feed cannot distinguish which trades printed at the close incorporate current information and which embed spreads set hours earlier.

A simple example (see Figure 1) illustrates this distinction. Suppose that at 10:00 AM, an investor and dealer agree to trade an IG bond at a spread of 150 bps over the 10-year Treasury currently trading at 350 bps. Following the agreement, the trade is not immediately reported, such that the market cannot learn from the agreed-upon yield-spread component. Now suppose further that by 4:00 PM, the Treasury yield has declined by 10 bps to 340 bps while the bond's fair yield spread has widened to 190 bps. When the Treasury is spotted at 4:00 PM, the original 150-bps spread is applied to the contemporaneous Treasury yield to produce a final yield of 490 bps. The interest-rate component reflects 4:00 PM conditions, but the yield-spread component reflects 10:00 AM information. Under TRACE rules, this trade is reported only after spotting and appears as a 4:00 PM print.

Contrast this with a trade negotiated at 4:00 PM on the spot, using both the current Treasury yield and the contemporaneous 190-bps spread, totaling a yield of 530 bps. This second trade is also reported with a 4:00 PM timestamp. In the TRACE feed, these two trades are indistinguishable: both appear to be executed at the close, despite one reflecting morning market conditions and the other reflecting closing-time conditions. Without the ability to distinguish the DTST, the 4:00 PM prints suggest an average closing yield of 510 basis points (with an average yield-spread component of 170 basis points), while the accurate yield reflecting contemporaneous credit conditions should be 20 basis points higher at 530 basis points.

For users of TRACE, such as index providers and pricing services, this lack of distin-

guishability has important implications. Any method used to construct end-of-day prices, credit curves, or NAV marks will treat both trades as equally representative closing prints, even though only one incorporates up-to-date information. The blending of stale and contemporaneous information at the close is the key institutional feature motivating our analysis.

B. Regulatory Efforts to Improve DTST Transparency

Regulators have long recognized the opacity associated with DTSTs. Following recommendations by the SEC's Fixed Income Market Structure Advisory Committee (FIMSAC), FINRA proposed amendments to Rule 6730 in July 2020 that would require TRACE reporters to flag DTSTs and disclose the time at which the spread was agreed.[11] The proposal was broadly supported by buy-side institutions, while several sell-side firms emphasized the operational adjustments that such a change would require.[12]

FINRA revisited the issue in November 2022 in Regulatory Notice 22-26.[13] Rather than relying on a single report at the spotting time, FINRA proposed a two-part reporting structure. Firms would submit an initial TRACE report within 15 minutes of the spread agreement, containing the agreed spread and the benchmark Treasury identifier, and a second report at the spotting time containing the final price. The two reports would be linked so that both the initial terms and the final outcome would be visible.

This proposal generated substantial feedback. Many commentators supported enhanced transparency, but others raised concerns about the complexity and cost of a two-report framework and encouraged FINRA to reconsider a simpler, single-report approach similar to the 2020 proposal.[14] As of the end of 2025, FINRA had not yet adopted a final rule implementing either framework. TRACE therefore continues to lack a DTST identifier or

[11] See FINRA Regulatory Notice 20-24: https://www.finra.org/sites/default/files/2020-07/Regulatory-Notice-20-24.pdf.

[12] See market-participant comments submitted in response to Regulatory Notice 20-24: https://www.finra.org/rules-guidance/notices/20-24.

[13] See FINRA Regulatory Notice 22-26: https://www.finra.org/rules-guidance/notices/22-26.

[14] See market-participant comments submitted in response to Regulatory Notice 22-26: https://www.finra.org/rules-guidance/notices/22-26.

any disclosure of spread-agreement timing, and the resulting opacity remains a defining feature of the institutional environment we study.

III. Data and Sample Construction

Our analysis combines publicly available information on corporate bond transactions from FINRA's Trade Reporting and Compliance Engine (TRACE) with proprietary trade-level data from MarketAxess covering all activity on its platform from March 2021 to December 2024. The TRACE data are obtained via the Enhanced TRACE Feed through WRDS. These data provide detailed secondary market transaction information for corporate bonds, including CUSIP, trade execution time, price, quantity, a dealer-reported buy/sell indicator, and an indicator for whether the counterparty is a customer. Following Dick-Nielsen (2014), we filter out cancellations, corrections, reversals, error trades, and duplicate reports, and apply the price-sequence-based filters.

As discussed earlier, the execution time in TRACE corresponds to the time at which all trading terms for a bond transaction are officially finalized. For DTSTs, this execution time is recorded when the bond's benchmark Treasury yield is set and the final price is determined. Consequently, some trades with an execution time of 4:00 PM may in fact be DTSTs whose yield spreads were negotiated and agreed upon earlier in the day. To distinguish these trades from non-DTSTs whose terms, including yield spreads, are determined at 4:00 PM, we exploit a proprietary MarketAxess dataset, TRACE Context. For each trade executed on MarketAxess, TRACE Context identifies whether the trade was negotiated on a delayed-spotting basis and reports the exact time at which the spread was agreed, in addition to standard trade-level fields such as bond identifier, execution time, price, quantity, trade direction, counterparty type, and message sequence number that are comparable to those in TRACE. We merge TRACE with the MarketAxess TRACE Context data to flag DTSTs in the TRACE tape and to append the corresponding timestamp for yield spread determination to these transactions.

We supplement the combined FINRA TRACE and MarketAxess TRACE Context data with MarketAxess's CP+ dataset, a high-frequency pricing service that provides real-time bid and ask estimates for a broad universe of U.S. corporate bonds.[15] CP+ is generated by a proprietary machine learning pricing engine that integrates TRACE-reported transactions with a rich set of MarketAxess internal data, including request-for-quote (RFQ) inquiry flows, dealer runs, and trading activity completed on the platform. In recent years, CP+ has been increasingly adopted by market participants, including broker-dealers and buy-side institutions. In addition, S&P Global Market Intelligence has incorporated MarketAxess pricing data, including CP+, into its corporate bond pricing and valuation framework.[16] Jacobsen, Venkataraman, and Xu (2025) show that CP+ is more informative about future trade price than transaction price information provided by TRACE.[17]

For each bond and at each quote update, CP+ produces bid and ask prices together with the corresponding yields, yield spreads relative to a benchmark Treasury security, the identity of the benchmark issue, and precise timestamps. This information is available at the minute frequency and is often updated multiple times per minute, reflecting both executed trades and unexecuted but informative market activity observed by MarketAxess. Importantly for our purposes, for DTSTs, CP+ internally observes the agreed-upon yield spread at the time it is negotiated, even though the trade is not reported to TRACE until later. As a result, CP+ bid and ask price estimates embed DTSTs' spread information in real time.

To construct our sample, we obtain bond characteristics from the Mergent Fixed Income Securities Database (FISD), including issue size, issue and maturity dates, and historical credit ratings. For each bond on each trading day, we construct a composite credit rating

[15] For a detailed description of the CP+ pricing data, see Shin et al. (2025).

[16] See https://press.spglobal.com/2024-10-31-S-P-Global-Market-Intelligence-and-MarketAxess-Announce-Strategic-Fixed-Income-Data-Partnership.

[17] For other studies using CP+ in the analysis of corporate bond market microstructure, see Kargar, Lester, Plante, and Weill (2023), and Shin et al. (2025).

based on ratings assigned by the three major agencies: S&P, Moody's, and Fitch.[18] Our sample is restricted to fixed-rate, U.S. dollar–denominated corporate bonds issued by U.S. entities. We exclude newly issued bonds with less than six months of seasoning, bonds within 1.5 years of maturity, and small issues with an original face value below $1 million. We also exclude Rule 144A, asset-backed, convertible, equity-linked, privately placed, and sinking-fund bonds. The analysis is based on secondary-market trades and excludes transactions executed on weekends, U.S. holidays, and early-close days recommended by the Securities Industry and Financial Markets Association (SIFMA). Our final sample comprises 10,667 bonds issued by 1,438 firms, traded over the period from March 2021 to December 2024.

Finally, we collect daily end-of-day prices for corporate bonds from two major corporate bond index providers, Bloomberg and ICE. Bloomberg is the dominant index provider in the corporate bond market, with its indices serving as benchmarks for the vast majority of passive bond funds by assets under management in 2024.[19] ICE has also become an important competitor and provider of pricing data and has been increasing its market share. Both index providers value their index constituents using bid prices. To facilitate a consistent comparison between index providers' prices and TRACE transaction prices, we work with clean bid prices net of accrued interest.

IV. DTST vs. Non-DTST: Pricing Gap at the Index Close

We begin by examining DTSTs spotted to the index close and comparing their pricing to contemporaneous non-DTSTs at the closing time. We then quantify the closing-time pricing gap between DTSTs and non-DTSTs and relate it to pre-close intraday volatility. Finally, we investigate the determinants of DTST activity at the index close.

[18]We map each rating notch to a numeric value, assigning 21 to AAA, 20 to AA+, 19 to AA, 18 to AA-, and so on. This scale is applied consistently across all three rating agencies. If a bond has only one rating, that rating is used as its composite rating. If it has ratings from two agencies, we take the lower (that is, worse) rating as the composite. For bonds rated by all three agencies, we use the median of the three ratings. Bonds without ratings from any of these agencies are excluded from the sample.

[19]See Shin et al. (2025).

A. DTSTs Spotted to the Index Close

We examine corporate bond trading activity reported in TRACE during the 15-minute close window (4:00:00 PM – 4:14:59 PM), which corresponds to the index close for most corporate bond indices. We identify DTSTs using the DTST flag constructed by merging FINRA TRACE with MarketAxess TRACE Context, and for each bond-day we compute the share of closing-time volume flagged as DTSTs.

Panel A of Table I shows that, for IG bonds, DTSTs account for about 26% of closing-time trading volume on average. DTST intensity varies substantially across bond-days. The standard deviation is roughly 43%, and the distribution ranges from 0% at the 10^{th} percentile to 100% at the 90^{th} percentile. DTST activity is present on both customer-buy and customer-sell trades, with a slightly higher DTST share in customer sells.[20]

In the time series, the daily closing-time DTST share fluctuates considerably, but the 20-day moving average is relatively stable and modestly lower in 2024 (Figure 2, Panel A). DTST patterns are broadly similar for customer buys and sells, although there are periods when the two diverge, with elevated activity occurring on different days across trade directions (Figure 2, Panel B).

Unlike IG bonds, whose prices are driven largely by interest rate movements, HY bond prices are more sensitive to issuer-specific credit risk. HY bond trades are also typically negotiated in dollar price terms rather than as a spread to a benchmark Treasury. As a result, Treasury spotting is used much less frequent in HY trading. Consistent with this pattern, Panel A of Table I shows that DTSTs are far less prevalent among HY bonds, accounting for only about 2% of closing-time trade volume. Over time, the DTST share in HY appears a bit higher in more recent years, which may reflect the growing role of indexing and benchmark-oriented trading in the HY segment (Figure 3). Given the very

[20]In the buy and sell subsamples, the reported number of observations for DTST share corresponds to the number of bond-days with customer buys and customer sells, respectively, in the index-closing window. Consequently, the sum of observations across the two subsamples can exceed the number of observations in the full sample, which is defined at the bond-day level and includes all bond-days with either customer buys or customer sells in the index-closing window.

limited prevalence of DTSTs in HY trading, we focus the remainder of our analysis on IG bonds, where DTST activity is economically meaningful.

DTSTs are executed at the index close, but their yield-spread component is typically agreed earlier in the day at the spread-agreement timestamp. Figure 4 plots the distribution of DTST volume by spread-agreement hour. Very little DTST volume is negotiated before 8:00 AM. DTST activity rises sharply through the morning. By 10:00 AM, negotiations account for a relatively stable share of total DTST volume through the middle of the day. Activity then tapers modestly late in the afternoon. The broad intraday dispersion of spread-agreement times indicates that DTSTs are not arranged exclusively near the close. Rather, they are negotiated throughout the trading day and then executed at the close. This pattern is consistent with DTST usage by index-oriented investors that manage intraday portfolio adjustments while anchoring execution to the closing print.

We find that closing-time DTST activity appears unrelated to bond characteristics. Panel B of Table I compares bond-days with and without DTST in the close window. Relative to bond-days without DTSTs, DTST bond-days involve bonds with slightly longer remaining maturities and younger ages, and marginally larger issue sizes, while credit quality and liquidity are similar across the two groups.

B. Pricing Gap at the Index Close and Intraday Yield Spread Volatility

If market conditions or information change between the spread-agreement time of DTST and the close, the agreed DTST spread can become stale relative to spreads negotiated at the close. This temporal separation can generate systematic differences between the yield spreads implied by DTSTs and non-DTSTs executed in the close window.

To quantify these differences, we construct a bond-day yield-spread gap measure, $YS\ gap_{i,t}$, defined as:

$$YS\ gap_{i,t} = |\, YS_{i,t}^{\text{DTST}} - YS_{i,t}^{\text{non-DTST}}|, \tag{1}$$

where $YS_{i,t}^{\text{DTST}}$ and $YS_{i,t}^{\text{non-DTST}}$ denote the trade-size-weighted average yield spreads of DTSTs and non-DTSTs, respectively, executed within the 15-minute close window for bond i on day t. We compute these bond-day averages in three steps. First, we obtain the benchmark Treasury yield for each corporate bond trade. To do that, we use MarketAxess CP+ data to infer the benchmark Treasury yield at the minute level by subtracting CP+ yield-spread estimates from CP+ yield estimates. We perform this calculation separately for the bid and the ask, which yields minute-by-minute bid and ask series for the relevant benchmark Treasury. Second, for each corporate bond trade, we compute its yield spread by subtracting the matched benchmark Treasury yield, aligned by execution time and trade direction, from the corporate bond yield calculated based on the transaction price in TRACE. Third, we aggregate trade-level spreads to the bond-day level within the close window using trade size as weights, separately for DTSTs and non-DTSTs. By construction, $YS\ gap_{i,t}$ is missing if either DTST or non-DTSTs are not present in the index-close window.

Since DTSTs and non-DTSTs in the close window are benchmarked to the same Treasury yields, differences in yield spreads map directly into differences in transaction prices. To facilitate interpretation of economic magnitudes, we also construct a bond-day price gap measure, $Price\ gap_{i,t}$, defined analogously to $YS\ gap_{i,t}$:

$$Price\ gap_{i,t} = |Price_{i,t}^{\text{DTST}} - Price_{i,t}^{\text{non-DTST}}|, \tag{2}$$

where $Price_{i,t}^{\text{DTST}}$ and $Price_{i,t}^{\text{non-DTST}}$ denote the closing-time trade-size-weighted average clean prices (excluding accrued interest) of DTSTs and non-DTSTs, respectively.

Panel A of Table II shows that DTSTs and non-DTSTs executed at closing time can differ substantially in pricing. The average $YS\ gap_{i,t}$ is 2.59 bps, and the average $Price\ gap_{i,t}$ is 19.00 bps. Both gap measures exhibit pronounced right skew. The means exceed the medians, indicating that a nontrivial fraction of bond-days features especially large closing-time pricing deviations. This is also evident in the upper tail of the distribution. The 90^{th} percentiles of $YS\ gap_{i,t}$ and $Price\ gap_{i,t}$ are 5.49 bps and 45.50 bps, respectively.

The pricing gap between DTSTs and non-DTSTs does not appear to be explained by differences in trade characteristics. First, the gap is unlikely to reflect differences in trade direction and the associated bid-ask spread. When we re-estimate the pricing gap separately for buys and for sells, we obtain estimates of similar magnitude, suggesting that the gap is not simply capturing bid-ask bounce.[21] Second, differences in trade size also do not explain the result. Although non-DTSTs have a larger average par amount than DTSTs ($671,656 versus $486,962), this difference is driven by a small number of very large trades. The median non-DTST is, in fact, substantially smaller than the median DTST ($60,000 versus $191,000). To address this difference directly, we re-estimate the pricing gap within trade-size groups and continue to find economically meaningful gaps across all size buckets (Panel B). In addition, because some observations may be line items from larger portfolio trades and therefore subject to different pricing terms (Li, O'Hara, Rapp, and Zhou, 2025), we use the MarketAxess portfolio-trade flag to exclude portfolio-trade line items from the sample. Panel C shows that the pricing gap remains and is, if anything, slightly larger than in the full sample.

Because DTSTs are negotiated earlier in the day but executed at the close, the extent to which DTST pricing differs from non-DTST pricing at the close likely depends on how much market conditions move between the spread-agreement time and 4:00 PM. When pre-close trading is more volatile, the negotiated DTST spread is more likely to become stale by the close, increasing the likelihood of a larger pricing gap relative to non-DTSTs executed in the close window.

To test this idea, we construct a bond-day measure of pre-close intraday volatility using CP+ prices. For each bond i on day t, we compute minute-level midpoints from CP+ bid and ask yield spreads (or prices) and calculate the standard deviation of these minute-by-minute midpoints over the pre-close interval 8:00 AM to 3:59 PM. Figure 5 shows that the pricing gaps between DTSTs and non-DTSTs co-move closely with these intraday volatility

[21] Restricting the comparison to trades with the same direction substantially reduces the number of bond-day estimates in both the buy-only and sell-only samples.

measures over time. Both the yield-spread gap (Panel A) and the price gap (Panel B) rise during periods of elevated market-wide intraday volatility, including the onset of the Federal Reserve's tightening cycle in the second half of 2022 and the banking-sector stress episode in March 2023 following the SVB failure.

We formalize the time-series patterns in Figure 5 using a regression framework. At the bond-day level, we estimate:

$$\textit{Pricing gap}_{i,t} = \alpha + \beta \textit{Intraday volatility}_{i,t} + \epsilon_{i,t}, \tag{3}$$

where $\textit{Pricing gap}_{i,t}$ is either $\textit{YS gap}_{i,t}$ or $\textit{Price gap}_{i,t}$. The main independent variable $\textit{Intraday volatility}_{i,t}$ is our pre-close intraday volatility measure. When the dependent variable is $\textit{YS gap}_{i,t}$, the intraday volatility is computed as the standard deviation of CP+ minute-level mid yield spreads over 8:00 AM to 3:59 PM. When the dependent variable is $\textit{Price gap}_{i,t}$, we use CP+ minute-level mid prices instead. We progressively add day fixed effects, bond fixed effects, and rating fixed effects and bond controls (the log of time to maturity, log age, log amount outstanding, and a fraction for zero trading days over the past three months) across specifications, and we two-way cluster standard errors by bond and day.

Panel A of Table III shows a strong positive relation between pricing gaps at the close and pre-close intraday volatility. When the dependent variable is $\textit{YS gap}_{i,t}$ (Columns (1) through (4)), the coefficient on intraday yield-spread volatility is positive and highly significant (Column (1)), and remains so after adding day fixed effects (Column (2)), bond fixed effects (Column (3)), and time-varying controls (Column (4)). The same conclusion holds when the dependent variable is $\textit{Price gap}_{i,t}$. Higher intraday volatility in price is positively associated with larger closing-time price gaps (Columns (5) through (8)). Panel B confirms robustness to an alternative volatility proxy based on the intraday max–min range of minute-level mid yield spreads (or prices). Using this range-based measure produces the same pattern: larger pre-close intraday swings predict larger DTST–non-DTST pricing gaps at the close.

C. Pricing Gap at the Index Close: Additional Analysis

While our main analysis takes the incidence of DTST activity at the close as given and focuses on how DTST pricing differs from non-DTST pricing, it is natural to ask what drives the decision to negotiate the yield-spread component earlier in the day rather than at the close. Waiting to negotiate until the close would align both the yield spread and the benchmark Treasury component with close-time conditions, potentially reducing tracking error. In contrast, negotiating earlier can be attractive if investors seek to lock in a yield-spread level before intraday movements in market conditions, while still anchoring the Treasury leg to the close.

We therefore examine whether DTST usage is systematically related to directional intraday movements in yield spreads. To do so, we construct signed pricing-gap measures, defined as DTST pricing minus non-DTST pricing. The sign indicates whether DTSTs occur at wider/narrower spreads (or lower/higher prices) than contemporaneous non-DTSTs in the close window. Panel B of Table II shows a clear asymmetry across trade direction. For customer buys, the signed yield-spread gap averages 1.06 bps, implying that DTS buys occur at wider spreads than non-DTS buys at the close. For customer sells, the signed yield-spread gap averages -0.26 bps, implying that DTS sells occur at narrower spreads than non-DTS sells. The corresponding signed price gaps display the mirror-image pattern. DTS buys occur at lower prices than non-DTS buys, whereas DTS sells occur at higher prices than non-DTS sells. These directional differences are visible in the time-series plots in Figure 6.

To link DTST prevalence more directly to pre-close movements in yield spreads, we estimate bond-day regressions of close–open yield-spread changes on indicators for DTS buys and DTS sells:

$$\textit{Close–open YS Change}_{i,t} = \beta_1 D(\textit{DTS buy})_{i,t} + \beta_2 D(\textit{DTS sell})_{i,t} + \textit{Controls}_{i,t} + \epsilon_{i,t}, \quad (4)$$

where $\textit{Close–open YS Change}_{i,t}$ is the CP+ mid-spread immediately before 4:00 PM minus

the CP+ mid-spread immediately after 8:00 AM. The key regressors are $D(DTS\ buy)_{i,t}$ and $D(DTS\ sell)_{i,t}$, which equal one if bond i has at least one customer-buy or customer-sell DTST at the close, respectively. We include day and bond fixed effects, time-varying bond controls, and pre-close trading volume, and we two-way cluster standard errors by bond and day.

Table V supports the directional hypothesis. DTS buys are associated with spread tightening into the close (Column (1)), whereas DTS sells are associated with spread widening (Column (2)). The relationship holds in the joint specification that includes both indicators (Column (3)). Finally, because DTSTs and non-DTSTs *both* remain exposed to interest-rate risk through the close, intraday movements in benchmark Treasury yields should play a limited role in the decision to use DTSTs. Consistent with this, Columns (4) through (6) show that close–open changes in the benchmark Treasury yield are at most weakly related to DTST occurrence. The coefficient for DTS buys is essentially zero, and the coefficient for DTS sells is small and only marginally significant at the 10% level. Overall, the evidence suggests that DTST usage is most closely associated with intraday yield-spread dynamics, rather than Treasury-yield movements.

V. DTST-Induced Pricing Distortions and Benchmark Valuation

Our analysis thus far shows that DTSTs account for a substantial share of closing-time trade prints and that DTST pricing can deviate significantly from contemporaneous non-DTST pricing. Because TRACE prints are a primary input into end-of-day closing price construction, the co-mingling of DTSTs and non-DTSTs can mechanically distort closing prices. In this section, we introduce a measure of DTST-induced closing-price distortion and quantify its magnitude. We then examine whether these distortions are systematic rather than idiosyncratic, documenting commonality across bonds and over time. Finally, we link DTST-induced distortions to bid prices by major index providers, showing how stale DTST pricing can propagate into end-of-day closing prices, which are used for indexing and

performance measurement.

A. Measuring DTST-Induced Pricing Distortions

We quantify DTST-induced pricing distortions by comparing two closing-price measures based on TRACE prints in the close window. The first uses all reported trades during the close window, mirroring the information set of market participants who form end-of-day prices directly from TRACE. The second uses only non-DTSTs, which should better reflect contemporaneous yield-spread information at the close in a counterfactual setting where stale DTSTs could be identified and excluded. The wedge between these two constructions captures the extent to which stale DTST pricing distorts closing marks.

Specifically, we define a yield-spread distortion measure,

$$YS\ distortion_{i,t} = |\, YS_{i,t}^{\text{all}} - YS_{i,t}^{\text{non-DTST}}|, \tag{5}$$

where $YS_{i,t}^{\text{all}}$ and $YS_{i,t}^{\text{non-DTST}}$ are the trade-size-weighted average yield spreads computed, respectively, using all close-window prints and using only non-DTST prints for bond i on day t. Larger values of $YS\ distortion_{i,t}$ indicate greater distortion arising from the inclusion of DTSTs whose yield-spread component may be stale. Analogously, we define a price-based measure,

$$Price\ distortion_{i,t} = |Price_{i,t}^{\text{all}} - Price_{i,t}^{\text{non-DTST}}|, \tag{6}$$

where the averages are constructed in the same manner using transaction prices.

Panel A of Table VI shows that DTSTs can induce economically meaningful distortions in closing marks. The average yield-spread distortion is 1.17 bps, and the average price distortion is 8.67 bps. Both measures are strongly right-skewed. The median yield-spread distortion is 0.55 bps but rises to 2.98 bps at the 90^{th} percentile, while the median price distortion is 3.89 bps and reaches 23.51 bps at the 90^{th} percentile. These distributional patterns indicate that, although distortions are modest on a typical day, a nontrivial subset of

bond-days experiences large distortions. The time-series evidence in Figure 7 further suggests that distortions are state-dependent. Both yield-spread and price distortions increase sharply during periods of elevated market volatility (with pronounced spikes in the daily series and a clear rise in the 20-day moving average), and then subside as market conditions normalize.

We also examine signed pricing distortions, defined as the all-trades close minus the non-DTST close, and relate them to trade direction. This signed measure captures not only the magnitude of DTST-induced distortions but also whether the all-trades close is pushed upward or downward relative to the non-DTST benchmark. Panel B of Table VI shows substantial dispersion on both sides of zero for both customer buys and customer sells. For customer buys, the 10^{th} and 90^{th} percentiles of signed yield-spread distortions are -0.98 bps and 1.66 bps, respectively. For customer sells, the corresponding percentiles are -1.21 bps and 1.25 bps. The price-based signed distortions exhibit a similar two-sided distribution: for customer buys, the 10^{th} and 90^{th} percentiles are -11.60 bps and 8.32 bps, and for customer sells they are -10.66 bps and 9.38 bps.

In the time series (Figure 8), signed distortions appear more pronounced for customer buys. Consistent with the distributional evidence, customer-buy close-window activity is more often associated with higher yield spreads (and correspondingly lower prices) for the DTST relative to the non-DTST close. The magnitude of these distortions fluctuates over time and is larger during periods of elevated market volatility.

B. Commonality in Pricing Distortions

Do DTST-induced pricing distortions comove across bonds? If distortions are largely idiosyncratic, even if sometimes large, their aggregate effects may be limited in well-diversified corporate bond portfolios and may not materially affect market-wide valuation. By contrast, if distortions exhibit a common component, then closing-price errors can become systematic, moving together across the cross-section and potentially contributing to correlated valuation noise at the market level.

In this subsection, we test for commonality in pricing distortions across corporate bonds.[22] Specifically, for each bond i, we first estimate the following time-series regression:

$$\begin{aligned} \textit{Signed YS distortion}_{i,t} = \alpha + \beta_1 \, \textit{Signed YS distortion}_{M,t} \\ + \beta_2 \, \textit{Signed YS distortion}_{M,t-1} + \beta_3 \, \textit{Signed YS distortion}_{M,t+1} + \epsilon_{i,t}, \end{aligned} \tag{7}$$

where Signed YS distortion$_{i,t}$ is defined in Equation (5) but without taking the absolute value, and Signed YS distortion$_{M,t}$ is the concurrent market-wide average distortion across bonds at time t, weighted by amount outstanding. When constructing this measure, we exclude bond i, so the regressor varies slightly across bonds and captures comovement with distortions in the rest of the market. We include one lag and one lead of the market-wide distortion to allow for potentially delayed adjustment in this comovement.

Table VII provides strong evidence that DTST-induced pricing distortions exhibit substantial comovement across bonds. In Column (1), the coefficient on the contemporaneous market-wide distortion is positive and highly significant, with an average estimate of 0.934. Economically, this magnitude implies close to one-for-one comovement between a bond's distortion and the broader market-wide distortion at the same time. The cross-sectional results reinforce this conclusion. Over 90% of the bond-level regressions produce a positive contemporaneous loading, and more than 55% are statistically significant at conventional levels. By contrast, the lead and lag terms are close to zero and generally insignificant, indicating that commonality is predominantly contemporaneous rather than driven by delayed adjustment. The sum of the contemporaneous, lagged, and lead coefficients is strongly significant in both mean-based and median-based tests. Market-wide distortions also have meaningful explanatory power for bond-level distortions, with average adjusted R-squared around 16%.

[22] Our empirical design parallels the standard approach used in the liquidity-commovement literature. See, for example, Chordia, Roll, and Subrahmanyam (2000) for commonality in stock liquidity, and Bao, Pan, and Wang (2011) for commonality in corporate bond liquidity.

Columns (2) and (3) show that commonality is present within customer-buy and customer-sell distortions separately, but it is stronger on the sell side. The average contemporaneous loading is larger for sells than for buys (0.970 versus 0.819), indicating that sell-side distortions in yield spread comove more tightly with market-wide distortions. This asymmetry is particularly important for valuation. Many benchmarks and portfolio pricing conventions rely more heavily on bid-side information, and bid quotes are naturally tied to the pricing environment for customer sells. As a result, a systematic component in sell-side distortions can translate more directly into correlated valuation noise across bonds held by investors.

Columns (4) through (6) corroborate these findings using an alternative distortion measure constructed from prices rather than yield spreads. The contemporaneous market-wide coefficient remains large and highly significant across all trades and within buy and sell subsamples, while the lead and lag terms contribute little.

In sum, the results in Table VII indicate that DTST-induced distortions are not merely idiosyncratic noise at the individual-bond level. Instead, they move systematically across the cross-section, implying that closing-price errors can become correlated across bonds and therefore affect market-wide valuations, especially during periods when distortions are elevated.

C. Pricing Distortions and Index Provider Bond Valuation

To gauge the economic relevance of DTST-induced pricing distortions, we turn to a setting where closing prints directly feed into widely used valuations: end-of-day prices produced by corporate bond index providers. Leading providers such as Bloomberg and ICE publish evaluated end-of-day prices that underpin index levels, benchmark returns, and the daily valuation of index-tracking portfolios. Because these valuations are constructed using transaction information from TRACE and related feeds, they are potentially exposed to the same measurement problem documented above.

In particular, index providers, like other TRACE users, cannot directly distinguish DTST

prints from non-DTST prints, and thus cannot systematically exclude stale information from DTST prices when forming end-of-day marks. If DTSTs distort the close-window information set, evaluated end-of-day prices should load more heavily on trade-based measures that include DTSTs than on counterfactual measures that exclude them. We test this implication by comparing Bloomberg and ICE end-of-day bid prices to trade-size-weighted TRACE bid prices (transaction prices of customer-sell/dealer-buy trades) computed over the close window, constructed both with and without DTSTs.

Specifically, we quantify whether DTST-contaminated closing prints materially affect end-of-day valuations produced by index providers. For each bond i and day t, we construct two close-window benchmark prices, $Price_{i,t}^{\text{all}}$ and $Price_{i,t}^{\text{non-DTST}}$, both based on TRACE customer-sell prints, net of accrued interest. We then measure how close an index provider's end-of-day price is to each benchmark via $Pricing\ deviation_{i,t}$, defined as the absolute difference between the provider price and the relevant benchmark. Because each bond-day can be paired with either benchmark, we form a bond-day-benchmark panel and estimate:

$$Pricing\ deviation_{i,t} = \alpha + \beta\, D(Distorted\ deviation)_{i,t} + \text{Controls}_{i,t} + \epsilon_{i,t}, \tag{8}$$

where $D(\text{Distorted deviation})_{i,t}$ equals one when the deviation is computed relative to $Price_{i,t}^{\text{all}}$ and zero when it is computed relative to $Price_{i,t}^{\text{non-DTST}}$. We include both day fixed effects as well as a host of bond-level controls. If index providers' bids effectively reflect the full TRACE close-window information set, without being able to identify and exclude stale DTSTs, then their evaluated prices should be systematically closer to $Price_{i,t}^{\text{all}}$, yielding a negative estimate for β.[23]

Panel A of Table VIII provides direct evidence to support this hypothesis for Bloomberg BVAL bid prices. The coefficient on $D(\text{Distorted deviation})_{i,t}$ is negative and highly statistically significant, indicating that BVAL bids are, on average, closer to the benchmark

[23]Note that we are unable to verify the accuracy of index providers' bid prices without observing the bond's true fundamental value. This limitation is not central to our test, however, because our analysis relies only on its relative differences from $Price_{i,t}^{\text{all}}$ *and* $Price_{i,t}^{\text{non-DTST}}$.

constructed from all close-window prints than to the benchmark that excludes DTSTs. The magnitude is economically meaningful. Column (1) shows that the baseline estimate implies that the typical BVAL mark is 2.215 bps closer to $Price_{i,t}^{\text{all}}$ than to $Price_{i,t}^{\text{non-DTST}}$, a nontrivial magnitude compared to the average closing distortion in our sample (8.67 bps).

The cross-sectional splits in Panel A further strengthen this interpretation. When we partition bond-days by the fraction of DTST prints in the close window, the effect is substantially larger in the high-DTST subsample than in the low-DTST subsample, consistent with greater contamination of the TRACE close-window pricing when DTST activity is more prevalent (Columns (2) and (3)). A similar pattern emerges when we split by the magnitude of the bond-day pricing distortion (Columns (4) and (5)). The estimated effect is concentrated in the high-distortion subsample and is close to zero when distortions are small.

Panel B shows that the link persists across BVAL quality subsamples. Bloomberg assigns each bid a BVAL Score from 1 (lowest) to 10 (highest), which summarizes the quantity and consistency of the market inputs supporting the evaluation. When we re-estimate Equation (8) within the BVAL score bins, the coefficient on $D(\text{Distorted deviation})_{i,t}$ remains negative and statistically significant throughout. The effect persists even for the highest-score observations, indicating that even bids supported by "high-confidence" pricing data track the close-window TRACE information set and therefore remain exposed to stale DTST prints. Put differently, even sophisticated evaluation models based on direct, recent, and corroborated data cannot fully purge DTST-driven distortions when the underlying transaction tape embeds stale prices that are not separately identifiable.

Finally, Panel C replicates the analysis from Panel A using ICE bid prices and yields qualitatively similar results. ICE marks, like BVAL marks, are closer to the DTST-inclusive benchmark than to the DTST-excluded benchmark on average, and the effect strengthens in subsamples with higher DTST intensity and larger distortions. Together, the evidence in Table VIII illustrates the economic relevance of DTST-induced closing distortions. They

are not only visible in transaction-based closing-price measures, but also influence evaluated end-of-day prices produced by major index providers, thereby affecting benchmark returns and daily portfolio valuations.

VI. The Impact of Delayed DTST Reporting on Price Discovery

Delayed reporting of DTSTs not only distorts closing-price estimation, but may also impede the incorporation of information into corporate bond prices. First, DTSTs that are disseminated only at the index close can embed stale pricing information, potentially contaminating valuations and trading decisions in the period immediately after the close. Second, because the DTST yield spread is negotiated earlier but not publicly reported until later, the market lacks access to the trade information contained in the agreed-upon yield spread between the spread-agreement time and trade dissemination. Together, these reporting frictions can distort post-close and post-agreement price formation, with important implications for price discovery in the corporate bond market.

A. DTST Stale Information and Price Discovery After the Index Close

If DTSTs embed stale yield-spread information yet are indistinguishable in TRACE from non-DTSTs that reflect contemporaneous information at the close, investors who monitor TRACE prints may draw incorrect inferences about prevailing bond values. Such misinference can, in turn, shape price formation immediately after the index close.

To assess this possibility, we examine post-close price movements and relate them to the signed pricing gap between DTSTs and non-DTSTs at the close. Specifically, we estimate the following bond-day regression:

$$YS_{i,t}^{\text{Post-close}} - YS_{i,t}^{\text{non-DTST}} = \alpha + \beta(YS_{i,t}^{\text{DTST}} - YS_{i,t}^{\text{non-DTST}}) + Controls_{i,t} + \epsilon_{i,t}, \qquad (9)$$

where $YS_{i,t}^{\text{Post-close}}$ is the yield spread of bond i on day t measured over a post-close window,

and $YS_{i,t}^{\text{DTST}}$ and $YS_{i,t}^{\text{non-DTST}}$ are the closing-time yield spreads from DTSTs and non-DTSTs, respectively.

If DTST prints distort subsequent price discovery, then a larger DTST–non-DTST gap at the close should be associated with a larger deviation of post-close pricing from the non-DTST close benchmark. This relationship should be directional: when $YS_{i,t}^{\text{DTST}}$ is greater than $YS_{i,t}^{\text{non-DTST}}$, post-close yield spreads should be larger than the non-DTST close (and when $YS_{i,t}^{\text{DTST}} < YS_{i,t}^{\text{non-DTST}}$, they should decrease), implying $\beta > 0$.

Table IX supports this hypothesis. We measure $YS_{i,t}^{\text{Post-close}}$ over three alternative time windows (Columns (1) through (3)): (i) 4:15 PM–6:00 PM on day t, (ii) 8:00 AM–11:00 AM on day $t+1$, and (iii) 4:15 PM on day t through 11:00 AM on day $t+1$. Across all specifications, β is positive and highly significant. The estimate in Column (1) implies that when $YS_{i,t}^{\text{DTST}}$ exceeds $YS_{i,t}^{\text{non-DTST}}$ by 1 bp, $YS_{i,t}^{\text{Post-close}}$ over 4:15 PM – 6:00 PM increases by 0.627 bp from the non-DTST close. This effect persists into the next trading day: β remains positive and increases somewhat in magnitude in Column (2). The results are robust to controlling for a host of bond characteristics and including day fixed effects (Columns (4) through (6)).

The persistent impact of DTSTs on subsequent price formation raises the question of whether some market participants can trade against the resulting distortion. While DTSTs are not explicitly flagged in TRACE and therefore cannot be systematically distinguished from other closing prints, some participants may have better information about particular DTSTs. For example, dealers and customers participating in a DTST can identify that those transactions in which they are directly involved as a DTST and separate it from other closing trades. In addition, investors who have access to CP+ estimates that have incorporated DTST yield spread information in real time may have a more accurate view of contemporaneous yield spreads at the close. Access to such transaction-specific information can create profitable opportunities to trade in a direction that corrects DTST-induced price

distortions.[24]

We therefore examine whether larger closing-time yield-spread gaps are associated with subsequent corrective trading, that is, trades that move prices in the direction opposite the distortion implied by the signed pricing gap. Specifically, we begin by estimating the following bond-day regression:

$$D(\textit{Trade arrival post-close})_{i,t} = \alpha + \beta\ \textit{YS gap}_{i,t} + \textit{Controls}_{i,t} + \epsilon_{i,t}, \tag{10}$$

where $D(\textit{Trade arrival post-close})_{i,t}$ is an indicator variable for whether the bond trades between 4:15 PM and 11:00 AM the next day (multiplied by 100) and *YS gap* is the absolute difference in yield spreads of DTSTs and non-DTSTs as defined in Equation (1).

Panel A of Table X shows that larger closing-time yield spread gaps are followed by a higher probability of a post-close trade (Column (1)). This pattern appears in both inter-dealer trades (Column (2)) and dealer–customer trades (Column (3)), consistent with the idea that both dealers and customers can obtain (directly or indirectly) information about DTST pricing and trade on it. The composition of post-close trading also aligns with the direction of the distortion implied by the signed pricing gap. When a DTST occurs at a higher yield spread than a concurrent non-DTST, post-close trading is significantly more likely to involve customer buys (Column (4)), while the corresponding estimate for customer sells is small and insignificant (Column (5)). By contrast, when a DTST occurs at a lower yield spread than a concurrent non-DTST, we find no statistically significant relation between the gap and subsequent customer buying or selling (Columns (6) and (7)). This asymmetry is consistent with the higher frictions involved in shorting corporate bonds: correcting a distortion associated with lower DTST yield spreads typically requires selling (often short-selling), which may be costly or infeasible unless the trader already holds inventory.

[24]For related analyses of how trading through dealer networks affects price discovery and liquidity, see, for example, Di Maggio, Kermani, and Song (2017); Hollifield, Neklyudov, and Spatt (2017); O'Hara, Wang, and Zhou (2018); Li and Schürhoff (2019); Hendershott, Li, Livdan, and Schürhoff (2020); Goldstein, Hotchkiss, and Nikolova (2021); Choi, Huh, and Shin (2024).

Panel B reinforces this interpretation by showing that larger closing-time gaps are also associated with faster post-close trading. We construct *Time to first post-close trade*$_{i,t}$, defined as the elapsed minutes from 4:15 PM to the first subsequent trade, and re-estimate Equation (10) using this measure as the dependent variable. The coefficient on *YS gap*$_{i,t}$ is negative and highly significant, indicating that larger gaps are followed by quicker trade arrival (Column (1)). This pattern holds for both interdealer (Column (2)) and dealer-customer trades (Column (3)). Directionally, the acceleration is concentrated in customer buys when a DTST occurs at a higher yield spread than a concurrent non-DTST (Columns (4) through (5)). We again find no significant relation when a DTST occurs at a lower yield spread than a concurrent non-DTST (Columns (6) through (7)). Collectively, these results suggest that some corrective trades occur following the close, but these trades are not sufficient to fully eliminate the pricing distortion, consistent with the persistent effects documented in Table IX.

B. DTST Post-Trade Opacity and Post-Agreement Price Discovery

Delayed reporting of DTSTs can also affect price formation in the window immediately following spread negotiation and leading into the index close. Because a DTST yield spread is negotiated and effectively determined earlier in the trading day, yet not reported to FINRA and disseminated to the broader market until the index close, market participants do not observe the agreed-upon spread, or the information it conveys, between the spread-agreement timestamp and the close. This temporary information opacity arises precisely when investors would otherwise incorporate the negotiated spread into valuations and trading decisions, potentially shaping the pricing of subsequent trades.

In this subsection, we examine how the lack of timely disclosure affects post-agreement price discovery once the DTST yield spread is set. Identifying this effect is challenging because the relevant counterfactual is unobserved: if post-agreement trade prices are distorted by delayed dissemination of the DTST spread, we cannot directly observe what those prices

would have been had the market learned the spread at the time it was negotiated.

We address this challenge by exploiting spread-agreement timestamps for each DTST provided by MarketAxess and benchmarking the pricing of post-agreement bond trades against post-agreement CP+ prices. Importantly, MarketAxess observes the negotiated DTST yield spread internally at the time of agreement, so their CP+ estimates incorporate that information immediately after the spread is set. To minimize any mechanical influence of CP+ on subsequent price formation, we restrict attention to FINRA TRACE trades executed outside the MarketAxess platform. Specifically, we estimate the following trade-level regression:

$$\textit{YS deviation from CP+}_{j,i,t} = \alpha + \beta\, D(\textit{post-agreement trade})_{j,i,t} + \epsilon_{j,i,t}. \tag{11}$$

Here, $\textit{YS deviation from CP+}_{j,i,t}$ is the absolute difference between the yield spread of trade j in bond i on day t and the CP+ yield spread from the previous minute, matched on trade direction. The indicator $D(\textit{post-agreement trade})_{j,i,t}$ equals one for the first trade that arrives after a DTST spread is determined. We focus on the first post-agreement trade because its deviation from CP+ provides the cleanest measure of pricing in the absence of publicly disseminated DTST spread information immediately after agreement. Later post-agreement trades are less informative because the first trade can influence both CP+ updates and subsequent FINRA TRACE transaction prices, mechanically compressing deviations. We include bond–day interacted fixed effects so identification comes from within-bond, within-day comparisons. We also control for trade characteristics by adding trade-size-group fixed effects and trade-direction fixed effects, ensuring that the estimated β compares trades of similar type. We restrict the sample to non-DTSTs executed from 8:00 AM to before 4:00 PM.

Table XI shows that, relative to other trades executed during the day, post-agreement trades exhibit larger deviations from the CP+ benchmark yield spreads, which incorporates negotiated DTST spread information immediately (Column (1)). The results are robust to adding fixed effects for the hour of trades (Column (2)). We obtain similar conclusions

using prices instead of yield spreads to construct a *Price deviation from CP+*$_{j,i,t}$ measure (Columns (3)–(4)). Economically, post-agreement trade prices deviate from CP+ by roughly 1 bp more than otherwise comparable trades. Taken together, these findings indicate that delayed dissemination of DTST information materially distorts subsequent price formation in the period following spread agreement.

VII. Conclusion

Reliable end-of-day closing prices are foundational to the functioning of the corporate bond market. They underpin the valuation and performance measurement of trillions of dollars in fixed-income assets, shape investment decisions by mutual funds and ETFs, and can matter for the broader economy through their role in risk management and financial intermediation. Yet in a segmented market where trading is sparse, producing a representative "close" is inherently difficult, even in the absence of additional frictions. This challenge has become increasingly more important as index-based investment has expanded and as trading activity has become more concentrated around the close.

This paper shows that a common trading convention, delayed Treasury spotting, interacts with TRACE reporting conventions in a way that can further weaken the informational content of closing prints. Using proprietary data that separately identify the time at which yield spreads are agreed and the time at which trades are reported, we provide the first systematic evidence on how delayed spotting and delayed reporting jointly distort transaction-based closing prices. We quantify the magnitude and incidence of DTST-induced mismeasurement, document that the resulting distortions contain a substantial common component across bonds, and show that they are largest precisely when market conditions are most volatile. We demonstrate that these distortions propagate beyond academic measures of closing prices by influencing evaluated end-of-day prices used by major index providers. We further show that delayed reporting of DTSTs can impede price discovery, both after spread agreement and after index close.

More broadly, our findings highlight how an opaque timing friction affecting only a subset of trades can generate systematic valuation distortion in a market where the transaction record is already thin. Transparency is not only about disseminating more prints, it is also about disseminating the right timing information to interpret those prints. The paper therefore contributes to a central agenda in finance: designing data, institutions, and market rules that support reliable pricing in illiquid markets. When valuation rests on a limited set of transactions, seemingly small informational frictions can have economically meaningful effects on benchmarks and price discovery, with broader implications for market quality.

References

Anand, Amber, Chotibhak Jotikasthira, and Kumar Venkataraman, 2021, Mutual fund trading style and bond market fragility, *Review of Financial Studies* 34, 2993–3044.

Asquith, Paul, Thomas R. Covert, and Parag A. Pathak, 2013, The effects of mandatory transparency, Working paper.

Bao, Jack, Jun Pan, and Jiang Wang, 2011, The illiquidity of corporate bonds, *The Journal of Finance* 66, 911–946.

Bessembinder, Hendrik, William Maxwell, and Kumar Venkataraman, 2006, Market transparency, liquidity externalities, and institutional trading costs in corporate bonds, *Journal of Financial Economics* 82, 251–288.

Bretscher, Lorenzo, Lukas Schmid, and Tiange Ye, 2023, Passive demand and active supply: Evidence from maturity-mandated corporate bond funds, *Swiss Finance Institute Research Paper* .

Chernenko, Sergey, and Adi Sunderam, 2016, Liquidity transformation in asset management: Evidence from the cash holdings of mutual funds, SSRN Working Paper 2016/23, European Systemic Risk Board (ESRB).

Choi, Jaewon, Saeid Hoseinzade, Sean Seunghun Shin, and Hassan Tehranian, 2020, Corporate bond mutual funds and asset fire sales, *Journal of Financial Economics* 138, 432–457.

Choi, Jaewon, Yesol Huh, and Sean Shin, 2024, Customer liquidity provision: Implications for corporate bond transaction costs, *Management Science* 70, 187–206.

Choi, Jaewon, Mathias Kronlund, and Ji Yeol Jimmy Oh, 2025, Silent swing: Do open-end funds tilt holdings valuations in response to flows?, Technical report, SSRN Working Paper.

Chordia, Tarun, Richard Roll, and Avanidhar Subrahmanyam, 2000, Commonality in liquidity, *Journal of financial economics* 56, 3–28.

Cici, Gjergji, Scott Gibson, and John J. Merrick, 2011, Missing the marks? dispersion in corporate bond valuations across mutual funds, *Journal of Financial Economics* 101, 206–226.

Cuny, Christine, Omri Even-Tov, and Edward M. Watts, 2021, From implicit to explicit: The impact of disclosure requirements on hidden transaction costs, *Journal of Accounting Research* 59, 215–242.

Di Maggio, Marco, Amir Kermani, and Zhaogang Song, 2017, The value of trading relations in turbulent times, *Journal of Financial Economics* 124, 266–284.

Dick-Nielsen, Jens, 2014, How to clean enhanced TRACE data, *Available at SSRN 2337908* .

Dick-Nielsen, Jens, and Marco Rossi, 2019, The cost of immediacy for corporate bonds, *Review of Financial Studies* 32, 1–41.

Duffie, Darrell, Piotr Dworczak, and Haoxiang Zhu, 2017, Benchmarks in search markets, *The Journal of Finance* 72, 1983–2044.

Duffie, Darrell, Nicolae Gârleanu, and Lasse Heje Pedersen, 2005, Over-the-counter markets, *Econometrica* 73, 1815–1847.

Duffie, Darrell, Nicolae Gârleanu, and Lasse Heje Pedersen, 2007, Valuation in over-the-counter markets, *Review of Financial Studies* 20, 1865–1900.

Edwards, Amy K, Lawrence E Harris, and Michael S Piwowar, 2007, Corporate bond market transaction costs and transparency, *Journal of Finance* 62, 1421–1451.

Falato, Antonio, Ali Hortacsu, Dan Li, and Chaehee Shin, 2021, Fire-sale spillovers in debt markets, *Journal of Finance* 76, 3055–3102.

Giannetti, Mariassunta, and Chotibhak Jotikasthira, 2024, Bond price fragility and the structure of the mutual fund industry, *The Review of Financial Studies* 37, 2063–2109.

Goldstein, Itay, Hao Jiang, and David T Ng, 2017, Investor flows and fragility in corporate bond funds, *Journal of Financial Economics* 126, 592–613.

Goldstein, Michael A., Edith S. Hotchkiss, and Svitlana S. Nikolova, 2021, Dealer behavior and the trading of newly issued corporate bonds Available at SSRN 1022356.

Goldstein, Michael A., Edith S. Hotchkiss, and Erik R. Sirri, 2007, Transparency and liquidity: A controlled experiment on corporate bonds, *The Review of Financial Studies* 20, 235–273.

Han, Song, Alan Guoming Huang, Madhu Kalimipalli, and Ke Wang, 2022, Information and liquidity of over-the-counter securities: Evidence from public registration of rule 144a bonds, *Journal of Financial Markets* 59, 100655.

Hendershott, Terrence, Dan Li, Dmitry Livdan, and Norman Schürhoff, 2020, Relationship trading in over-the-counter markets, *The Journal of Finance* 75, 683–734.

Hollifield, Burton, Artem Neklyudov, and Chester Spatt, 2017, Bid-ask spreads, trading networks, and the pricing of securitizations, *Review of Financial Studies* 30, 3048–3085.

Huang, Alan Guoming, Maureen O'Hara, Jinming Xue, and Xing (Alex) Zhou, 2025, Beyond creation and redemption: Principal trading by bond etfs SSRN Working Paper.

Huang, Alan Guoming, Russ Wermers, Jinming Xue, and Xing (Alex) Zhou, 2024, Bond valuation dispersion and etf creation, Working paper, SSRN, SSRN abstract ID: 5046012; posted 2024-11-18.

Jacobsen, Stacey, and Kumar Venkataraman, 2018, Does trade reporting improve market quality in an institutional market? evidence from 144a corporate bonds, Working paper, SSRN, SSRN abstract ID: 3171056.

Jacobsen, Stacey, Kumar Venkataraman, and David X. Xu, 2025, Illiquidity meets intelligence: AI-driven price discovery in corporate bond markets, *SSRN Electronic Journal* .

Jiang, Hao, Yi Li, Zheng Sun, and Ashley Wang, 2022, Does mutual fund illiquidity introduce fragility into asset prices? evidence from the corporate bond market, *Journal of Financial Economics* 143, 277–302.

Jin, Dunhong, Marcin Kacperczyk, Bige Kahraman, and Felix Suntheim, 2022, Swing pricing and fragility in open-end mutual funds, *The Review of Financial Studies* 35, 1–50.

Kargar, Mahyar, Benjamin R. Lester, Sébastien Plante, and Pierre-Olivier Weill, 2023, Sequential search for corporate bonds, *SSRN Electronic Journal* .

Koont, Naz, Yiming Ma, Ľuboš Pástor, and Yao Zeng, 2025, Steering a ship in illiquid waters: Active management of passive funds, *The Review of Financial Studies* 38, 2887–2935.

Kuong, John Chi-Fong, James O'Donovan, and Jinyuan Zhang, 2024, Monetary policy and fragility in corporate bond mutual funds, *Journal of Financial Economics* 161, 103931.

Li, Dan, and Norman Schürhoff, 2019, Dealer networks, *The Journal of Finance* 74, 91–144.

Li, Jessica S, Maureen O'Hara, Andreas C Rapp, and Xing Alex Zhou, 2025, Bond market illiquidity: Is portfolio trading the solution?, *SMU Cox School of Business Research Paper No. 23-09; Available at SSRN 4495516* .

Li, Yi, Maureen O'Hara, and Xing Zhou, 2024, Mutual fund fragility, dealer liquidity provision, and the pricing of municipal bonds, *Management Science* 70, 4802–4823.

Ma, Yiming, Kairong Xiao, and Yao Zeng, 2022, Mutual fund liquidity transformation and reverse flight to liquidity, *The Review of Financial Studies* 35, 4674–4711, Published online February 9, 2022.

O'Hara, Maureen, Yang Wang, and Xing Alex Zhou, 2018, The execution quality of corporate bonds, *Journal of Financial Economics* 130, 308–326.

Shim, John J., and Karamfil Todorov, 2021, Etfs, illiquid assets, and fire sales, BIS Working Papers 975, Bank for International Settlements.

Shin, Sean Seunghun, Xing (Alex) Zhou, and Qifei Zhu, 2025, The growing index effect in the corporate bond market, SSRN Working Paper SMU Cox School of Business Research Paper No. 25-7, SSRN, https://ssrn.com/abstract=5181327.

Vayanos, Dimitri, and Tan Wang, 2007, Search and endogenous concentration of liquidity in asset markets, *Journal of Economic Theory* 136, 66–104.

Vayanos, Dimitri, and Pierre-Olivier Weill, 2008, A search-based theory of the on-the-run phenomenon, *The Journal of Finance* 63, 1361–1398.

Zhu, Haoxiang, 2012, Finding a good price in opaque over-the-counter markets, *The Review of Financial Studies* 25, 1255–1285.

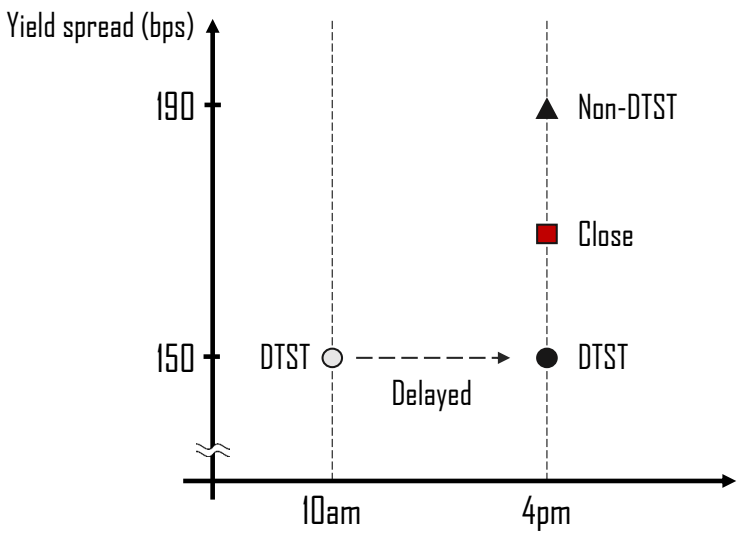
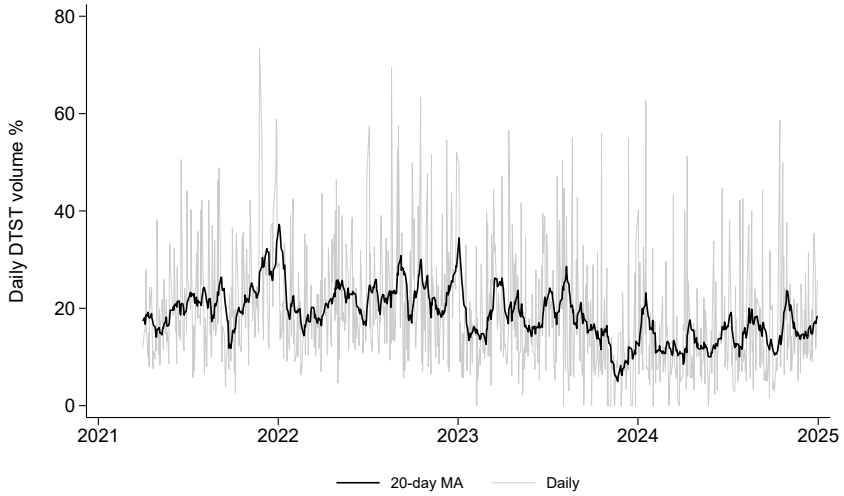


Figure 1: Simple illustration of DTST

This figure illustrates the distinction between a DTST and a non-DTST. The DTST with a yield spread of 150 basis points is negotiated at 10:00 AM and executed at 4:00 PM, when the non-DTST has a yield spread of 190 basis points. The "Close" marker refers to the average of all trades executed at the close.

(a) Aggregate DTST volume fraction at the close



(b) DTST volume fraction by customer trade direction at the close

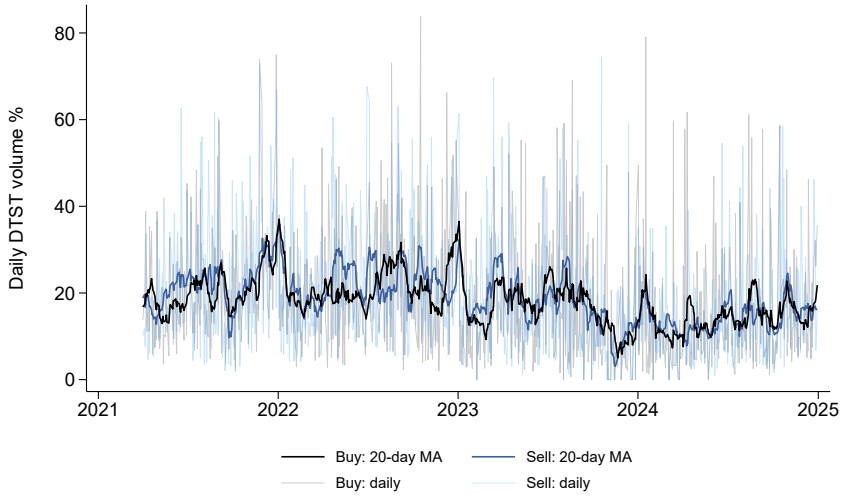
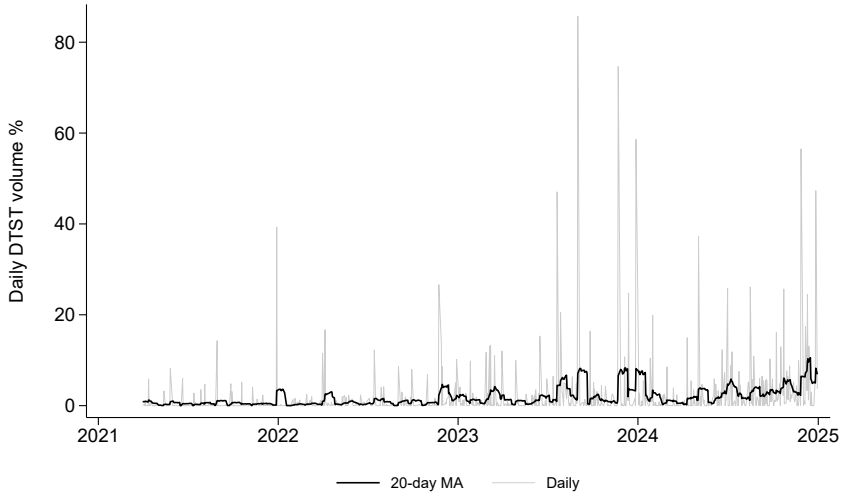


Figure 2: Daily DTST volume fraction in investment grade bonds

This figure presents the daily DTST volume fraction (%) within trades executed at the close (between 4:00:00 PM and 4:14:59 PM) for investment grade bonds. The DTST volume fraction is defined as DTST volume divided by total trading volume. We plot both the daily time series (light gray and light blue) and its 20-day moving average (solid black and blue lines). Panel (a) reports results using all trades. Panel (b) separately plots the fractions for customer buy and customer sell trades. The sample spans March 2021 to December 2024; the plotted series begin in April 2021 due to the 20-day moving-average window.

(a) Daily DTST volume fraction



(b) Daily DTST volume fraction for customer buy and sell trades

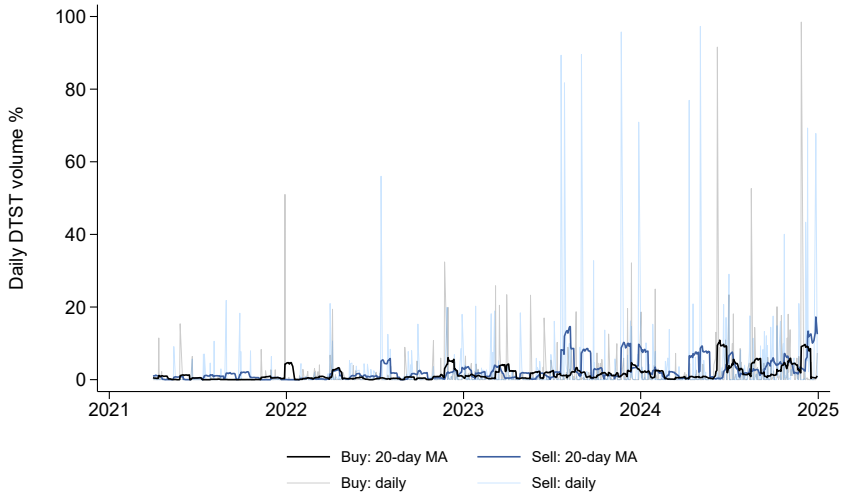


Figure 3: Daily DTST volume fraction in high yield bonds

This figure presents the daily DTST volume fraction (%) within trades executed at the close for high yield bonds. The DTST volume fraction is defined as DTST volume divided by total trading volume between 4:00:00 PM and 4:14:59 PM. We plot both the daily time series (light gray and light blue) and its 20-day moving average (solid black and blue lines). Panel (a) reports results using all trades. Panel (b) separately plots the fractions for customer buy and customer sell trades. The sample spans March 2021 to December 2024; the plotted series begin in April 2021 due to the 20-day moving-average window.

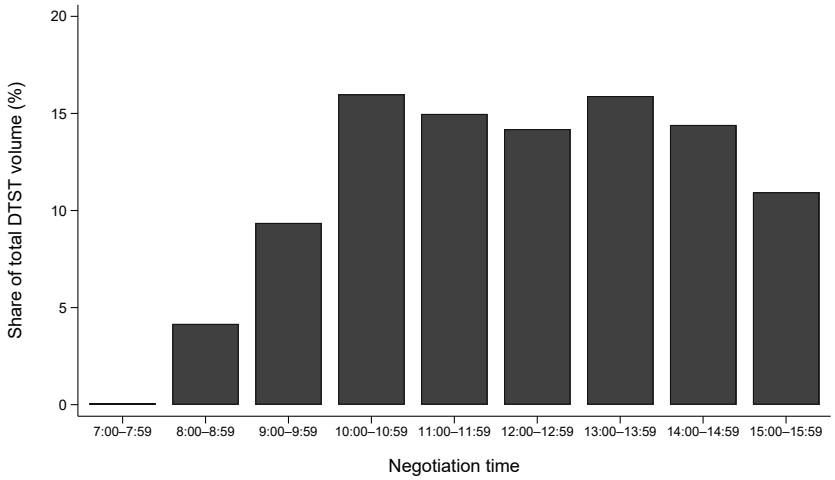
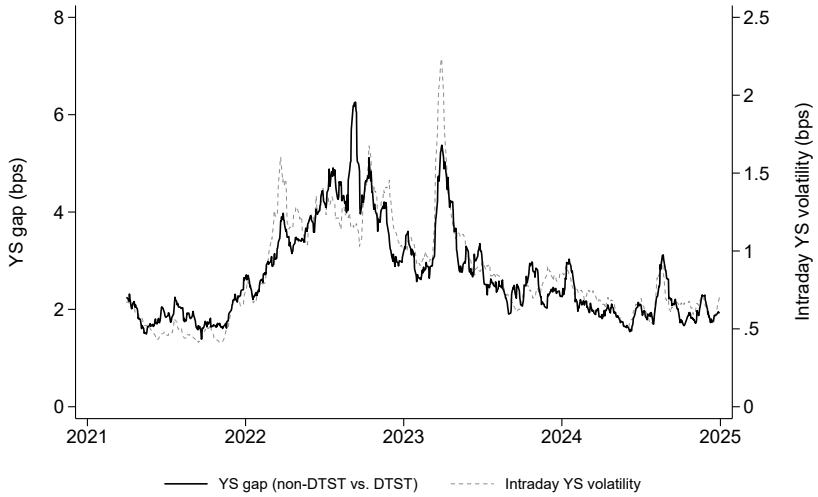


Figure 4: DTST volume distribution across spread-agreement time

This figure shows the distribution of DTST volume fractions across spread-agreement time. The spread-agreement time, sourced from MarketAxess, is the timestamp at which the DTST spread is agreed. The volume fraction is defined as the DTST volume whose spread-agreement time falls within a given hourly window divided by total DTST volume. The x-axis reports hourly bins. The sample includes all customer DTSTs agreed prior to the close and executed at the close. The sample consists of investment grade bonds from March 2021 to December 2024.

(a) Yield spread gap (Non-DTST vs. DTST)



(b) Price gap (Non-DTST vs. DTST)

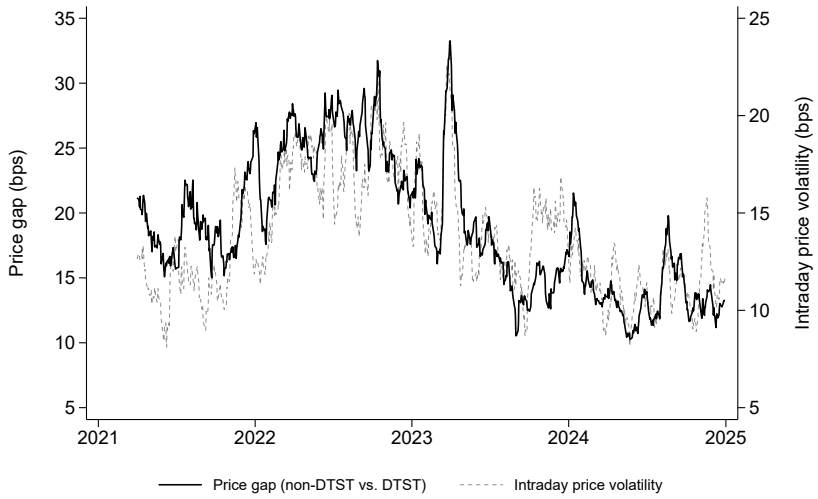
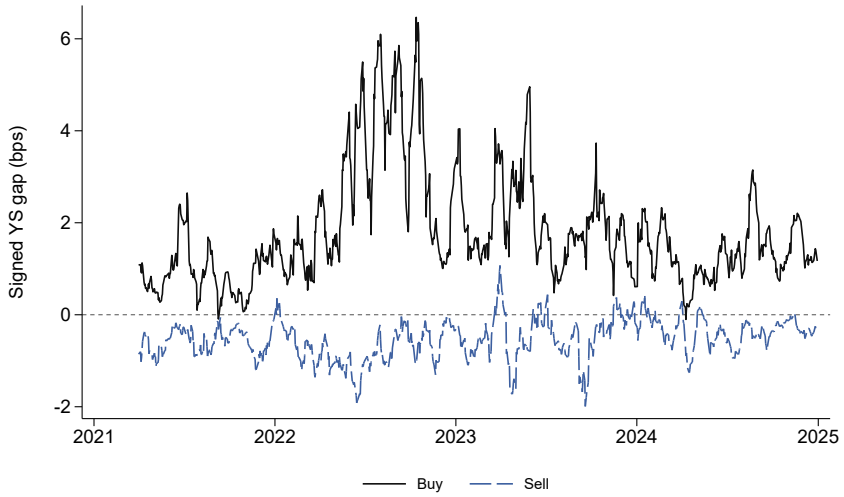


Figure 5: Intraday volatility and pricing gaps between non-DTST and DTST at the close

This figure presents the yield spread and price gaps between non-DTST and DTST at the close, along with the intraday volatility of yield spreads and prices. For each bond-day, we first compute the gaps by taking the trade-size-weighted averages of yield spreads and prices using non-DTSTs and DTSTs executed at the close, and then taking their absolute difference. We then average these gaps across bonds each day and plot the 20-day moving average of daily average gaps. Similarly, intraday volatility is calculated as the standard deviation of the CP+ minute-by-minute mid-spreads and prices between 8:00 AM and 3:59 PM. We then average the standard deviation across bonds by day and plot its 20-day moving average. Panel (a) reports results for YS, and Panel (b) reports results for price. The sample spans March 2021 to December 2024; the plotted series begin in April 2021 due to the 20-day moving-average window.

(a) DTST minus non-DTST yield spread



(b) DTST minus non-DTST price

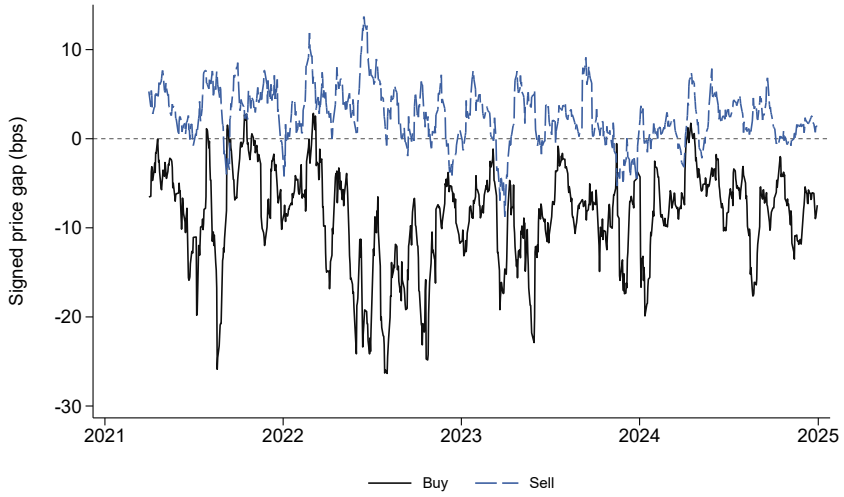
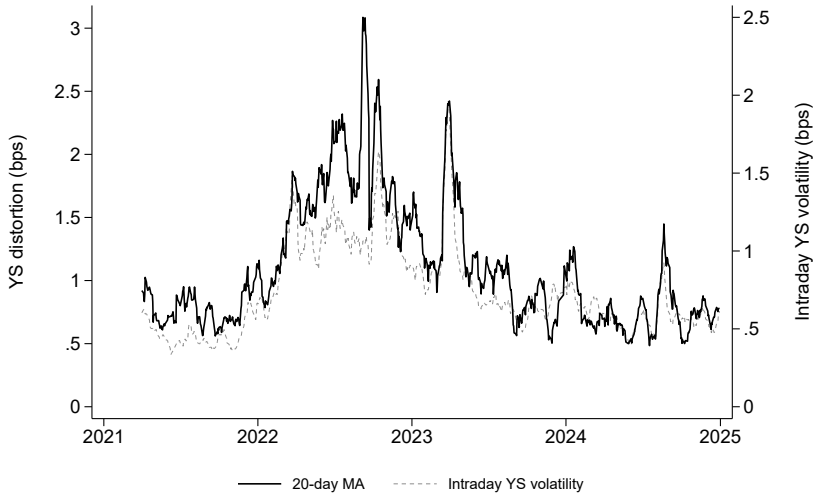


Figure 6: Signed pricing gaps for buy and sell trades

This figure presents the yield spread and price differences between DTST and non-DTST (DTST minus non-DTST). We compute the difference within customer buy and sell trades separately. For each bond-day, we first take the trade-size-weighted averages of yield spreads and prices using DTSTs and non-DTSTs executed at the close separately, and then calculate the differences as the DTST average minus the non-DTST average. We then average these bond-level differences across bonds each day and plot the 20-day moving average. Panel (a) reports results for the signed yield spread gap, and Panel (b) reports results for the signed price gap. The sample spans March 2021 to December 2024; the plotted series begin in April 2021 due to the 20-day moving-average window.

(a) Yield spread distortion (non-DTST vs. all)



(b) Price distortion (non-DTST vs. all)

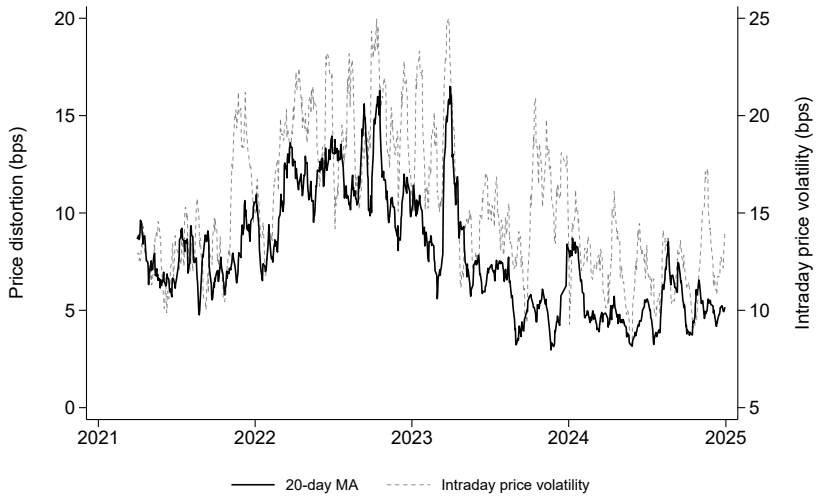
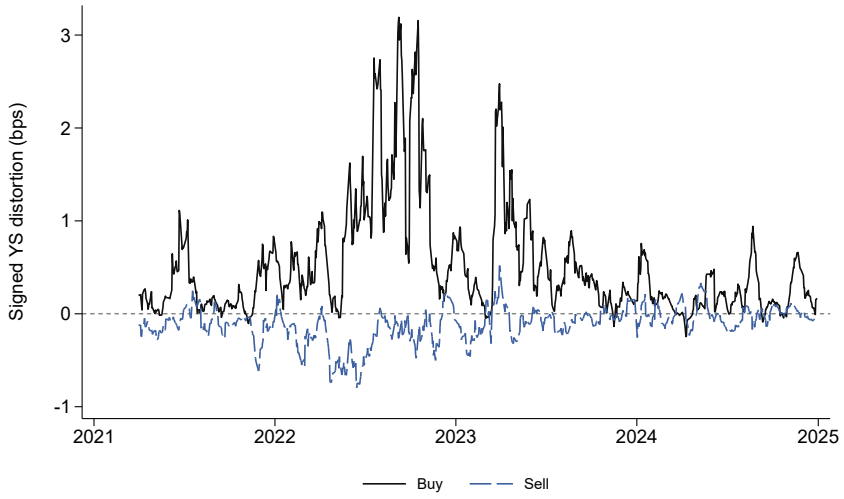


Figure 7: Pricing distortion at close

This figure presents the yield spread (YS) and price distortion at the close, measured as the absolute difference between the trade-size-weighted average of non-DTSTs and the trade-size-weighted average of all trades (DTSTs combined) executed at the close. For each bond-day, we compute the trade-size-weighted averages of YS and prices separately for non-DTSTs and for all trades at the close, and then calculate the absolute difference between them. We then average these bond-level distortions across bonds each day and plot both the daily series (light gray) and the 20-day moving average (black line). Panel (a) reports results for YS, and Panel (b) reports results for prices. The sample spans March 2021 to December 2024; the plotted series begin in April 2021 due to the 20-day moving-average window.

(a) Signed yield spread distortion (all minus non-DTST)



(b) Signed price distortion (all minus non-DTST)

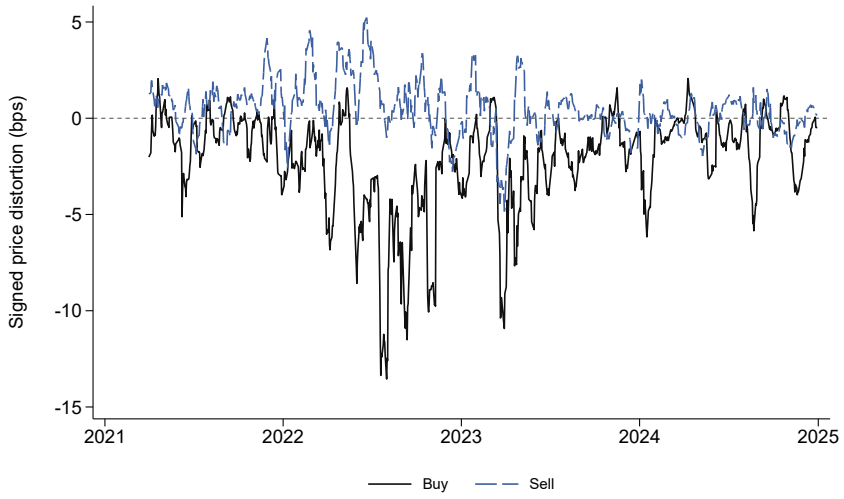


Figure 8: Signed pricing distortions for buys or sells at close

This figure presents the yield spread (YS) and price differences (all trades minus non-DTSTs) at the close, computed separately for customer buy and sell trades. For each bond-day, we compute the volume-weighted averages of YS and prices separately for all trades and non-DTSTs executed at the close, and then calculate the difference as the all-trade average minus the non-DTST average. We then average these bond-level differences across bonds each day and plot the 20-day moving average. Panel (a) reports results for YS, and Panel (b) reports results for prices. The sample spans March 2021 to December 2024; the plotted series begin in April 2021 due to the 20-day moving-average window.

Table I: Descriptive statistics for DTSTs and bond characteristics

This table reports descriptive statistics for DTSTs and bond characteristics. Panel A reports the DTST ratio (%), defined for each bond-day as DTST volume divided by total trading volume during the 15-minute index-close window (4:00:00–4:14:59 PM). Statistics are reported separately for investment-grade (IG) and high-yield (HY) bonds. We also calculate the DTST ratio separately for customer buy and customer sell trades. Panel B reports bond characteristics for IG bond-days with at least one trade during the index-close window, split by whether at least one DTST occurs ("With DTST") or only non-DTST occurs ("Without DTST"). The bond characteristics include time to maturity, age, amount outstanding, and credit rating. The credit rating is converted to a numerical scale where AAA = 21, with lower ratings assigned lower numbers. We report the number of observations (N), mean, standard deviation (Sd), and selected percentiles (P10, P25, P50, P75, P90). The sample period is March 2021 to December 2024.

Panel A. DTST Ratio (%)

	N	Mean	Sd	P10	P25	P50	P75	P90
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IG								
DTST ratio	1,042,530	26.03	42.51	0.00	0.00	0.00	67.42	100.00
DTST ratio, buy	558,893	24.73	42.44	0.00	0.00	0.00	42.55	100.00
DTST ratio, sell	643,086	26.73	43.36	0.00	0.00	0.00	87.72	100.00
HY								
DTST ratio	49,678	1.66	12.40	0.00	0.00	0.00	0.00	0.00
DTST ratio, buy	28,187	1.63	12.43	0.00	0.00	0.00	0.00	0.00
DTST ratio, sell	26,283	1.98	13.67	0.00	0.00	0.00	0.00	0.00

Panel B. Bond characteristics for bond-days with vs. without DTSTs (IG bonds only)

	N	Mean	Sd	P10	P25	P50	P75	P90
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
With DTST								
Time to maturity (years)	315,725	14.23	10.64	3.06	5.07	9.20	24.28	28.38
Age (years)	315,725	4.32	3.66	0.98	1.74	3.26	5.77	8.64
Amount outstanding ($ million)	315,725	1213.94	1052.51	425.00	579.29	900.00	1500.00	2489.51
Credit rating (AAA=21)	315,725	14.41	1.94	12.00	13.00	14.00	16.00	17.00
Zero trading days	315,725	0.30	0.24	0.02	0.10	0.25	0.48	0.67
Without DTST								
Time to maturity (years)	726,805	13.95	10.63	2.82	4.80	9.31	23.46	28.18
Age (years)	726,805	4.87	4.14	1.02	1.92	3.72	6.56	9.83
Amount outstanding ($ million)	726,805	1133.93	930.61	400.00	500.00	850.00	1447.29	2250.00
Credit rating (AAA=21)	726,805	14.45	1.96	12.00	13.00	14.00	16.00	17.00
Zero trading days	726,805	0.31	0.25	0.02	0.10	0.25	0.48	0.69

Table II: Descriptive statistics for yield spread and price gaps (DTSTs vs. non-DTSTs)

This table reports descriptive statistics for yield-spread (YS) gaps and price gaps between DTSTs and non-DTSTs, expressed in basis points. Panel A reports *YS gap* and *Price gap*, where *YS gap* is defined as the absolute difference between the trade-size-weighted average yield spread of DTSTs and that of non-DTSTs. Panel A also reports the corresponding measures computed separately for customer buy and customer sell trades. Panel B reports *YS gap* and *Price gap* calculated within the same trade-size group. Trade-size groups are defined based on par trading volume: micro ($1–$100,000), odd-lot ($100,000–$1,000,000), round-lot ($1,000,000–$5,000,000), and block (above $5,000,000). Panel C reports *YS gap* and *Price gap* after excluding portfolio trades. Portfolio trades are identified using the PT flag in the TRACE Context data before May 15, 2023, and the FINRA TRACE portfolio trade flag thereafter. The table reports the number of observations (N), mean, standard deviation (SD), and selected percentiles (P10, P25, P50, P75, P90). The sample period is March 2021 to December 2024.

Panel A. YS and price gaps (in basis points)

	N	Mean	Sd	P10	P25	P50	P75	P90
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
YS gap	93,008	2.59	3.89	0.25	0.66	1.53	3.05	5.49
YS gap, buy	25,640	2.59	4.75	0.21	0.56	1.30	2.62	5.14
YS gap, sell	38,537	1.94	2.55	0.20	0.53	1.24	2.49	4.31
Price gap	93,205	19.00	24.46	1.12	4.15	11.00	24.40	45.50
Price gap, buy	25,681	18.08	27.09	1.00	3.40	9.23	21.10	42.90
Price gap, sell	38,617	15.80	19.65	0.90	3.40	9.40	21.00	38.50

Panel B. YS and price gaps within the same trade-size group (in basis points)

	N	Mean	Sd	P10	P25	P50	P75	P90
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
YS gap, micro	18,424	2.83	4.83	0.23	0.62	1.42	2.96	5.84
YS gap, odd-lot	26,638	2.10	2.68	0.22	0.59	1.37	2.67	4.65
YS gap, round-lot	2,340	2.36	2.57	0.27	0.71	1.67	3.14	5.21
YS gap, block	120	2.38	1.93	0.37	0.92	1.94	3.34	5.47
Price gap, micro	18,460	20.81	29.73	1.20	4.30	11.30	25.14	49.30
Price gap, odd-lot	26,691	17.25	21.09	1.06	3.80	10.20	22.60	42.30
Price gap, round-lot	2,344	17.39	20.03	1.03	4.00	10.72	23.27	42.70
Price gap, block	121	15.00	14.94	1.10	4.20	10.30	20.90	32.12

Panel C. YS and price gaps after excluding portfolio trades (in basis points)

	N	Mean	Sd	P10	P25	P50	P75	P90
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
YS gap, without PT	48,781	3.02	4.71	0.27	0.73	1.70	3.43	6.45
Price gap, without PT	48,901	20.83	28.09	1.28	4.32	11.70	26.20	50.10

Table III: Pricing gaps and Intraday volatility

This table examines the relationship between intraday volatility and pricing gaps between non-DTST and DTST at the close. The dependent variables are *YS gap* (Columns (1) through (4)) and *Price gap* (Columns (5) through (8)), both in basis points. We define *YS gap* at the bond-day level as the absolute difference between the trade-size-weighted average yield spread of DTSTs and that of non-DTSTs at the close. We similarly define *Price gap* for the price. The key independent variables are: *Intraday volatility*, the standard deviation of CP+ minute-by-minute mid-spreads (or prices in Columns (5)–(8)) between 8:00 AM and 3:59 PM for each bond-day (Panel A); and *Intraday max–min*, the difference between the maximum and minimum CP+ minute-by-minute mid-spreads (or prices in Columns (5)–(8)) over the same window (Panel B). Control variables include the log of time to maturity, age, and amount outstanding, as well as the fraction of zero trading days over the past three months. *Day FE*, *Bond FE*, and *Rating FE* refer to day, bond, and rating fixed effects, respectively. In Column (1), the constant term is included but not reported. Standard errors are two-way clustered at the bond and day levels and are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Intraday yield spread volatility

Dependent variables (bps):	*YS gap*				*Price gap*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intraday volatility	1.301***	0.919***	0.532***	0.523***	0.451***	0.495***	0.162***	0.148***
	(0.058)	(0.058)	(0.049)	(0.046)	(0.026)	(0.024)	(0.024)	(0.022)
Ln(time to maturity)				-1.160***				-11.151***
				(0.289)				(1.255)
Ln(age)				0.041				0.175
				(0.064)				(0.537)
Ln(amount outstanding)				-0.634**				-4.920***
				(0.269)				(1.406)
Zero trading days				0.168				1.274
				(0.198)				(1.450)
Observations	93,000	92,999	92,145	92,145	93,047	93,046	92,192	92,192
Adjusted R^2	0.054	0.095	0.243	0.229	0.050	0.119	0.222	0.217
Day FE	N	Y	Y	Y	N	Y	Y	Y
Bond FE	N	N	Y	Y	N	N	Y	Y
Rating FE	N	N	N	Y	N	N	N	Y

Panel B. Intraday yield spread max minus min

Dependent variables (bps):	*YS gap*				*Price gap*			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Intraday max-min	0.413***	0.315***	0.185***	0.182***	0.133***	0.138***	0.062***	0.056***
	(0.017)	(0.019)	(0.016)	(0.015)	(0.007)	(0.006)	(0.008)	(0.007)
Ln(time to maturity)				-1.133***				-10.441***
				(0.288)				(1.259)
Ln(age)				0.038				0.220
				(0.064)				(0.536)
Ln(amount outstanding)				-0.641**				-4.894***
				(0.271)				(1.404)
Zero trading days				0.188				1.405
				(0.198)				(1.449)
Observations	93,001	93,000	93,001	92,146	93,048	93,047	93,048	92,193
Adjusted R^2	0.063	0.098	0.244	0.229	0.061	0.124	0.223	0.217
Day FE	N	Y	Y	Y	N	Y	Y	Y
Bond FE	N	N	Y	Y	N	N	Y	Y
Rating FE	N	N	N	Y	N	N	N	Y

Table IV: Descriptive statistics for signed pricing gaps (DTSTs vs. non-DTSTs)

This table reports descriptive statistics for signed yield-spread (YS) gaps and signed price gaps between DTSTs and non-DTSTs, expressed in basis points. *Signed YS gap* is defined as the trade-size-weighted average yield spread of DTSTs minus that of non-DTSTs, and *Signed price gap* is defined analogously. The signed gaps are also computed separately for customer buy and customer sell trades. The table reports the number of observations (N), mean, standard deviation (Sd), and selected percentiles (P10, P25, P50, P75, P90). The sample period is March 2021 to December 2024.

	N	Mean	Sd	P10	P25	P50	P75	P90
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Signed YS gap	93,008	0.40	4.57	-3.28	-1.45	0.01	1.61	3.93
Signed YS gap, buy	25,640	1.06	5.29	-2.42	-1.04	0.14	1.61	4.17
Signed YS gap, sell	38,537	-0.26	3.17	-3.12	-1.38	-0.10	1.10	2.68
Signed price gap	93,205	-1.74	30.46	-30.73	-11.55	0.00	10.50	27.50
Signed price gap, buy	25,681	-4.57	32.05	-30.70	-11.10	-0.40	7.60	21.70
Signed price gap, sell	38,617	0.82	25.00	-24.20	-8.60	0.10	10.20	25.88

Table V: Intraday yield spread change and DTST

This table examines the relationship between intraday yield spread changes and the presence of DTSTs at the close. In Columns (1) through (3), the dependent variable is *Close–open YS change*, calculated at the bond-day level as the CP+ mid-spread immediately before the close (at 3:59 PM, or the latest quote beforehand) minus the CP+ mid-spread immediately after the open (at 8:00 AM, or the earliest quote thereafter). The key independent variables are *D(DTS buy)* and *D(DTS sell)*, indicator variables equal to one if the bond-day has at least one customer-buy DTST or customer-sell DTST at the close, respectively. Control variables include the log of time to maturity, age, and amount outstanding, as well as the fraction of zero trading days over the past three months and the log of customer buy and sell volume prior to 4:00 PM. In Columns (4)–(6), we report results from placebo tests where the dependent variable is *Close–open TR change*, defined at the bond-day level as the benchmark Treasury yield at the close minus the benchmark Treasury yield at the open. We impute the benchmark yield from the CP+ mid-yields and mid-spreads. All specifications include day, bond, and rating fixed effects. Standard errors are two-way clustered at the bond and day levels and are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variables (bps):	*Close–open YS change*			*Close–open TR change*		
	(1)	(2)	(3)	(4)	(5)	(6)
D(DTS buy)	-0.119***		-0.080***	-0.001		-0.005
	(0.026)		(0.025)	(0.034)		(0.034)
D(DTS sell)		0.151***	0.102***		0.061*	0.061*
		(0.014)	(0.014)		(0.032)	(0.032)
Ln(time to maturity)	-0.230***	-0.076	-0.130*	0.311	0.309	0.310
	(0.068)	(0.068)	(0.068)	(0.336)	(0.336)	(0.336)
Ln(age)	-0.081***	-0.045**	-0.087***	0.010	0.010	0.010
	(0.021)	(0.021)	(0.021)	(0.018)	(0.017)	(0.018)
Ln(amount outstanding)	0.042	-0.082	-0.044	0.002	0.002	0.001
	(0.051)	(0.052)	(0.048)	(0.026)	(0.026)	(0.026)
Zero trading days	-0.071	0.343***	0.074	-0.069	-0.072	-0.070
	(0.048)	(0.050)	(0.049)	(0.093)	(0.093)	(0.092)
Ln(Buy pre-4PM volume)	-0.068***		-0.059***	0.000		0.000
	(0.002)		(0.002)	(0.001)		(0.001)
Ln(Sell pre-4PM volume)		0.065***	0.057***		-0.001	-0.001
		(0.002)	(0.002)		(0.001)	(0.001)
Observations	3,648,579	3,648,579	3,648,579	3,643,101	3,643,101	3,643,101
Adjusted R^2	0.408	0.408	0.417	0.884	0.884	0.884
Day, Bond, and Rating FEs	Y	Y	Y	Y	Y	Y

Table VI: Descriptive statistics for pricing distortions

This table reports descriptive statistics for yield-spread (YS) distortions and price distortions, expressed in basis points. Panel A reports *YS distortion* and *Price distortion*, where *YS distortion* is defined as the absolute difference between the trade-size-weighted average yield spread of all trades and that of non-DTSTs. Panel A also reports the corresponding measures computed separately for customer buy and customer sell trades. Panel B reports the signed YS and price distortions and the corresponding buy- and sell-side measures. *Signed YS distortion* is defined as the trade-size-weighted average yield spread of all trades minus that of non-DTSTs, and *Signed price distortion* is defined analogously. The table reports the number of observations (N), mean, standard deviation (Sd), and selected percentiles (P10, P25, P50, P75, P90). The sample period is March 2021 to December 2024.

Panel A. YS and price distortions (in basis points)

	N	Mean	Sd	P10	P25	P50	P75	P90
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
YS distortion	93,022	1.17	1.76	0.03	0.14	0.55	1.49	2.98
YS distortion, buy	25,642	1.04	1.83	0.03	0.12	0.45	1.21	2.54
YS distortion, sell	38,544	0.87	1.18	0.03	0.12	0.43	1.15	2.24
Price distortion	93,205	8.67	12.35	0.14	0.87	3.89	11.35	23.51
Price distortion, buy	25,681	7.59	11.94	0.11	0.72	3.08	9.28	20.14
Price distortion, sell	38,617	7.08	10.15	0.10	0.72	3.18	9.26	19.21

Panel B. Signed YS and price distortions (in basis points)

	N	Mean	Sd	P10	P25	P50	P75	P90
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Signed YS distortion	93,022	0.15	1.84	-1.43	-0.45	0.00	0.57	1.78
Signed YS distortion, buy	25,642	0.32	1.94	-0.98	-0.28	0.01	0.45	1.66
Signed YS distortion, sell	38,544	-0.00	1.32	-1.21	-0.37	-0.00	0.37	1.25
Signed price distortion	93,205	-0.72	13.37	-13.27	-3.92	0.00	3.24	11.13
Signed price distortion, buy	25,681	-1.29	12.66	-11.60	-2.98	0.00	1.90	8.32
Signed price distortion, sell	38,617	-0.36	11.22	-10.66	-2.67	0.00	2.63	9.38

Table VII: Market-wide commonality in pricing distortion at the close

This table examines the market-wide commonality in pricing distortion at the close. We follow Chordia et al. (2000) by regressing the individual bond-day-level distortion measures on the market-wide daily average distortion, together with its lead and lag terms, in time-series regressions. We use the signed yield spread and price distortion measures (all minus non-DTST) in Columns (1) through (3) and Columns (4) through (6), respectively. For each bond, the market average distortion excludes the focal bond, and we take the amount-outstanding-weighted average. Columns labeled "All," "Buy", and "Sell" report results for all trades, customer buys, and customer sells, respectively. "*Concurrent*", "*Lag*", and "*Lead*" refer to same-day, previous-day, and next-day market average distortion, respectively. Cross-sectional averages of time-series slope coefficients are reported with t-statistics in parentheses. "% +" reports the percentage of individual bond regressions with positive slope coefficients; "% + and significant" reports the percentage of coefficients that are statistically significantly positive at the 5% level based on a one-tailed test. "Sum" is the sum of concurrent, lag, and lead coefficients, and we report its cross-sectional averages with t-statistics. Mean and median adjusted R^2 across individual bond-level time-series regressions are reported. The sample is limited to bonds that have at least 20 bond-day observations with the distortion measure available with at least one DTST at the close. The last row reports the number of unique bonds used for each specification.

	Signed YS distortion			Signed price distortion		
	All	Buy	Sell	All	Buy	Sell
	(1)	(2)	(3)	(4)	(5)	(6)
Concurrent	0.934	0.819	0.970	0.934	0.926	0.980
	(38.04)	(17.12)	(34.92)	(40.52)	(18.00)	(33.62)
% +	91.48	89.49	94.65	90.13	90.59	92.77
% + and significant	55.25	43.67	61.79	54.94	47.04	58.65
Lag	0.009	0.031	0.001	-0.006	0.053	-0.026
	(0.47)	(1.25)	(0.04)	(-0.34)	(1.57)	(-1.09)
% +	50.48	52.83	50.47	52.79	53.23	47.33
% + and significant	9.32	11.86	9.43	10.35	8.60	7.39
Lead	-0.007	0.028	-0.003	0.010	-0.009	0.015
	(-0.36)	(0.67)	(-0.12)	(0.56)	(-0.25)	(0.60)
% +	47.29	51.75	47.33	51.27	49.46	51.26
% + and significant	7.56	9.70	8.02	6.77	6.45	7.86
Sum	0.937	0.878	0.968	0.938	0.970	0.968
	(24.48)	(15.78)	(24.60)	(27.55)	(16.41)	(22.29)
Median	0.820	0.619	0.959	0.838	0.804	0.899
Adjusted R^2						
Mean	0.159	0.181	0.241	0.154	0.192	0.213
Median	0.133	0.141	0.222	0.124	0.175	0.202
N (unique bonds)	1256	371	636	1256	372	636

Table VIII: Deviations to Index Providers' End-Of-Day Bid Prices

This table compares pricing deviations between two price measures, each relative to the end-of-day bid price from an index provider (BVAL or ICE): (1) the 4:00 PM bid price including both DTSTs and non-DTSTs and (2) the 4:00 PM bid price including only non-DTSTs. Using a stacked regression specification at the bond-day level, each bond-day contributes two observations to the dependent variable: the pricing deviation for the price including both DTSTs and non-DTSTs and the pricing deviation for the price including only non-DTSTs. The key independent variable is *Distorted deviation*, an indicator variable that equals one for observations representing the absolute pricing deviation of the price including both DTSTs and non-DTSTs and zero otherwise. Control variables include the log of time to maturity, age, and amount outstanding, as well as the fraction of zero trading days over the past three months. *Day FE*, *Bond FE*, and *Rating FE* refer to day, bond, and rating fixed effects, respectively, and are included in all regressions. In Panel A, using BVAL bid prices, Column (1) represents the full sample, while Columns (2) through (5) split observations based on the median ratio of DTS sales to all sales at 4:00 PM and the median price distortion measure, defined as the absolute difference between the 4:00 PM bid price including both DTSTs and non-DTSTs and the bid price including only non-DTSTs. In Panel B, using Bloomberg's BVAL score, we examine whether higher quantity and consistency of market data (based on trades and quotes) used to produce the BVAL bid price affect the difference between the absolute pricing deviations. Column (1) represents the full sample, while Columns (2) through (5) represent subsamples for BVAL scores of 7 to 10, where higher values on a scale of 1 to 10 indicate higher data strength. In Panel C, using ICE bid prices, Column (1) represents the full sample, while Columns (2) through (5) also split observations based on the median ratio of DTS sales to all sales at 4:00 PM and the median price distortion measure. Standard errors are two-way clustered at the bond and day levels and are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

(Table VIII continued)

Panel A. BVAL bid price benchmark

Dependent variable (bps):	*Pricing deviation*				
	All	Low DTST ratio	High DTST ratio	Low distortion	High distortion
	(1)	(2)	(3)	(4)	(5)
Distorted deviation	-2.215***	-1.432***	-3.002***	-0.255**	-4.175***
	(0.178)	(0.146)	(0.269)	(0.112)	(0.292)
Ln(time to maturity)	13.391**	17.836***	12.541**	24.660***	-16.821***
	(5.556)	(6.269)	(6.229)	(8.094)	(2.374)
Ln(age)	23.895***	23.011***	25.976***	30.334***	1.454*
	(3.974)	(4.358)	(4.530)	(5.554)	(0.765)
Ln(amount outstanding)	-6.809	0.888	-19.216	10.030	-8.097*
	(9.549)	(11.390)	(15.155)	(16.608)	(4.252)
Zero trading days	2.082	1.285	2.120	5.875	2.283
	(5.272)	(6.831)	(6.845)	(10.136)	(2.407)
Observations	77,204	38,704	38,500	38,602	38,602
Adjusted R^2	0.643	0.676	0.659	0.728	0.259
Day, Bond, and Rating FEs	Y	Y	Y	Y	Y

Panel B. BVAL bid price benchmark – BVAL score subsamples

Dependent variable (bps):	*Pricing deviation*				
	All	BVAL score 7	BVAL score 8	BVAL score 9	BVAL score 10
	(1)	(2)	(3)	(4)	(5)
Distorted deviation	-2.215***	-1.765***	-2.824***	-2.167***	-1.727***
	(0.178)	(0.392)	(0.249)	(0.218)	(0.147)
Ln(time to maturity)	13.391**	8.142	10.737	36.930***	24.206***
	(5.556)	(11.081)	(7.011)	(9.930)	(8.579)
Ln(age)	23.895***	19.517***	25.533***	25.893***	-0.288
	(3.974)	(6.775)	(4.793)	(5.816)	(3.058)
Ln(amount outstanding)	-6.809	-14.363	-23.145	-34.183*	1.685
	(9.549)	(26.918)	(16.254)	(17.471)	(3.623)
Zero trading days	2.082	19.079	3.327	-6.563	2.233
	(5.272)	(21.481)	(9.323)	(8.920)	(4.854)
Observations	77,204	9,458	21,220	29,886	16,588
Adjusted R^2	0.643	0.723	0.695	0.682	0.782
Day, Bond, and Rating FEs	Y	Y	Y	Y	Y

Panel C. ICE bid price benchmark

Dependent variable (bps):	*Pricing deviation*				
	All	Low DTST ratio	High DTST ratio	Low distortion	High distortion
	(1)	(2)	(3)	(4)	(5)
Distorted deviation	-1.754***	-1.045***	-2.468***	-0.152	-3.357***
	(0.250)	(0.141)	(0.405)	(0.120)	(0.453)
Ln(time to maturity)	-1.218	2.109	-0.433	12.006	-35.187***
	(5.912)	(6.474)	(6.551)	(8.453)	(3.286)
Ln(age)	23.900***	22.156***	26.605***	29.670***	2.545**
	(4.049)	(4.380)	(4.626)	(5.544)	(1.063)
Ln(amount outstanding)	-13.477	-5.889	-23.284	3.474	-14.420**
	(10.210)	(12.071)	(16.285)	(17.748)	(5.590)
Zero trading days	-1.417	-1.221	-2.634	6.871	-5.330
	(5.409)	(7.381)	(6.804)	(10.645)	(3.597)
Observations	76,810	38,514	38,296	38,406	38,404
Adjusted R^2	0.629	0.662	0.646	0.718	0.390
Day, Bond, and Rating FEs	Y	Y	Y	Y	Y

Table IX: DTSTs and post-close price formation

This table shows the impact of DTSTs on price formation after the index close. The dependent variable is the difference in yield spreads, calculated as average yield spread of trades during a given window minus average yield spread of non-DTSTs at the close. We take trade-size-weighted averages. We consider three windows: (i) 4:15:00 PM–5:59:59 PM, (ii) 8:00:00 AM–10:59:59 AM on the following day, and (iii) 4:15:00 PM–10:59:59 AM on the following day. The key independent variable is the signed yield spread gap (DTST minus non-DTST) at the close. Control variables include the log of time to maturity, age, and amount outstanding, as well as the fraction of zero trading days over the past three months. Columns (1) through (3) exclude fixed effects (the constant term is included but not reported); Columns (4) through (6) include day, bond, and rating fixed effects. Standard errors are two-way clustered at the bond and day levels and are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable (bps):	*YS(the given window) minus YS(non-DTSTs at the close)*					
Window:	4:15PM–6PM	8AM–11AM	4:15PM–11AM	4:15PM–6PM	8AM–11AM	4:15PM–11AM
	(1)	(2)	(3)	(4)	(5)	(6)
Signed YS gap (DTST minus non-DTST)	0.627***	0.714***	0.687***	0.722***	0.785***	0.751***
	(0.023)	(0.014)	(0.014)	(0.020)	(0.014)	(0.014)
Ln(time to maturity)				1.711***	-0.064	0.349
				(0.588)	(0.455)	(0.367)
Ln(age)				0.045	0.389***	0.156
				(0.159)	(0.148)	(0.114)
Ln(amount outstanding)				-0.316	0.307	0.102
				(0.762)	(0.613)	(0.512)
Zero trading days				1.048*	1.256**	1.130***
				(0.561)	(0.554)	(0.412)
Observations	31,296	50,723	62,115	30,035	49,615	61,026
Adjusted R^2	0.215	0.261	0.282	0.346	0.414	0.412
Day FE	N	N	N	Y	Y	Y
Bond FE	N	N	N	Y	Y	Y
Rating FE	N	N	N	Y	Y	Y

Table X: Pricing gap at the close and post-close trade timing

This table examines the relationship between the yield spread gap at the close and subsequent trading activity. In Panel A, the dependent variable is an indicator *D(Trade arrival post-close)*, equal to one if the bond trades between 4:15 PM and 11:00 AM the following day and zero otherwise. We multiply this indicator by 100 for coefficient scaling. We construct *D(Trade arrival post-close)* separately for each trade type: any, interdealer, customer, customer buy, and customer sell. Column (1) uses all trades; Columns (2) and (3) restrict the sample to interdealer and customer trades, respectively. In Columns (4) through (7), we use customer buys and sells, and split the sample into $YS^{\text{DTST}} > YS^{\text{non-DTST}}$ and $YS^{\text{DTST}} < YS^{\text{non-DTST}}$ bond-days, where YS^{DTST} and $YS^{\text{non-DTST}}$ are trade-size-weighted average yield spreads of DTSTs and non-DTSTs at close, respectively. The main independent variable is the yield spread gap between DTSTs and non-DTSTs at the close (*YS gap*). In Panel B, the dependent variable is *Time to first post-close trade*, defined as the elapsed minutes from 4:15 PM to the first subsequent trade, measured separately for each trade type. If no trade occurs by 11:00 AM on the following day, we drop the corresponding bond-day from the sample. All specifications include controls for bond characteristics (log time to maturity, log age, log amount outstanding, and the zero-trading-day measure) but omitted to save space. We also include day, bond, and rating fixed effects. Standard errors are two-way clustered at the bond and day levels and are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Presence of post-close trade

Dependent variable:	*D(Trade arrival post-close) × 100*						
				$YS^{\text{DTST}} > YS^{\text{non-DTST}}$		$YS^{\text{DTST}} < YS^{\text{non-DTST}}$	
Trade types:	All	Interdealer	Customer	Cust buy	Cust sell	Cust buy	Cust sell
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
YS gap	0.189***	0.225***	0.176***	0.294***	-0.026	0.105	-0.012
	(0.036)	(0.043)	(0.038)	(0.055)	(0.056)	(0.088)	(0.094)
Observations	92,154	92,154	92,154	45,691	45,691	44,795	44,795
Adjusted R^2	0.259	0.237	0.269	0.265	0.227	0.253	0.226
Control variables	Y	Y	Y	Y	Y	Y	Y
Day, Bond, and Rating FEs	Y	Y	Y	Y	Y	Y	Y

Panel B. Time to first post-close trade

Dependent variable:	*Time to first post-close trade (in minutes)*						
				$YS^{\text{DTST}} > YS^{\text{non-DTST}}$		$YS^{\text{DTST}} < YS^{\text{non-DTST}}$	
Trade types:	All	Interdealer	Customer	Cust buy	Cust sell	Cust buy	Cust sell
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
YS gap	-1.931***	-2.923***	-1.820***	-2.445***	0.164	2.018	-1.202
	(0.608)	(0.618)	(0.629)	(0.756)	(0.905)	(1.456)	(1.563)
Observations	66,561	49,890	61,093	22,159	20,754	21,371	20,839
Adjusted R^2	0.153	0.145	0.152	0.115	0.154	0.112	0.163
Control variables	Y	Y	Y	Y	Y	Y	Y
Day, Bond, and Rating FEs	Y	Y	Y	Y	Y	Y	Y

Table XI: Delayed reporting of DTSTs and post-agreement price formation

This table benchmarks the first post-agreement non-DTST trade against CP+ estimates and compares it to other non-DTST trades. In Columns (1) and (2), the dependent variable is *YS deviation from CP+*, defined as the absolute difference between yield spread of a transaction and CP+ yield spread. To compute this difference, we match each trade to the most recent minute-level CP+ yield spread with the same trade direction. In Columns (3) and (4), we analogously define the dependent variable *Price deviation from CP+* for price. The indicator *D(post-agreement trade)* equals one for the first non-DTST following the spread-agreement time for a DTST, only when this non-DTST occurs more than 15 minutes after the spread-agreement time; the indicator equals zero otherwise. All specifications include bond-times-day interacted fixed effects, trade-size group fixed effects, and trade direction fixed effects. The trade-size groups are defined based on par trading volume: micro ($1–$100,000), odd-lot ($100,000–$1,000,000), round-lot ($1,000,000–$5,000,000), and block (above $5,000,000). The sample consists of all non-DTSTs executed between 8:00:00 AM and 3:59:59 PM outside of the MarketAxess platform. Standard errors are two-way clustered at the bond and day levels and are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent variables:	*YS deviation from CP+*		*Price deviation from CP+*	
	(1)	(2)	(3)	(4)
D(post-agreement trade)	0.285***	0.198***	1.382***	0.999***
	(0.031)	(0.031)	(0.169)	(0.166)
Observations	1,177,886	1,177,886	1,178,010	1,178,010
Adjusted R^2	0.428	0.431	0.363	0.365
Bond×Day FE	Y	Y	Y	Y
Trade size group FE	Y	Y	Y	Y
Trade direction FE	Y	Y	Y	Y
Hour FE	N	Y	N	Y