Receiving Investors in the Block Market for Corporate Bonds

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We examine block trading in corporate bonds to test theoretical predictions regarding receiving investors to whom dealers distribute the block. By exploiting rules governing trade reporting timeliness and using proxies for informed trading, we show that receivers experience worse outcomes in settings with elevated information asymmetry, although losses are smaller than initiating a similar-size trade. Receivers obtain better terms in periods following mandatory trade reporting and for offsetting trades that occur after block trade disclosure. Dealers speed up offsetting activity with shorter reporting delay, but do not withdraw. Our study highlights the relevance of disclosure rules and conditions for a well-functioning block market.

JEL Classification: G14, G18, G24

Keywords: Block market; receiving investor; dealer; trade disclosure; asymmetric information; transparency; transaction costs.

1. Introduction

In the corporate bond market, institutional investors frequently transact in quantities that far exceed the standard round lot size of $1 million. As shown in Figure 1, transactions exceeding $15 million have accounted for nearly 15% of trading volume over the past two decades. While trading has slowly migrated to electronic bond platforms, they primarily cater to retail investors and small institutional trades (O'Hara and Zhao, 2021). For the large institutional trades, the over-the-counter (OTC) block market represents an important source of liquidity. Block trading typically involves a sequence of negotiated, non-anonymous, and asynchronous transactions: an "initiating" block trade between the institution and the dealer, typically facilitated in a principal capacity, followed by the dealer executing offsetting trades with "receiving" investors to reverse the block position.

Receiving investors play an important role in the theoretical models of the block market, yet they have received little attention in the empirical literature. Theoretical models, such as those by Burdett and O'Hara (1987), Naik et al. (1999) and Back et al. (2020), depict a setting in which a dealer acquires and subsequently disposes of a block position through a sequence of transactions. Given that informed traders tend to transact in larger quantities, information asymmetry plays a crucial role in the block market. In these models, the dealer typically possesses less information than the initiator, but the dealer may learn (at least partially) about the trade's motive by observing the block size, price, initiator identity, and other signals during negotiations.

The least informed is the receiving investor who is approached by the dealer interested in trading out of the block position. In the framework of Burdett and O'Hara (1987), receiving investors lack information regarding the existence and size of the yet-to-be-reported block trade, thus making it difficult for them to fully anticipate its information effects. These models predict that timely disclosure of the block trade's terms can convey private information to the market, thus reducing the profits that dealers earn in subsequent transactions with receiving investors.

In this study, we analyze the price effects of block trades, with a particular focus on the information available to receiving investors. By exploiting rules governing trade reporting timelines and using proxies

for informed trading, we show that receiving investors experience worse outcomes in settings with elevated information asymmetry within the block trade process.

Our study holds relevance for regulatory proposals related to trade disclosure, which are likely to benefit some participants at the expense of others, as noted by Harris (1992). Much of the regulatory debates on the health of the OTC block market have revolved around how trade disclosure, such as timely reporting of block trades, may impact block initiators and dealers, whereas the welfare of receiving investors has received less attention.

Receiving investors (henceforth, receivers), who offset the dealers' added inventory risk of the block position, are vital to a well-functioning block market. Their significance has grown as dealers have been less inclined to commit capital for market-making due to post-crisis banking regulations.[1] Consistent with theoretical predictions, our results show that receivers choose to participate when the expected losses due to adverse selection are lower than the cost of initiating a trade of similar size. These findings highlight that regulations affecting their information environment could have a significant impact on the size of the block market.

While there is extensive empirical work on trading costs for large transactions, few studies have differentiated between specific types of customers (i.e., initiators vs. receivers). Unlike many markets in which the parties to a trade are not identified (e.g., TAQ data from U.S. equity), the enhanced TRACE transaction data in the corporate bond market capture the entire history of the dealers' trades with counterparties. We leverage these unique data features to develop a methodology for identifying the initiating block trade and the related transactions with receivers.[2]

We first characterize the price effects of block trades. Our analysis focuses on a sample of 205,104 "initiating" block buy and sell transactions, each exceeding $15 million, as well as 690,418 related offsetting trades with receivers. These transactions span the years from 2002 to 2021. Notably, dealers

[1] See Schultz (2017), Bao et al. (2018), Bessembinder et al. (2018), Dick-Nielsen and Rossi (2019), and Trebbi and Xiao (2019) for the impact of Dodd Frank Act on bank-affiliated dealers in the corporate bond market.

[2] Outside of the block market setting, it can be challenging to classify customer trades as initiating investor trades (i.e., trades that add to dealers' inventory risk) versus receiving investor trades (i.e., trades that offset dealers' inventory position). Identifying the initiating investor trade is important for measuring price effects and its distribution among the different market participants.

typically offset a block position with about 3-4 counterparties, with the trade size averaging $9 million, suggesting that receivers predominantly represent institutions. Building on the block literature (e.g., Kraus and Stoll, 1972), we estimate both the temporary (liquidity effects) and permanent (information effects) price impact of block trades, and further, using our methodology, decompose liquidity effects into dealer and receiver spreads.

Round-trip dealer spreads for intermediating block trades average 22 basis points (bp). Dealers charge a markup on both the initiator (18 bp) and receiver (3 bp) legs of their round-trip trades. Markups paid by receivers are smaller for lower quality bonds and larger blocks, and for mega blocks involving high yield bonds, the markups are negative. These patterns indicate that dealers attract counterparties with better terms when facing substantial inventory risk.

We study the role of adverse selection on the distribution of price effects in the block market. While the average permanent price impact is near zero, the median and third quartile of price impact are 1.4 bp and 52 bp, respectively, suggesting that some blocks are associated with informed trading. We sort the blocks into decile portfolios based on the block's ex-post permanent price impact and find that receivers experience less favorable outcomes when the block trade is informed. In contrast, dealers' spreads remain relatively unaffected, indicating that dealers can anticipate informed trading and manage the adverse selection risk.

Further, we exploit prior evidence from the corporate bond market that sustained customer buying is associated with price discovery while sustained customer selling is associated with price reversals (Cai et al., 2019; Anand et al., 2021). For our sample, block buys appear to be informed, as evidenced by positive permanent price impact (7 bp), compared to block sells, which exhibit negative impact (-4 bp). For both block buys and sells, dealer spreads are positive and of similar magnitude. However, there is a notable difference in the outcomes for receivers when offsetting informed blocks. In the case of block buys, receivers bear adverse selection risk, as indicated by negative receiver spreads (-12 bp), while for block sells, where significant information effects are absent, receiver spreads are slightly positive (1 bp).

Given adverse selection risk, we study the economics underlying the receivers' decision to participate in the block market. Grossman (1992) describes receivers as natural counterparties of the

initiator with unexpressed trading interests that are known to the dealer. In this context, we compute "imputed" costs, or the hypothetical cost if the receiver had instead *initiated* a trade of similar size at the same time. Notably, even with information effects, receivers obtain better outcomes (+20 bp for building a position), or at the very least, no worse outcome (+1 bp for liquidating a position) by offsetting the dealers' position than initiating a trade of similar size.

These results help explain the appeal of the block market for receiving investors, supporting Burdett and O'Hara (1987) prediction that despite potential losses on informed blocks, participation can be optimal for investors seeking to either establish or liquidate a large position. Our results highlight the necessary conditions for a well-functioning block market; if information asymmetry becomes excessively large, receivers will withdraw from the block market.

Next, we explore how regulations that affect the trade disclosure environment affect the block market. Our analysis begins with a study of the introduction of trade reporting for public corporate bonds in 2003 and 2004, as well as non-public 144A corporate bonds in June 2014. In line with empirical literature, we find that the initiation of trade reporting results in reduced dealer profits in the block market.[3] However, the impact of trade reporting on customers within the block market is nuanced and depends on "type". Consistent with theory, such as Madhavan (1995), our findings indicate that increased transparency benefits the less-informed customers (receivers) in their negotiations with dealers while outcomes remain largely unaffected for the better-informed customers (initiators).

In our second analysis, we exploit variations in trade reporting procedures that allow dealers a delay between the time of execution and the reporting of a block trade to the TRACE system. The timing in trade report disclosure lies at the heart of numerous policy debates surrounding the structure of bond markets. Dealers and industry groups have long argued that real-time block trade reporting makes it difficult to unwind a block position over time. The delay provides dealers with an opportunity to partially offset the block position before it is reported to the market. In recent years, regulators have explored a range of

[3] See, e.g., Bessembinder et al. (2006), Edwards et al. (2007), Goldstein et al. (2007), and O'Hara et al. (2017).

proposals, including extending the delay for block trades from the current 15 minutes to 48 hours[4], as well as reducing the delay from 15 minutes to no more than one minute.[5]

Between 2003 and 2006, FINRA implemented a gradual reduction in the maximum stipulated reporting delay for corporate bonds in three stages, from 75 minutes to 45 minutes, to 30 minutes, to the current 15 minutes. The Back et al. (2020) model predicts that receivers will obtain more favorable terms on offsetting trades that take place after the disclosure of the block trade compared to those before it. To test this prediction, we present related evidence through a "within block" analysis, which allows us to control for trade, bond issue, and market conditions that may also impact trading costs.

Within each reporting delay regime, receivers obtain economically large cost reductions (within block), ranging from 5 bp to 11 bp, on offsetting trades that occur after the block report compared to those before it. Changes in dealer spreads exhibit a similar pattern but with opposite signs. Further, as the reporting delay shortens, dealers reverse the block position at a faster rate, strategically offsetting approximately 20% of the position before the block trade report. Dealers are also strategic in the timing of report: more difficult block trades (e.g., mega blocks in high yield bonds) are associated with increased reporting delay. These findings provide empirical support for the specific mechanism by which timely trade reports benefit the less informed customers in their negotiations with dealers. We discuss the implications of our research for recent regulatory proposals on trade disclosure in the concluding section.

Our Study versus the Related Literature

Madhavan (2000) argues that the block market has been viewed in the literature primarily from the initiator's viewpoint, but the benefits may largely accrue to receiving investors. While there is research on trading costs of large transactions, it is difficult to test theoretical predictions concerning specific customer-types. Most publicly available databases do not identify investor-types, and the hypothesized relation may be obscured in the available transactions data which represent a mixture of investors. As a result, even the

[4] FINRA and the CFTC proposed pilot programs to delay reporting of block trades in corporate bonds and swaps, respectively from 15 minutes to 48 hours (see https://www.finra.org/rules-guidance/notices/19-12 for FINRA proposal and https://www.cftc.gov/LawRegulation/FederalRegister/finalrules/2020-21568.html for CFTC proposal).
[5] The proposal covers trade reporting in corporate bonds, agency debt securities, asset backed securities and agency pass-through mortgage-backed securities (MBS). See https://www.finra.org/rules-guidance/notices/22-17.

most fundamental predictions regarding receiving investors remain untested. Our study attempts to fill this gap in the literature.

Theoretical models describe many benefits to receiving investors such as: avoid paying the premium for initiating a large trade; lower adverse selection risk; smaller execution delay; smaller opportunity cost of a failed search; among others. Recent empirical studies document high search costs, high costs of delayed executions, and frequent and costly trade failures in the fixed income market (see Hendershott et al., 2020a, 2020b; Kargar et al., 2022). We provide related evidence that investors with a desire to trade may obtain lower costs by participating in offsetting trades with the block dealer, as predicted by Burdett and O'Hara (1987).

Our study complements the analysis in Choi et al. (2023), who examine short horizon customer-matched corporate bonds trades (i.e., those that do not require dealer inventory capacity). The study differentiates between liquidity demanding and liquidity providing customers and shows that traditional measures underestimate trading costs due to the aggregation of customer types. In comparison, we examine block trades where dealers commit inventory capacity and study receiving investors to whom the dealer distributes the block.

Further, we present direct empirical evidence on the primary mechanism envisioned in theoretical models (e.g., Naik et al., 1999; Back et al., 2020) on how transparent regimes level the information playing field. With greater transparency, theory predicts that counterparties will incorporate the potential adverse price move of a block trade as the dealer continues to offset the position. The framework in Back et al. (2020) suggests that receiving investors obtain better prices on offsetting trades that occur after the block trade is publicly reported. We exploit variations in trade reporting rules to provide evidence for this mechanism and further, add nuance to the existing literature by showing the type of customers that benefit from greater transparency.

2. Related Literature on Block Market and Transparency

The block market represents a setting where information asymmetry and inventory risk are particularly elevated. Because a large trade may signal information-motive (Easley and O'Hara, 1987),

dealers must discern whether the block initiator is informed. Dealers must also consider the ease of locating receivers and the price at which the block can be distributed.

As per theory, the block market can lower the initiator's trade execution costs by mitigating adverse selection risk (Seppi, 1990), locating counterparties (Grossman, 1992), and facilitating risk sharing (Keim and Madhavan, 1996). Researchers, focusing on block trades in the equity market, have provided evidence in support of these models. Madhavan and Cheng (1997) and Booth et al. (2001) report evidence from U.S. and Canadian equity markets, respectively, that "upstairs" block market trades are primarily liquidity motivated, Bessembinder and Venkataraman (2004) report lower liquidity costs for block trades in the French equity market, and Keim and Madhavan (1996) report lower price effects of block trades due to risk sharing based on U.S. equity institutional trade data.

2.1. Large Trades in the Corporate Bond Market

Like the equity market, the initiator and the dealer negotiate the terms of the block trade in the corporate bond market. One notable distinction is that the "downstairs" market, where the initiator could split a block and trade in smaller pieces, is an organized, anonymous exchange for equities, while it primarily operates as a non-anonymous OTC market for corporate bonds. Therefore, it may become difficult for an informed bond trader to hide a large position during bilateral negotiations with counterparties. Moreover, unlike equities, where trading costs increase with trade size, larger trades in corporate bonds tend to incur lower costs compared to smaller trades (see Edwards et al., 2007; Goldstein et al., 2007), which reduces the incentive to split a block position.

Prior corporate bond studies find that institutions prefer to trade in large quantities with a handful of relationship dealers (Di Maggio et al., 2017; O'Hara et al., 2018; Hendershott et al., 2020b; Nikolova and Wang, 2020; Goldstein et al., 2021) and that larger trades are more informed than smaller trades (Han and Zhou; 2014). Thus, it appears that order splitting is less common in corporate bonds than in equities, although Czech and Pintér (2020) report evidence of order splitting across multiple dealers in the UK market. O'Hara et al. (2018) show that dealers exercise market power – more active institutions receive

better trade terms than less active institutions.[6] Jurkatis et. al (2022) find that dealers value institutional clients to whom they can off-load bonds acquired in previous trades. Hollifield et al. (2020) find that large trades are more often intermediated by central dealers who exhibit longer inventory holding periods than peripheral dealers. Goldstein and Hotchkiss (2020) find that dealers' holding period declines with illiquidity and bond risk, indicating that dealers care about inventory and search costs.

2.2. Transparency and the Block Market for Corporate Bonds

Every block trade involves receiving investors who, in due course, reverse the large position of the dealer. As per theory, the surplus that dealers extract from receiving investors in bilateral negotiations increases with the extent of asymmetric information within the block trade process, for example, when the initiator is an informed trader, or in opaque markets, where ex-post details on completed transactions are not available to all market participants.

FINRA adopted a phased approach to corporate bond trade dissemination that began with the most actively traded bonds in 2002, then expanded to all non-144A corporate bonds in 2006 and finally to 144A corporate bonds in June 2014. Dealers are allowed a delay between execution time of the trade and report time of the trade to FINRA's TRACE system. Current TRACE procedures require dealers to report immediately to the TRACE system but in no case later than 15 minutes after trade time, but TRACE rules shortened the maximum stipulated reporting delay in three stages, from 75 minutes when TRACE was initiated in 2002, to 45 minutes, to 30 minutes, to the current 15 minutes in 2006. In all four regimes, FINRA disseminates the trade report to the market immediately upon receipt from a dealer.

Initiation of trade reporting diminishes the dealers' advantage by making public valuable information about recent trading activity in the bond or related bonds.[7] In the context of the block market, which typically involves a sequence of trades between a dealer and initiator then dealer and receiver, timely trade reporting conveys the dealer's private information on a recently-executed block trade to the market,

[6] Other studies show that the dealer's centrality in the interdealer market is an important determinant of the terms of trade for customers (see Hollifield et al., 2017; Li and Schurhoff, 2019).

[7] Pagano and Roell (1996), Green et al. (2007) and Back et al. (2020), among others, show theoretically that opaque markets offer advantages to dealers in negotiations with less informed customers. Duffie et al. (2017) show that the publications of benchmark prices reduce the information advantage of dealers over customers.

allowing the potential counterparties to learn (at least partially) about the trade's motive by observing the terms of the block trade. It also makes dealers with recently acquired blocks more vulnerable to adverse price movements from front-running strategies. The experimental evidence from Bloomfield and O'Hara (1999) suggests that dealers prefer not to disclose their trades and that non-disclosing dealers earn substantially higher profits than disclosing dealers. Empirical research generally has found that customer trading costs have improved while dealer spreads have declined with mandatory trade reporting in corporate bonds (Edwards et al., 2007; Goldstein et al., 2007). Institutional trading costs also declined along with smaller differences in costs between large and small institutions after TRACE initiation (see Bessembinder et al., 2006; O'Hara et al., 2017). Brugler et al. (2022) document that post-trade transparency lowers the cost of issuing corporate bonds. For municipal bonds, Schultz (2012) finds a reduction with transparency in dispersion of purchase prices around bond issuance. For agency mortgage-backed securities, Schultz and Song (2019) report that trading costs fell for institutions, along with a decline in dealer's capital, with trade reporting. However, for stocks trading on the London Stock Exchange between 1986 and 1996, Gemmill (1996) reports that bid-ask spreads did not materially change across trade reporting regimes.

Along similar lines, shortening the reporting delay could make the dealers' position more vulnerable to price movements that negatively impact profits and incentivize dealers to offset the block at a faster rate. To the extent that dealers are unable to distribute the position quickly, it may reduce dealers' incentive to intermediate blocks or offer less attractive quotes to block initiators. Chalmers et al. (2021) examine the reduction in trade reporting delay for municipal bonds and find declines in average customer trading costs; however, the study does not examine the block market or differentiate the outcomes by customer type.

3. Data and Sample Characteristics

3.1. Data Sources and Sample Construction

We use the Mergent Fixed Income Securities Database (FISD) to select our initial sample of corporate bonds. We identify non-puttable or convertible U.S. Corporate Debentures and U.S. Corporate

Bank Notes (bond type=CDEB or USBN) with complete issuance information (offering date, amount, and maturity), resulting in an initial sample of 55,842 bonds.[8]

For corporate bond transactions, we use the enhanced version of the Trade Reporting and Compliance Engine (TRACE) data provided by FINRA that include dealer identification numbers, unmasked trade sizes, and trade data disseminated to the public as well as (144A bond) trades not so disseminated between July 2002 and November 2021. We match the FISD data to TRACE using the CUSIP identifier, which reduces the sample to 39,801 bonds and 147.9 million trades.

Table I reports the effects of additional data filters that we implement. We exclude all bonds with less than five trades during the almost twenty-year sample period. We also exclude trades with reported size that exceeds the bond's offering amount, trades reported after the bond's outstanding amount is reported as zero, and trades with execution dates prior to July 2002. We exclude trades reported as primary market transactions as well as secondary market transactions that occur immediately after issuance.[9] Finally, following the literature, we exclude trades by one relatively large dealer that, during 2014, began to report an immediately offsetting transaction for most of its principal trades. With these filters imposed, the corporate bond sample comprises of 138.5 million secondary market transactions in 38,762 distinct CUSIPs.

3.2. Block Market Activity Through Time

Figure 1 shows the market share of block trades, defined as a single transaction with par value of at least $15 million, to total trading volume on TRACE for the sample of corporate bonds over 2002-2021. We also report the market share for block size thresholds of $20 million and $30 million. During this period, the corporate bond market experienced many significant events, such as the phase-in of trade reporting (2002-2005), the global financial crisis (2007-2009), post-crisis bank regulations (2011-2014), and the growth in electronic trading venues. Throughout these developments, the market share of block trades has

[8] Specifically, we exclude the following types of debt: retail notes, foreign government, agency, municipal, pass-through trusts, pay in kind, strips, zeros, Eurobonds/Euronotes, asset and mortgage backed, insured, and guaranteed by letters of credit, medium term notes/zeros, convertible, and foreign currency.

[9] Bessembinder et al. (2022) shows that secondary market trading in a new issue in the days following issuance is dominated by the activities of the underwriting syndicate. If the offering day is on or before the 15th of the month we exclude the remainder of the issue month, otherwise we exclude the issue month and the following month.

remained remarkably stable, averaging about 13% over the sample period (Figure 1.A). The market share is higher for investment grade bonds than high yield bonds (Figure 1.B) and for large dealers than small dealers (Figure 1.C). We also find that the dealer's propensity to "prearrange" block trades has remained stable, averaging about 11% of the block volume, over the sample period (Figure 1.D.).[10]

These block market trading activity patterns are similar when we account for changes in bond attributes and market conditions over the sample period using a regression framework.[11] Figure 2 shows the regression coefficients of the year indicator variables (circles) and the 95% confidence interval (bars) from the model with 1,023 weekly observations and with Newey-West standard errors. Years 2002 and 2003 serve as the benchmark period. Figure 2.A indicates no significant change in the block market volume share relative to the benchmark period. Figure 2.B shows that the percentage of prearranged block trades is higher during the global financial crisis, consistent with decline in intermediary capital, but the subsequent years exhibit no significant change relative to the benchmark period. Overall, we do not find support for industry concerns that the block market in corporate bonds has become less relevant over time.

3.3. Identifying Block Trades and Receiving Investor Trades in TRACE data

The goal of this study is to understand outcomes for receiving investors to whom the dealer distributes the block. We leverage unique features of the corporate bond market to link the initiating block trade with the dealer's offsetting trades with receiving investors. The enhanced TRACE corporate bond transactions data that we utilize includes identifiers for buy and sell trades and dealer identification codes, which allow us to track the entire trading activity of a dealer.

To be included in our sample, the block trade must meet the following conditions: (a) the block trade is a dealer's sale or purchase with a customer with par value of $15 million or greater (or $20 million

[10] Following the literature, we define pre-arranged blocks as "riskless principal" trades when the dealer fully offsets the block position with a single opposite direction trade within 15 minutes, effectively acting in an agency capacity (see Harris, 2016; Choi et al., 2023). Bessembinder et al. (2018) report that more than 90% of dealer-to-customer trades each year between 2006 and 2016 were facilitated as "principal" (i.e., not prearranged) trades by dealers.

[11] Specifically, we regress the weekly block volume share (i.e., aggregate block volume relative to total trading volume) on the (average) characteristics for bonds traded during the week (i.e., log age, log issue size, and the percentage of traded bonds that are high yield, financial sector, and 144A bonds) and several measures of market conditions (i.e., the trailing weekly corporate bond market index return and S&P index return, and the average three-month LIBOR interest rate and the level of the VIX index over the preceding five days).

or $30 million for the alternate samples), and (b) the block trade is not reported as "agency" trade on TRACE or identified as a prearranged trade by our matching algorithm. We do not include block trades where the dealer acts as a broker (i.e., agency or prearranged trade) as it becomes ambiguous whether the initiating block trade was a customer buy or sell. Our approach allows us to identify with high confidence the initiating block trade, reported as a customer buy or sell, that creates a material inventory position for the dealer.

We identify the dealers' offsetting trades of the block trade with receiving investors, as follows. We first retain all trades by the block dealer in the bond during the week (i.e., five trading days) after the block trade.[12] We then, starting with block volume, cumulate the dealer's (signed) trading volume in the bond. If the cumulative imbalance reaches or crosses zero over the block week, we classify the block as being "fully offset". We define the "block end" time as the earlier of the time the block is fully offset or the end of the block week. Receiving investor trades are identified as those that offset the dealer's block position before the block end time.

We categorize the *earliest* large trade as the "trigger" or "initiating" block trade; thus, additional (opposite sign) block trades in the bond by the same dealer that occur until the block end time are classified as receiving investor trades. Subsequently, any trade by the dealer in the bond that meets the block definition is classified as an initiating block trade. If there is insufficient data to calculate price effects (described in Section 4), we exclude the block trade and the associated receiving investor trades from our sample.

Our analysis relies on the correct identification of trade type. Misclassification may arise from our assumption that the earliest block trade is the initiating trade.[13] We undertake several additional analyses to assess this assumption. First, in Figure 3, we report the mean and median signed end-of-day cumulative imbalance in the bond for the dealer over [-10, +10] days surrounding the block trade date (time 0). The

[12] We focus on one week for the following reasons. First, Bessembinder et al. (2018) show that the proportion of weekly trading volume that is carried into dealers' weekend inventory is generally less than 10%. Goldstein and Hotchkiss (2020) report median (mean) dealer holding periods of one (ten days). Hollifield et al. (2020) show more than 70% of large trades are matched within a week. Second, as the time from block trade increases, the link between a triggering block trade and the dealers' offsetting trades of opposite sign becomes less clear.

[13] As an example, if the block trade occurs on a Wednesday, the block week is from Wednesday to Friday, and the following Monday to Tuesday. If we observe a $15 million customer buy followed by a $20 million customer sell, we classify the $15 million buy as the "initiating block" and the $20 million sell as the "receiving investor" or offsetting trade.

analysis is based on the sample of 205,104 block trades reported in Table 1. The dealers' end-of-day position is close to zero prior to the block trade date, indicating that dealers' do not build a position in anticipation of a block trade. On the block day, dealers' closing position averages $12.5 million for block sells and -$7.9 million for block buys, while the average block size is $22.6 million. Thus, dealers offset a significant portion of the block within the block day, and then continue to offset the block position on subsequent trading days.

Second, we confirm that our main results are similar for three block size threshold samples, including mega blocks of $30 million or more. Because the size of the receiver trades is typically smaller than the initiating block trade, particularly for the mega block sample, it is less likely that the block is incorrectly classified as "initiating" instead of "receiving". Third, the percentage of fully offset blocks where at least one receiver trade exceeds the block trade size and occurs on the same day (within 15 minutes) as the initiating block is only 6% (0.8%). In Appendix Table II, our main results are robust when we exclude these block trades from the sample. The Appendix describes classification issues and the methodology in detail and presents several examples of trade classification.

Panel B of Table I reports summary statistics for our sample of 205,104 block trades over our sample period, of which 71% (146,052) represent investment grade bonds and 29% (59,052) represent high yield bonds. The majority (80%) of block trades are intermediated by large dealers. The average block size (par value) for the main sample is $22.6 million, while for the mega-block sample, the average block size is $44.3 million. The average block trade size as a percentage of the total trading volume for the bond on the block trade day is 51%.

In Table II, Panel, we report summary statistics for our sample of receiving investor trades. We identify 690,418 receiver trades associated with the block trade sample, implying that each block trade is associated on average with 3.37 receiver trades. Of the 205,104 block trades, 72% (148,601) are associated with more than one receiver trade (77% for mega block sample). The majority of receiver trades (71%) are with customers. This result is consistent with Hollifield et al. (2020) who find that smaller trades of a dealer are substantially more likely to be offset with other dealers, while larger trades are more likely to be offset with customers.

Panel B reports that, at the block-level, the average receiver trade size is $8.9 million while, in comparison, the average TRACE-reported trade size during our sample period is only $0.5 million. At the individual receiver trade level, 34% of trades are less than $1 million, 54% are between $1 and $15 million and 12% exceed $15 million. This distribution suggests that consistent with block market theory, receiving investors are primarily institutions. Both the average receiver trade size and the number of receiver trades increase with block size. For mega-blocks, the mean receiver trade size is $15.6 million (Panel B) and the number of receiver trades average 4.04 (Panel A). Panel C reports that the percentage of the block position that the dealer offsets during the block-week averages 64%. About 41% of the blocks are fully offset during the block-week and this statistic is slightly higher (44%) for smaller blocks.

4. Price Effects of Block Trades in the Corporate Bond Market

In this section, we describe our methodology to measure the price effects surrounding the block transaction. We classify price effects as permanent and temporary, then further decompose temporary effects into dealer and receiver spread components.

4.1. Measuring Price Effects of Block Trades

Figure 4 Panel A provides a graphical representation of the price effects of a customer-initiated block buy. Following the block trade literature (Kraus and Stoll, 1972), we calculate the block initiator's trading cost for size Q, I(Q), by comparing the block trade price P_B at block trade time t_{block} to the bond's pre-trade benchmark price, which we define as the value weighted-average trade price (VWAP) (across all dealers) during the prior week (P_{-1}). In Equation (1), the variable D equals +1 for a customer-initiated block buy and equals -1 for a customer-initiated block sell.

$$\textit{Block initiator cost, } I(Q) = D * [Ln(P_B) - Ln(P_{-1})] * 100 \qquad (1)$$

In the literature, the liquidity effect of the block trade is temporary while the information effect is permanent. For example, for a block buy, the initiator may pay a higher block price to compensate the dealer for added inventory risk. The temporary price impact T(Q) reflects the compensation to liquidity providers, as the bond price reverses to equilibrium value after the block trade. We estimate the reversal in price after a block trade by comparing the block trade price P_B to the bond's weekly VWAP in the following

week (P_{+1}). The permanent price impact, P(Q), reflects the change in market's perception of the bond value following the block trade, estimated by comparing the bond's weekly VWAP in the following week (P_{+1}) to the bond's weekly VWAP in the prior week (P_{-1}), relative to the week of the block trade.

$$\textit{Temporary price impact, } T(Q) = D * [Ln(P_B) - Ln(P_{+1})] *100 \quad (2)$$

$$\textit{Permanent price impact, } P(Q) = D * [Ln(P_{+1}) - Ln(P_{-1})] * 100 \quad (3)$$

A block trade causes the dealers' inventory to depart from the desired level (see Stoll, 1978; Amihud and Mendelson, 1980). In settings where dealers face significant inventory risk, such as illiquid bonds, block trades, or periods of market stress, receiving investors could potentially earn a liquidity premium for offsetting the dealers' position. We exploit the detailed enhanced TRACE data to delineate temporary price impact into compensation for the block dealer and receiving investors. To calculate dealer spread, we compare the prices of the dealer's round trip, i.e., the price P_B at which the dealer participates in the block trade, and the VWAP of receiver trades P_{OFF} at which the dealer offsets the block position. To calculate receiver spread, we compare the bond's weekly VWAP following the block week (P_{+1}) with the VWAP of receiver trades P_{OFF}.

$$\textit{Dealer spread, } D(Q) = D * [Ln(P_B) - Ln(P_{OFF})] * 100 \quad (4)$$

$$\textit{Receiver spread, } R(Q) = D * [Ln(P_{OFF}) - Ln(P_{+1})] * 100 \quad (5)$$

In Figure 4, Panel A, the illustration shows a block initiator cost of 20 basis points (bp) that is decomposed into permanent (5 bp) and temporary (15 bp) price impact, and further in Panel B, into dealer spread (10 bp) and receiver spread (5 bp).

To facilitate comparison across trading cost measures, the sample of 205,104 block trades that we identify in Table I, Panel B have non-missing values of initiator costs, dealer spreads and receiver spreads. That is, the bond must have at least one trade during the prior week, at least one trade during the subsequent week, and at least one (offsetting) trade by the block dealer during the block week. We exclude blocks with initiator cost, dealer or receiver spread, or permanent price impact that exceed \$50 (which are highly likely

to reflect errors), those identified as "agency" or prearranged trades and those with a block trade price below $5.[14] Trading costs are winsorized at the 1% and 99% levels.

4.2. The Price Effects of Block Trades

Table III presents the trading costs for our sample. Panel A reports the block initiator costs. For blocks of at least $15 million, block initiator costs average about 18 bp over our sample period. With about 10,500 block trades each year and the average block size of about $23 million, trading costs for our sample aggregate to about $435 million annually. Trading costs of the mega-block sample (21 bp) are higher than those of the full sample of blocks (16 bp), consistent with inventory and information models, but notably, this result stands in sharp contrast to the literature's findings that trading costs decline with trade size in the broader TRACE data (see e.g., Edwards et al., 2007). Panel D reports that block initiator costs are larger for high yield bonds (22 bp) than investment grade bonds (16 bp).

Panels B presents a two-way decomposition of initiator costs into permanent and temporary price impact. For the full sample, the mean and median permanent price impact is economically small. Although average permanent price impact is near zero, the standard deviation is 2.13, and the 50th, 75th, and 90th percentile of permanent price impact is 1.4 bp, 52 bp, and 162 bp respectively, indicating that some blocks are associated with large information effects.[15] In contrast to the equity block literature, which finds that information effects increase with block size (e.g., Madhavan and Cheng, 1997), information effects in corporate bonds do not vary systematically with block size. For blocks of at least $15 million, temporary price impact is economically large, averaging 18 bp, and increases with block size, from 16 bp for small blocks to 23 bp for mega-blocks, and almost twice as large for high yield (32 bp) than investment grade (13 bp) bonds.

Panel C presents a three-way decomposition of initiator costs into permanent price impact, dealer spreads, and receiver spreads. The temporary price impact can be attributed entirely to dealer spreads.

[14] The requirement of spread measures that do not cross $50 eliminates 0.02% of the sample, the requirement of non-missing initiator cost, dealer and receiver spread, and permanent price impact eliminates an additional 20% of the sample, the requirement of non-agency and non-prearranged trades eliminates an additional 12% of the sample. Our final sample consists of 205,104 block trades.

[15] In Section 6, we focus on a sample of block trades with large permanent price impact.

Dealer spreads of 22 bp in Panel C are larger than temporary price impact of 18 bp in Panel B. Dealer spreads do not vary with block size and are larger for high yield bonds (31 bp) than investment grade (18 bp) bonds.

Taken together, it is noteworthy that receiving investors earn *negative* spreads, implying that they do not get compensated for providing liquidity services to the dealer. For the full sample, receiver spreads average about -3 bp (Panel C), are larger for high yield (1 bp) than investment grade (-5 bp) bonds, and increase with block size, from -6 bp for smaller blocks to zero markup for mega blocks.[16] In Appendix Table III, we show that receiver spreads vary with counterparty type—spreads are close to zero when the receiver is a large dealer, while negative when the receiver is a customer or a small dealer.

5. The Economics of Receiving Investor Participation

Given that dealers have limited risk bearing capacity, particularly after banking regulations, it seems reasonable that receiving investors should earn compensation for reversing the dealers' block position (see e.g., Anand et al., 2021; Choi et al., 2023). However, our results suggest that receivers, despite being institutions, pay a markup for participating in offsetting trades. In this section, we study the economics underlying the receiver's participation in the block market.

Burdett and O'Hara's (1987) model offers a rational explanation for receiver participation, namely that investors who desire to either establish or liquidate a position might incur a higher trade execution cost for initiating a similar-size trade. To test the model's prediction, we build a trading cost model using our sample of block trades and then impute the cost of initiating a hypothetical trade on the block date. Specifically, the dependent variable of the trading cost model is the block initiator cost, and the explanatory variables are trade attributes, bond characteristics and market conditions at the time of the block trade.[17]

[16] In Appendix Table IV, we study the determinants of the price effects of block trades using a panel regression. The dependent variable in the regressions is one of the component measures of block trading costs. The explanatory variables are the important bond attributes, market conditions and block size. Consistent with the literature on corporate bond transactions costs, initiator costs and liquidity effects of the block are positively associated with block size, bond age, and high yield bonds, and negatively associated with issue size. Regression coefficients on bond attributes have a similar sign in the dealer spreads and receiver spreads regressions.

[17] The dependent variables include the log of block size, age and issue size, and indicators for high yield, financial sector, on-the-run, 144A bonds, and blocks intermediated by small dealers, and the weekly corporate bond market index return, the trailing weekly S&P index return, the average three-month LIBOR interest rate, and the level of the

The trading cost model is reported in Appendix Table IV Column 1. For each block trade, we estimate the "*imputed initiator cost*" as the fitted value from the model, where the trade size is the weighted average size of receiver trades associated with the block trade.[18]

In Table IV Panel A, we report the *receiver spread*, the *imputed initiator cost* from the trading cost model (multiplied by -1 for comparison purposes) and the *receiver savings*, which is the (pairwise) difference between the two measures. For the full sample, *receiver spread* averages -3 bp and mirror those reported in Table III, while the *imputed initiator cost* averages -14 bp. Thus, *savings* to receiving investors for participating in offsetting trades versus initiating a similar size trade are both economically (10 bp) large and statistically significant. *Savings* for receiving investors are positive for investment grade (Panel B) and high yield bonds (Panel C), averaging 7 bp and 19 bp, respectively, and larger for mega-blocks (16 bp), particularly in high yield bonds (32 bp). Further, savings increase monotonically with the number of offsetting trades, from 7 bp when the block is associated with one or two offsetting trades to 22 bp when the block is associated with 10 or more offsetting trades (Panel D). These results suggest that receivers are better off when block attributes improve their negotiating power with dealers, such as when block is large and involves riskier bonds (i.e., dealers face higher inventory risk).

6. Adverse Selection and Receiving Investor Outcomes

The block market is a setting where asymmetric information is elevated, as large trades are often information motivated. In support of the Burdett and O'Hara (1987) prediction, our results thus far suggest that, although receivers pay a markup on offsetting trades, participation is still optimal, as it is more expensive to initiate a similar-size trade. In this section, we examine scenarios where the block initiator is likely to be informed, which introduces adverse selection risk to the dealer and receiving investors. We

VIX index over the preceding five days. The corporate bond index return is measured around the time of the offsetting trades rather than the time of the triggering block trade.

[18] Admittedly, the trading cost model is based on block trades of at least $15 million while the average receiver trade size is less than $15 million. However, we note that our imputed cost estimates likely understate the trade execution cost, as it is well known that trading costs decline with trade size in the corporate bond market (see, e.g., Edwards et al., 2007). Bessembinder et al. (2018) report that transaction costs are 0.25% for trades between $100,000 and $1 million, 0.19% for trades between $1 and $10 million, and 0.16% for trades that exceed $10 million. We do not estimate the trading cost model using smaller trade size definitions as classification of initiator versus receiver customer type becomes more difficult for non-block sized trades.

consider both ex-post and ex-ante adverse selection risk.

6.1. Ex-Post Adverse Selection

In Figure 5, we sort each block trade (based on our full sample of 205,104 block trades) into ex-post permanent price impact deciles, then we report the average receiver spread for each decile. We find a clear negative relation between permanent price impact, a well-accepted measure of adverse selection risk (see Kraus and Stoll, 1972), and receiver spreads. For block trades in Decile 1 (i.e., lowest permanent price impact), receiving investors earn large positive spreads; for Decile 5, receiver spreads are essentially zero; and for Decile 10, receivers earn large negative spreads. In comparison, dealers earn large positive spreads for Decile 1, but notably, dealer spreads are stable at about 10 bp from Decile 5 to Decile 10. These results suggest that dealers can, on average, anticipate informed blocks and pass adverse selection costs to less informed counterparties (i.e., receiving investors).

6.2. Ex-Ante Adverse Selection

In our second setting, we exploit evidence from prior studies about asymmetric information effects of sustained buying versus selling activity in the corporate bond market (Cai et al., 2019; Anand et al., 2021). These studies find that block buys appear to be information motivated, while block sells are not. Similarly, equity block market studies report higher permanent price impact for block buys than block sells (Kraus and Stoll, 1972; Holthausen, Leftwich, and Mayers, 1987/1990; Chan and Lakonishok, 1993; Keim and Madhavan, 1996). These empirical patterns are in line with theoretical predictions (e.g., Burdett and O'Hara, 1987; Keim and Madhavan, 1996) that block buys, where the initiator typically creates a new position, are more likely than block sells (which could also be liquidity motivated) to be motivated by private information.

Table V reports cost measures analogous to those in Tables III for block buys and sells. For the full sample, there are 130,109 sell blocks and 74,995 buy blocks. Panel A reports that, consistent with the literature, permanent price impact is positive and substantially higher for block buys (7 bp) than block sells (-4 bp). Nonetheless, initiator costs are lower for block buys (15 bp) than block sells (19 bp). Dealer spreads are positive and of similar magnitude for both block buys (23 bp) and sells (21 bp). This implies that the

higher adverse selection risk of block buys is borne entirely by receiving investors. For block buys, receivers earn negative spreads (-12 bp), while for block sells, which do not have information effects, receiver spreads are slightly positive (1 bp).

Following the approach described in Section 5 and Table IV, we calculate imputed initiator costs for block buys and sells.[19] Table V Panel B reports the *Savings* for receiving investors, calculated as the pairwise difference between receiver spread and imputed initiator cost. For block sells, where information effects are small, *Savings* are large and average 20 bp. Thus, investors who desire to build a position are better off participating as receivers in the block market.

For block buys, where adverse selection costs are high, *Savings* is on average slightly positive (1 bp), which reflects receiver spread of -12 bp and imputed initiator costs of -13 bp. Thus, the losses attributable to higher adverse selection risk borne by receivers are nearly offset by the liquidity premium that is avoided by not participating as initiator.

These results highlight the necessary conditions for a well-functioning block market. They suggest that when information asymmetry reaches an excessive level, potential receivers might choose to abstain from participating in block trades. Further, these results support Burdett and O'Hara's (1987) theoretical prediction that receivers lose money on informed blocks, but despite such losses, participation can be optimal.

7. Disclosure of Trading Information and Receiving Investors Outcomes

The results thus far suggest that being a counterparty to a block dealer is an optimal strategy for investors interested in building or reducing a large position. One driver of receiver outcomes is the trading environment, which potentially confers information advantages on dealers over receivers during bilateral negotiations. In this section, we study regulatory rules concerning the disclosure of trade information. During our sample period, the corporate bond market was subject to numerous regimes of post-trade

[19] Our methodology is similar except we estimate the regression model in Appendix Table V Column (5) of block initiator costs on bond and market controls for block buys then use the parameter estimates from this model to obtain predicted initiator costs for the offsetting trades of block sells. Similarly, we obtain predicted initiator costs for the offsetting trades of block buys by using parameter estimates generated from the model in Appendix Table V Column (10) which regresses block initiator costs on bond and market controls for block sells.

reporting rules. The regulatory initiatives have generally led to greater transparency but also controversy, as many industry groups have opposed timely reporting of block trades.

7.1. Introduction of Mandatory Trade Reporting

We study the introduction of mandatory post-trade reporting in corporate bonds; specifically, the sample of non-public 144A bonds in 2014 and public bonds with staggered trade reporting in 2003 and 2004. The dissemination dates for the 2003 sample, 2004 sample and 144A sample of bonds are March 3, 2003, October 1, 2004, and June 27, 2014, respectively. For each sample, we study a 16-month period before and after the initiation of trade reporting.[20] For a bond to be included in our sample, the bond must have at least one block trade in the period before and after transparency. We retain block trades that are not marked as agency trades, not identified as pre-arranged by our algorithm, have a block trade price of at least $5.00 and have non-missing trading cost measures. These filters yield 622 block trades in 132 issues for 2003 sample, 863 block trades in 192 issues for 2004 sample, and 912 block trades in 183 issues for 2014 sample.

Table VI reports the results of the impact of mandatory trade reporting on block initiator costs, dealer spreads, and receiver spreads for our combined sample of block trades. Panel A reports univariate analysis of trading costs before and after TRACE initiation while Panel B reports similar analyses in a multivariate setting. *Post-Transparency* is an indicator variable that equals one for block trades in the period after trade report initiation and equals zero otherwise. Regressions include issue fixed effects, trade-level controls (the natural log of trade size, whether the intermediary is a small dealer) and market controls (the trailing weekly corporate bond market index return, trailing weekly S&P index return, the change in the average three-month LIBOR interest rate, and the change in the VIX index over the previous week) and standard errors are clustered at the issue level. We report dependent variable averages above the regression results and *p*-

[20] For bonds with TRACE initiation in March 2003, the period before transparency is restricted to 8 months, as the TRACE system was implemented in July 2002. We therefore selected the period after transparency to be 8-months, and to stay consistent, selected a 16-month window for all three sample. Specifically, for bonds with TRACE initiation in March 2003, we study the 16-month period between July 2002 (when TRACE was implemented) and October 2003 and define the period on or after March 2003 as post-TRACE. For bonds with TRACE initiation in October 2004, we study the 16-month period between February 2004 and May 2005, and define the period on or after October 2004 as post-TRACE. For 144A bonds with TRACE initiation in June 2014, we study 16-month period between November 2013 and February 2015, and define the period on or after June 2014 as post-TRACE.

Values below the regression coefficients.

Theoretical models (e.g., Pagano and Roell, 1996; Green et al., 2007) predict that opaque markets create opportunities for dealers to exploit their information advantage over customers. The univariate results in Table VI Panel A suggest that dealer spreads for facilitating blocks decline after mandatory trade reporting, from 22 bp to 18 bp, while regression results in Panel B, column (3) point to a 7 bp reduction in dealer spreads. In both panels, the decline is statistically significant and economically large, as 7 bp reflects about a third of the dealer spreads (22 bp) before trade reporting was introduced.

For block initiators, trade execution costs in Panel A, column (1) are not statistically different before and after trade reporting is introduced, averaging about 19 bp, and in Panel B, column (1), the coefficient on *post-Transparency* is not statistically significant. Therefore, greater transparency, despite reducing dealer spreads, had no impact on trade execution costs for one type of block market customer: the initiator.

Receiving investors are the primary beneficiaries from greater transparency in the block market. Receiver spreads increase, as reported in Panel A, column (5), from a -10 bp before trade reporting to -2 bps after trade reporting. The regression coefficient in Panel B, column (5), points to a statistically significant increase at the 10% level in the multivariate analysis. The increase of 12 bp is economically large relative to receiver spreads of -10 bps before transparency.

Prior studies have broadly concluded that trade report initiation in the corporate bond market leads to reduced deader spreads and improved trade execution costs for customers.[21] However, our study contributes to this literature by showing that the impact of transparency varies among customers based on their level of information. Our results show that mandatory reporting primarily benefits less-informed customers, while its effects on better-informed customers in the block market remain relatively unchanged.

We further investigate whether dealers, in response to reduced spreads, withdraw after transparency is introduced from the block market. In both univariate and multivariate tests (See Appendix Table VI), block volume relative to total volume does not decline; [22] however, dealers do offset a larger portion of the

[21] See, e.g., Edwards et al. (2007), Bessembinder et al. (2006), Goldstein et al. (2007), and O'Hara et al. (2018).
[22] The analysis in Appendix Table VI is based on block activity during a cusip-week average. The control variables in Panel B, column (1) regression are the trailing weekly S&P index and the change in average three-month LIBOR interest rate and VIX index over the previous week. The model is estimated with issue fixed effects and standard errors

block within the block week and are more likely to fully offset the block position. Thus, with introduction of trade reporting, dealers continue to intermediate blocks, but appear more sensitive to inventory risk, leading them to speed up the offsetting activity.

7.2. Within Block Analysis: Dispersion in Receiver Spreads

Figure 6.A reports a histogram of the dispersion in receiver spreads within a block. The analysis is based on 148,601 block trades of at least $15 million that are associated with two or more receiver trades. In comparison to average receiver spreads of -3 bp, as reported in Table III, the dispersion in receiver spreads averages 25 bp. About 19% of blocks exhibit dispersion of 10 to 20 bp, while about 40% exhibit dispersion of 20 bp or more. These results point to economically large differences (within a block) on terms of receiver trades. Figure 6.B shows that dispersion in receiver spreads is prevalent across all block sizes.

In Figure 7, we examine whether, for a block trade, terms vary with the receiver's position within a sequence of offsetting trades. This analysis could provide insights into whether specific strategies result in more favorable terms for receiving investors. Using trade execution timestamp for the full sample of block trades, we calculate the average receiver spreads for the first, second, third, fourth, and "fifth and higher" offsetting trades within a block. Figure 7 shows that receiver trades earlier in sequence earn negative spreads while those later in sequence earn positive spreads. This pattern supports the Keim and Madhavan (1996) prediction that the dealer will first offset the block position with the most interested receiving investors who are more likely to accept worse terms of trade. However, a second explanation is based on the timing of the public disclosure of the block trade, which we explore in the next section.

7.3. Within Block Analysis: Trade Reporting Delay and Receiving Investor Spreads

As per regulatory rules, the bond dealer is required to report the trade (customers do not report trades) to FINRA's TRACE system, which disseminates the trade information, including price and size, immediately upon receipt of a trade report from a dealer to the marketplace.[23] Notably, the dealer is allowed

clustered at issue level. Columns (2)-(4) include additional controls - the natural log of trade size, bond age, indicators for on-the-run bonds and block trades intermediated by small dealers, the trailing weekly corporate bond market index return, trailing weekly S&P index return.

[23] FINRA currently applies dissemination caps to large-size trades in corporate bonds. Reports for trades at or below the dissemination caps includes both the price and trade size while reports for trades above the dissemination caps

a delay between the execution of the trade and the reporting of the trade to FINRA's TRACE system. The reporting delay allows the block dealer to retain private information partially observed during bilateral negotiations with the initiator, and to potentially offset a portion of the block with receiving investors before the public reporting of the block. Back et al. (2020) predicts that receiving investors obtain better terms on offsetting trades that occur after versus before the report of a block trade.

In this section, we study the impact of the rules pertaining to maximum stipulated time delay in reporting trades to the TRACE system. During our sample period, FINRA shortened the reporting delay in three stages, from 75 minutes to 45 minutes, to 30 minutes, to the current 15 minutes. We examine block trades during these four reporting regimes: July 2002-September 2003 when trades were required to be reported within 75 minutes; October 2003-September 2004 when trades were required to be reported within 45 minutes; October 2004-June 2005 when trades were required to be reported within 30 minutes; and July 2005-June 2006 when trades were required to be reported within 15 minutes.

For this analysis, we start with our original sample of 205,104 block trades, then exclude block trades that are reported more than 24 hours after the execution timestamp of the trade (these are likely errors) and blocks trades for bonds that were not yet eligible in each regime for TRACE-dissemination. We retain block trades with at least one receiver trade both before and after the block trade report timestamp. [24]

For each reporting regime, we calculate separately the cost measures for receiver trades with an execution timestamp prior to and after the block report timestamp. Dealer and receiver spreads are calculated using trade-size weighted average prices, resulting in two observations for each block trade. This setting allows a control for trade-specific, bond-specific, and market-wide factors on the spread measures.

The results are reported in Table VII Panel A. The decline in dealer spreads on offsetting trades that occur after relative to those before the report of the block trade can be observed for all reporting regimes

include the price and capped trade size ("5MM+" (for IG) and "1MM+" (for non-IG)). The uncapped trade size is later published as part of a historical dataset six months after the calendar quarter in which they are reported. Hollifield et al. (2020) conclude that reporting caps are not particularly important in the presence of price reports.

[24] After removing bonds that are not TRACE eligible, we have 184,498 block trades over the sample period 2002-2021. Of this sample, 109,826 (59.4%) do not have an offsetting trade before block trade report and 18,034 (10%) do not have an offsetting trade after block trade report. Appendix Table VII presents the results analogous to Table VII Panel A without imposing the filter of a trade both before and after the block trade report. We find the results are qualitatively similar to Table VII.

and range from 5 bp to 11 bp. For example, in the July 2002-September 2003 regime reported in column (1), dealer spreads decline from 30 bp to 22 bps. The patterns in receiver spreads mirror those observed for dealer spreads, yet with an opposite sign. In the July 2002-September 2003 regime, receiving investors lose 16 bp on offsetting trades that occur prior to block trade report, but lose only 7 bp on offsetting trades that occur after block trade report, an improvement in trade terms of about 50%. These improvements can be observed for receiver spreads across all reporting regimes and range from 5 bp to 11 bp.

Table VII Panel B reports on the impact of block trade report on dealer and receiver spreads in a multivariate setting. Again, we study within-block differences in spread measures using receiving trades that execute before and after the report of block trade. 'Trades after report' is an indicator variable that equals one for receiver trades after block trade report and equals zero otherwise. All regressions are estimated using block-level fixed effects, and in columns (2) and (4), we include controls for the average offsetting trade size and the percentage of offsetting trades with a customer before and after the block trade report. We report dependent variable averages at the top of the regression and *p*-values below coefficients.

Results in Panel B column (1) suggest that dealer spreads, on average, are reduced by 7.5 bp on offsetting trades that occur after versus before block trade report. Dealer spreads average 20 bp for this sample of block trades, implying that the reduction is economically large. The results in column (3) suggest that receiving investors obtain better terms when they participate in offsetting trades that occur after the report of the block trade. Receiver spreads average -6 bp for our sample of block trades, implying the reduction of 7.5 bp is economically large.

Our analyses offer empirical support for the primary mechanism envisioned in theoretical models on how greater transparency levels the information playing field. In these models, receiving investors are informationally disadvantaged during bilateral negotiations with the dealer. Timely reporting of the block trade allows receiving investors to whom the dealer distributes the block to account for the potential adverse price move of a block trade.

7.4. Reporting Delay Regimes and Dealer Behavior

The results thus far show that dealer spreads are smaller on offsetting trades that occur after block trade report. In Table VIII, we study the trading behavior of the block dealer during the four reporting delay

regimes. The sample is constructed based on the screens described for Table VII with one exception--we do not require an offsetting trade in both the period prior to and after the block trade report. Panel A reports statistics on compliance with the reporting rule. In the July 2002-September 2003 regime, 92% of trades are reported within the stipulated maximum delay of 75 minutes, but only 70% are reported within 15 minutes. As the stipulated maximum delay drops over time to 15 minutes, 90% of trades are reported within the stipulated period. Thus, dealers respond to changes in reporting rules with trade reports that are less delayed, as intended by regulators.

Dealers are strategic about the speed with which they offset the block position. In all four reporting regimes, dealer offsets about 20% of the block position before block trade report. In other words, as stipulated maximum reporting delay for the block trade declines from 75 minutes to 15 minutes, dealers offset the block position at a faster rate, potentially to obtain better terms on receiver trades before the block trade is made public. Within the block week, dealers offset about half the block position and about 30% of blocks are fully offset in all four regimes.

Panel B reports results of dealer behavior in a multivariate setting. The indicator variables capture whether the block trade occurred during the 45-minute, 30-minute, or 15-minute reporting regime. The 75-minute regime serves as the reference period in the regressions. Regressions are estimated over the July 2002-June 2006 period.[25] Column (1) shows no material reduction in block activity following the shift from 75 to 45-minute and from 45 to 30-minute, and a reduction of 0.4 (about 12%) from 30 to 15-minute reporting regime. Results in columns (2) and (3) suggest that reductions in maximum stipulated reporting delay do not significantly change dealers offsetting behavior over the window of a block week. Importantly, in column (4), the coefficient on *% Offset Volume Before Report* is not statistically different across the regimes even though, as seen in Panel A, the average block trade reporting delay declines from 25 minutes in the July 2002-September 2003 regime to 14 minutes in the July 2005-June 2006 regime. Together, these

[25] Regressions include trade-level (except the regression in Column (1)) and issue-level (the natural log of trade size, bond age, issue size, and indicators for bonds issued by financial firms, on-the-run bonds, and block trades intermediated by small dealers) and market controls (the trailing weekly corporate bond market index return, trailing weekly S&P index return, the average three-month LIBOR interest rate, and the VIX index over the previous week) and are estimated using robust standard errors. Regressions in Column (1) are based on cusip-week trading activity and do not include trade-level or small dealer controls.

results suggest that dealers strategically speed up the offset activity of the block position as the reporting delay shortens in three stages.

7.5. Is Late Reporting Strategic?

The results thus far indicate that roughly 10% of the block trades in each reporting regime are not compliant with the reporting rule. If non-compliance (i.e., report "late") is strategic, i.e., to withhold valuable information that benefits the dealer in bilateral negotiations with receiving investors, then it should be observed more often for larger blocks. On the other hand, non-compliance due to other (e.g., back-office staffing, or slow systems) constraints should have no relation to block size.

In Table VIII Panel A, we report the non-compliance statistics by block size during the four reporting regimes. For blocks of at least $15 million, a material 8-10% of blocks in all four regimes are not in compliance with reporting rules while for mega blocks of at least $30 million, the non-compliance rate is 10% to 13%. For comparability, we examine non-compliance for all TRACE trades, including the very smallest trades, and find only 4-7% are reported outside of stipulated maximum delay. Porter and Weaver (1998) use out-of-sequence equity market NASDAQ trades to identify late reporting, arguing that dealers strategically delay reporting of equity trades that are information motivated. Our results suggest that non-compliance appears more often for mega blocks where benefits to the dealer are potentially larger.

Dealers may also strategically report within the stipulated time but not immediately (i.e., report "slow"). Appendix Figure 2.a shows a histogram of block trades that are reported within 0-1 minutes, 2-14, 15-29, etc. for the four reporting regimes. A large majority of blocks are reported immediately (within 1 minute), but still many blocks are reported with a longer delay. For the 75-minute regime, 30% of blocks are reported beyond 15 minutes; for the 15-minute regime, 38% of blocks are reported with a delay of two minutes or longer.

In Table IX, we provide evidence that those blocks with longer reporting delay are typically "more difficult" blocks. We compare "fast" reports (i.e., reported within two minutes of execution) to "slow" reports (i.e., reported within the last five minutes of stipulated time) and "late" reports (i.e., outside regulation). Table IX shows that relative to fast reports, slow and late reports tend to be associated with larger block sizes, mega blocks, and block buys (i.e., higher adverse selection). Smaller dealers, who likely

have more difficulty placing the bonds, are significantly more likely to delay trade reporting. Finally, dealer benefits from the additional time that is available with delayed reporting, as evidenced by the higher percentage of the block position that is offset.

8. Conclusions and Implications

This study highlights the important role played by receiving investors in the corporate bond block market. We test theoretical predictions regarding the impact of the information environment on receiving investors, a topic that has received less attention in the literature. Our analysis is based on a comprehensive sample of 205,104 block trades and 690,418 receiver trades in corporate bonds over the period 2002 to 2021. We find that receiving investors, the least informed party within the block trade process, largely lose from participating as a counterparty to information-based trades, whereas dealers, who observe trade terms and initiator identity are often able to anticipate informed trading and manage adverse selection risk.

We exploit regulatory changes over a two-decade period governing the mandatory disclosure of trading information. This includes the introduction of TRACE trade reporting and changes to the maximum permissible delay between trade execution and reporting by the dealer. Both analyses show that receivers losses are tapered in trading environments with reduced information asymmetry in the block trading process—receiving investors are better able to anticipate information effects and mitigate the adverse selection risk when they can observe trade terms.

Even though they are institutions, receiving investors often lose by serving as a counterparty to a block trade. So why do they participate? We show that participation represents a reasonable strategy, as their costs are either substantially lower (for building a position) or roughly equivalent (for liquidation a position) to the costs of initiating a trade of similar size. These findings offer direct empirical support for the Burdett and O'Hara (1987) model and demonstrate the block market's appeal to receivers seeking to either establish or liquidate a large position. Our results indicate that regulations that worsen receiving investors' information set may have a significant impact on the size of the block market—receivers participate when the expected losses due to adverse selection are lower than the cost of initiating a trade of similar size.

Despite the broader movement toward greater transparency in fixed income markets, regulators have considered proposals in recent years to delay the reporting of block trades in the corporate bond and swap markets. For example, in June 2019, FINRA proposed a pilot program to delay the report of a corporate bond block trade from 15 minutes to 48 hours, following the recommendation put forth by SEC's Fixed Income Market Structure Advisory Committee (FIMSAC). Much of the regulatory discussion has focused on the potential benefits for block initiators and dealers. Proponents of delayed block reporting argue that it provides dealers with more time to offset positions and that block initiators may receive better trade terms from dealers in the block market.

This study presents relevant evidence on the economic factors that explain the widespread support for the proposal from the dealer community.[26] We offer empirical support for the specific mechanism proposed by theorists, showing that trade disclosure partially reveals the dealer's private information, thereby reducing the dealer's ability to extract profits from receivers. Our analyses indicate that extending the delay for block trades will increase dealers' spreads and have a clear detrimental impact on receiving investors in the block market. Finally, we show that block market activity remains stable even as transparency increases, implying that dealers do not withdraw from the market. Instead, dealers offset the block position at a faster rate when trade reporting is timelier.

Notably, in October 2022, FINRA invited comments on a proposal to reduce the maximum stipulated trade reporting delay to no later than one minute after trade execution in various fixed income markets. To offer timely guidance for this proposal, we examine the block market for the most recent year, 2021, and find that dealer behavior during this period closely resembled the behavior during the regime from July 2005 to June 2006, both of which operated under a 15-minute reporting requirement.[27] Appendix Figure 2.b illustrates a histogram of the distribution of block trade reporting delays in 2021. It shows that

[26] See SIFMA's comment letter on the proposed pilot: https://www.finra.org/sites/default/files/2019-06/19-12_Sifma_Comment.pdf

[27] Specifically, in Table VIII, the average reporting delay is 14.6 minutes vs. 13.7 minutes; the percentage of block trades that are in reporting compliance is 93% vs. 90%; the percentage of block volume offset within the block week is 64% vs. 54%; the percentage of block trades that are fully offset within the block week is 40% vs. 34%; and the percentage of block volume offset before the block trade is publicly reported is 20% for both periods. In column (5) in Table VII, we report that, in 2021, dealer spreads decline by 2 bp and receiver spreads increase by 2 bp for offsetting trades that occur after relative to before the report of the block trade.

62% of blocks were reported immediately, while the remaining 38% had delays of two minutes or more, similar to the distribution from July 2005 to June 2006.

Our analysis suggests that shortening the reporting delay to one minute after block trade execution will provide receivers with more information during their negotiations with dealers. However, we also document a consistent preference among dealers, possibly due to inventory risk considerations, to offset around 20% of the block position before the block trade is reported, across all reporting regimes. Additionally, we find that smaller dealers are significantly more inclined than larger dealers to report trades with longer delay. Therefore, regulators must carefully weigh whether the one-minute reporting regime allows sufficient time for dealers, especially smaller ones, to effectively manage block positions, and if not, how it may affect the dealers' willingness to intermediate blocks in a principal capacity. The findings of our study are also relevant for regulatory efforts concerning the disclosure of aggregate trading volume data of U.S. Treasury securities and OTC U.S. equity markets.

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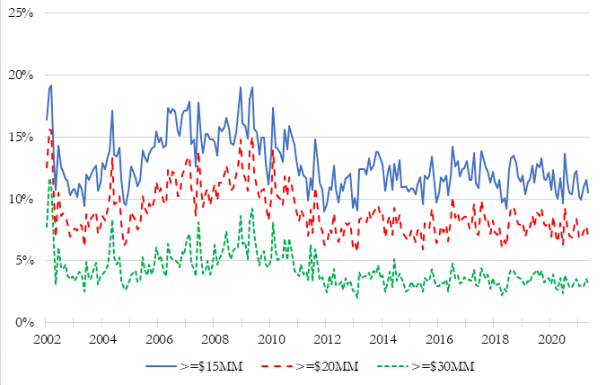
Figure 1

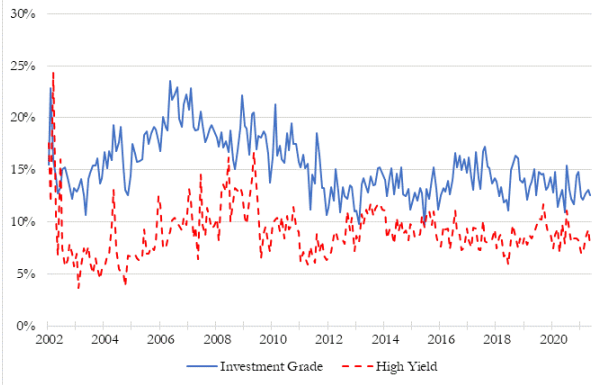
Block Trading Activity 2002-2021

These figures show block trading statistics over the July 2002 to November 2021 sample period. Figure A shows block trading volume relative to total volume for blocks that exceed $15 million (blue solid), $20 million (red long dash), and $30 million (green short dash). Figures B and C show block trading volume (>=$15 million) relative to total volume for investment grade (blue solid) and high yield (red long dash) bonds and for blocks intermediated by large (blue solid) and small (red long dash) dealers, respectively. Figure D shows the percentage of block trades that are prearranged, defined as blocks that are offset in a single trade within 15 minutes.

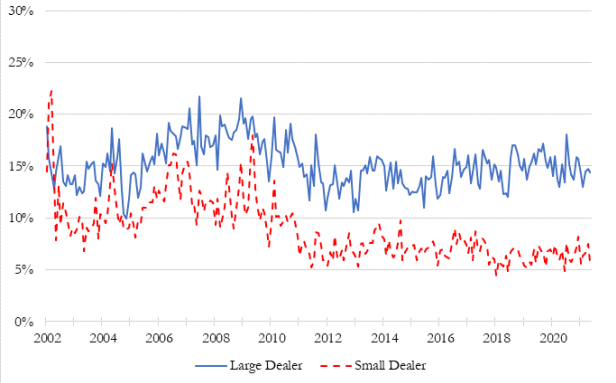
A. Block Size



B. Investment Grade vs. High Yield



C. Large vs. Small Dealer



D. % of Block Trades Prearranged

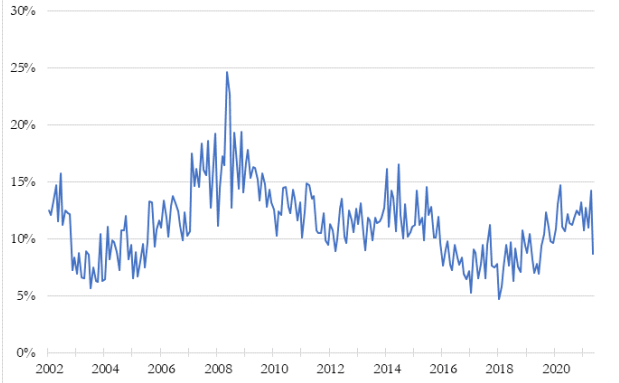
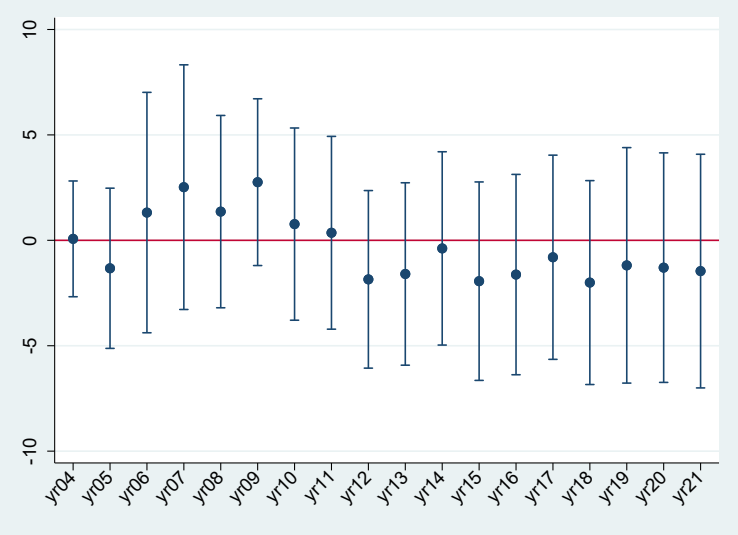


Figure 2

Block Trading: Year Effects

These figures show the coefficients on year dummies for regressions of block activity on issue characteristics and market conditions. Regressions report Newey-West standard errors. Circles represent the regressions coefficients and bars represent the 95% confidence interval. Years 2002 and 2003 are omitted in the regressions. Figure A shows the results when block trading relative to total volume is the dependent variable (reported as a percent). Figure B shows the percent of block trades that are prearranged, defined as blocks that are offset in a single trade within 15 minutes. For both figures, blocks are defined as trade sizes of at least $15 million. Data are organized on a weekly basis and regressions include 1,023 observations. Regression controls include log age, log issue size, and the percentage of traded bonds that are high yield, financial sector, and 144A bonds, and the trailing weekly corporate bond market index return, the trailing weekly S&P index return, the average three-month LIBOR interest rate, and the level of the VIX index over the preceding five days.

A. Block Volume / Total Volume



B. % Block Prearranged

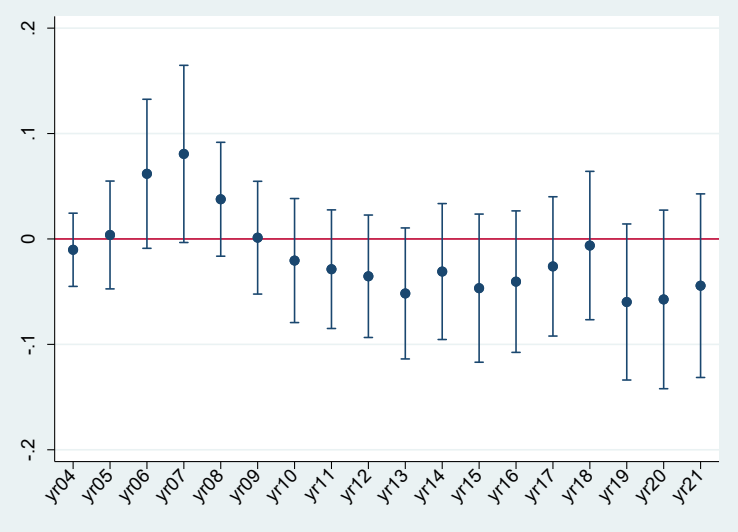
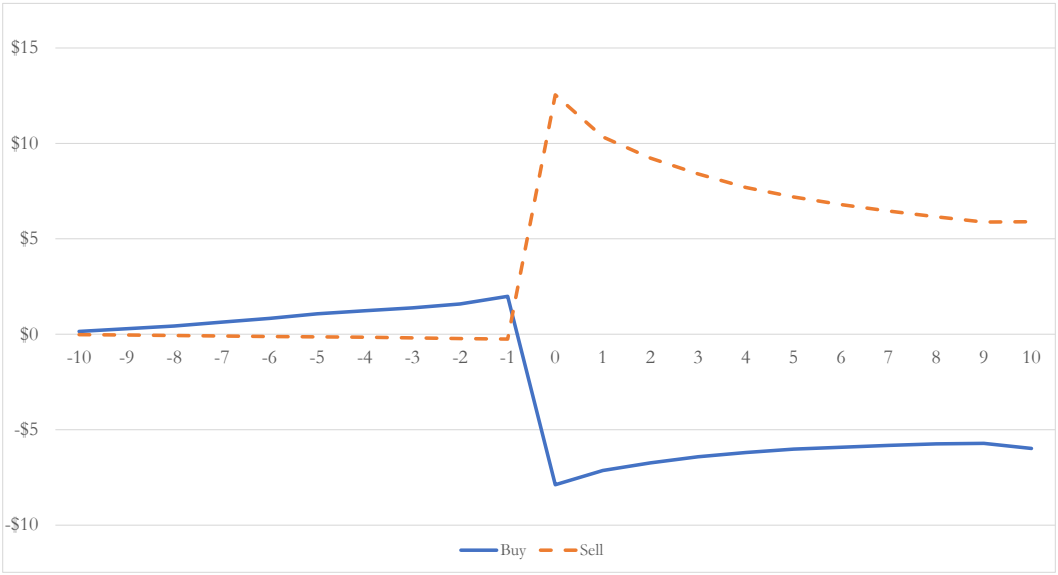


Figure 3

Dealer Inventory in Block Bond

This figure reports the mean and median signed end-of-day cumulated intermediating dealer inventory in the block bond starting ten days prior to the triggering block (time 0) and ending ten days subsequent (day 10). The analysis is based on the sample of 205,104 reported in Table 1. Orange dash lines represent customer block sells and blue solid lines represent customer block buys.

Mean signed end-of-day cumulated intermediating dealer inventory



Median signed end-of-day cumulated intermediating dealer inventory

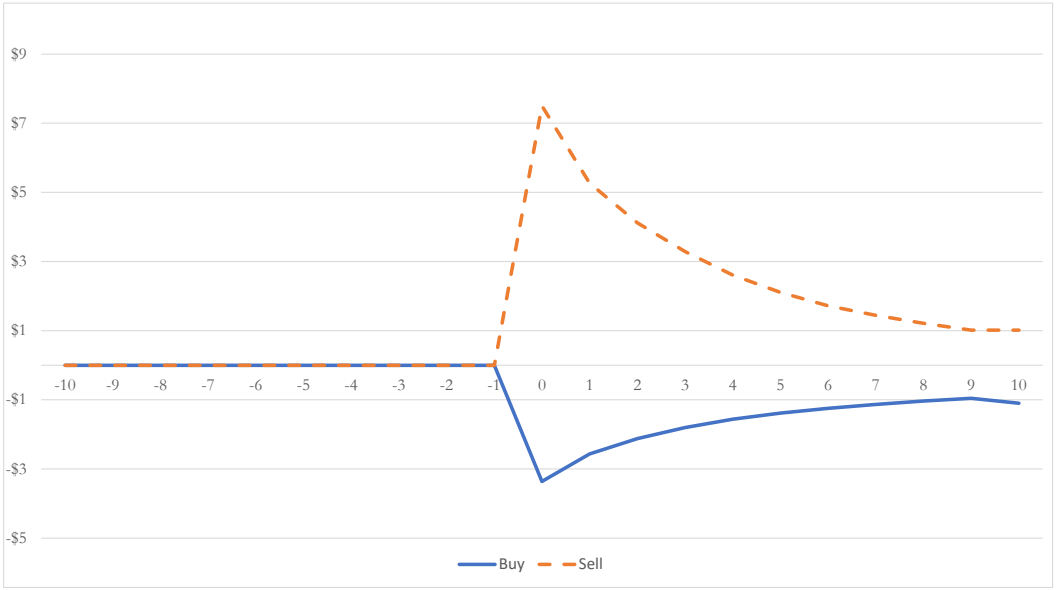
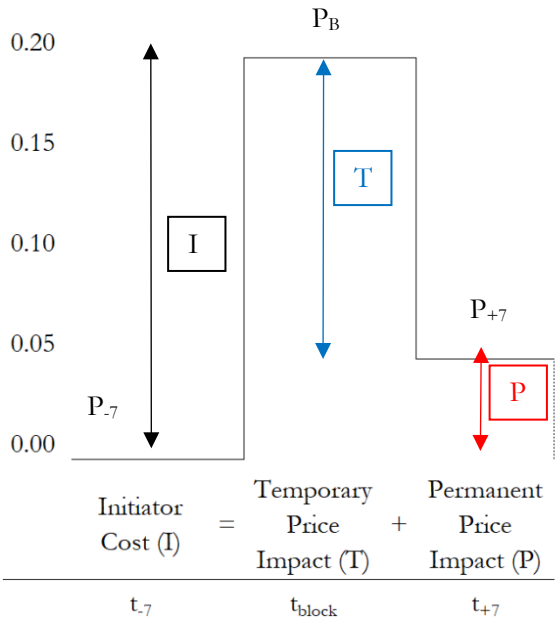


Figure 4

Decomposition of Block Initiator Costs

This figure shows the decomposition of block initiator costs for a hypothetical block buy by a customer at price P_B at time t_{block}. The bond trades at P_{-7} the week prior to the block trade at t_{-7} and at P_{+7} the week subsequent to the block trade at t_{+7}. The intermediating dealer offsets the block trade at a weighted-average buy price P_{Offset} at time t_{offset}. In Panel A, block initiator costs of 20bp are decomposed into a temporary price impact component (15bp) and a permanent price impact component (5bp). In Panel B, block initiator costs of 20bp are decomposed into two temporary price impact components, dealer spread (5bp) and receiver spread (5bp), and a permanent price impact component (5bp). The decomposition of a hypothetical block sell by a customer is analogous except reversed.

A. Temporary & Permanent Component



B. Dealer, Receiver & Permanent Component

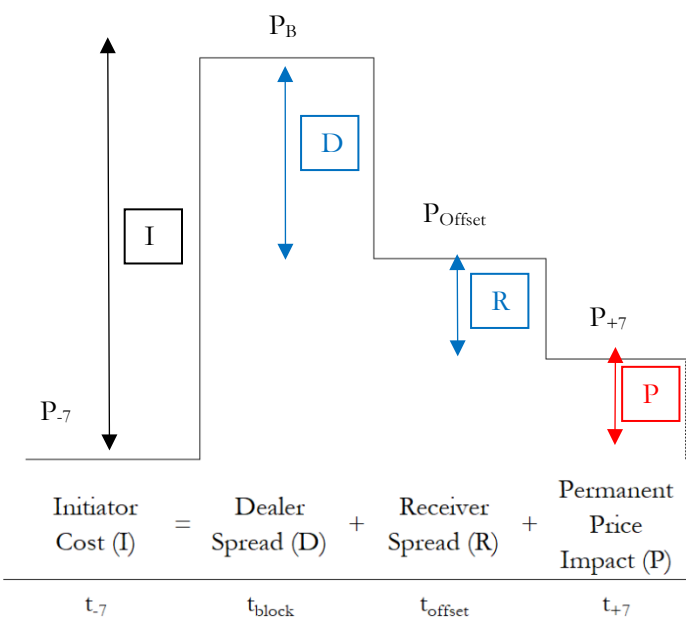
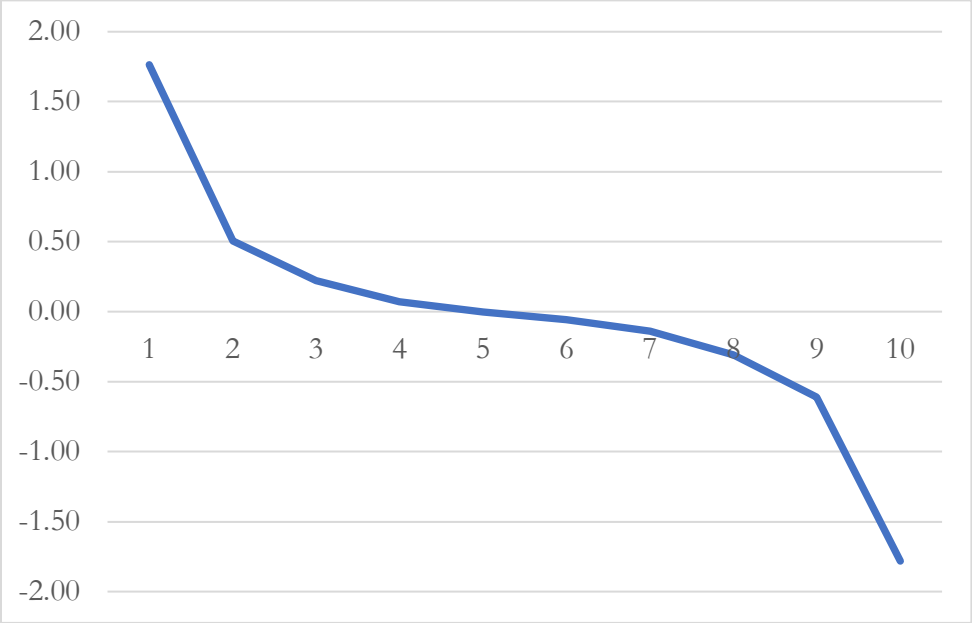


Figure 5

Receiving Investor Spreads by Ex-Post Permanent Price Impact

This figure reports average spreads for each ex-post permanent price impact decile, where decile 1 captures the lowest price impact and decile 10 captures the highest price impact decile. This figure is constructed using the full sample of 205,104 block trades of at least $15 million. Panel A reports receiving investor spreads and Panel b reports dealer spreads.

A. Receiving Investor Spreads



B. Dealer Spreads

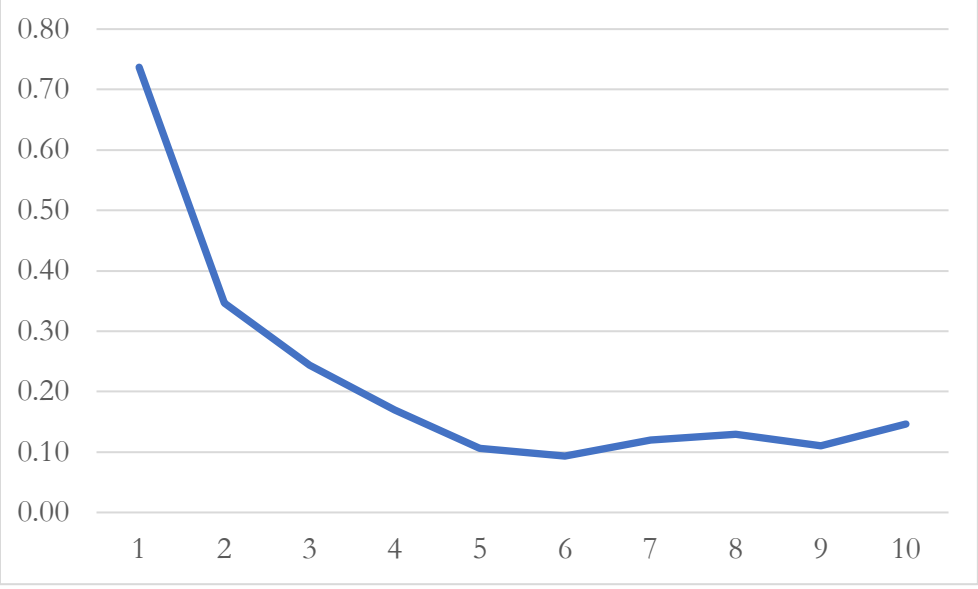
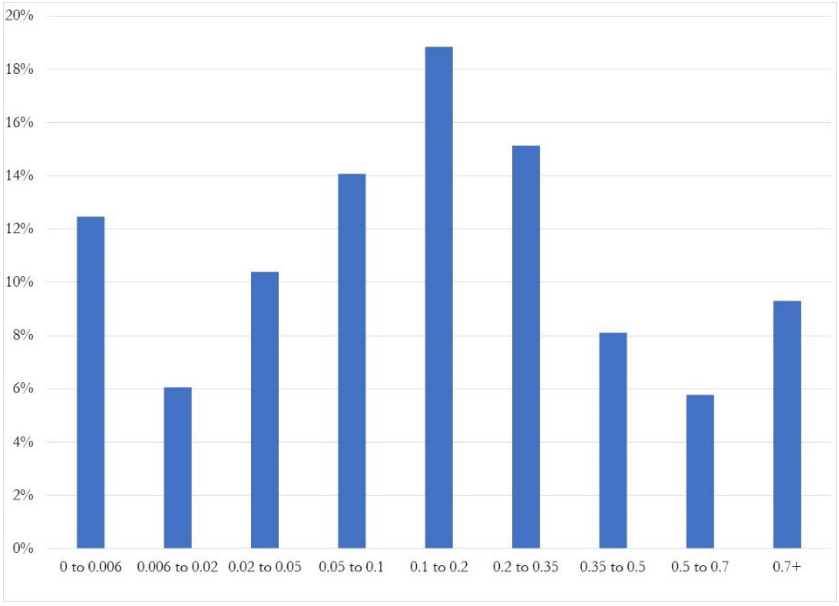


Figure 6

Dispersion in Receiving Investor Costs

These figures report the dispersion in receiving investor spreads for block trades (of at least $15 million) with at least two offsetting trades. Of the 205,104 blocks, 148,601 blocks have more than one offsetting trade. Of the 205,104 blocks, there are 690,418 receiving investor trades. Panel A reports a histogram of within-block standard deviation for the sample of 148,601 blocks. Panel B reports within block standard deviation for five block size definitions.

A. Histogram of Within-Block Dispersion



B. Dispersion by Block Size

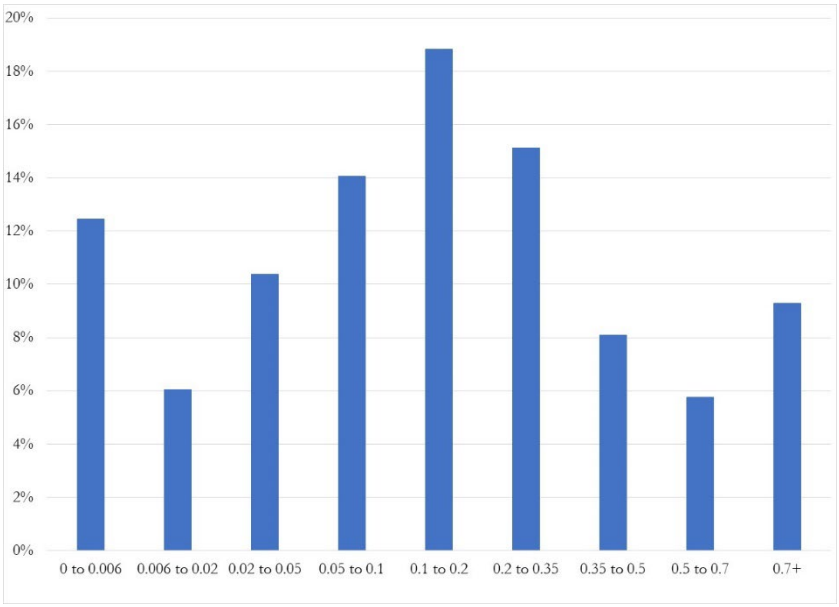


Figure 7

Receiving Investor Spread by Trade Sequence

These figures report the receiving investor spread by trade sequence for the full sample of 205,104 block trades of at least $15 million. We report mean receiving investor spreads for the first, second, third, and fourth offsetting trades and for the fifth and higher offsetting trades.

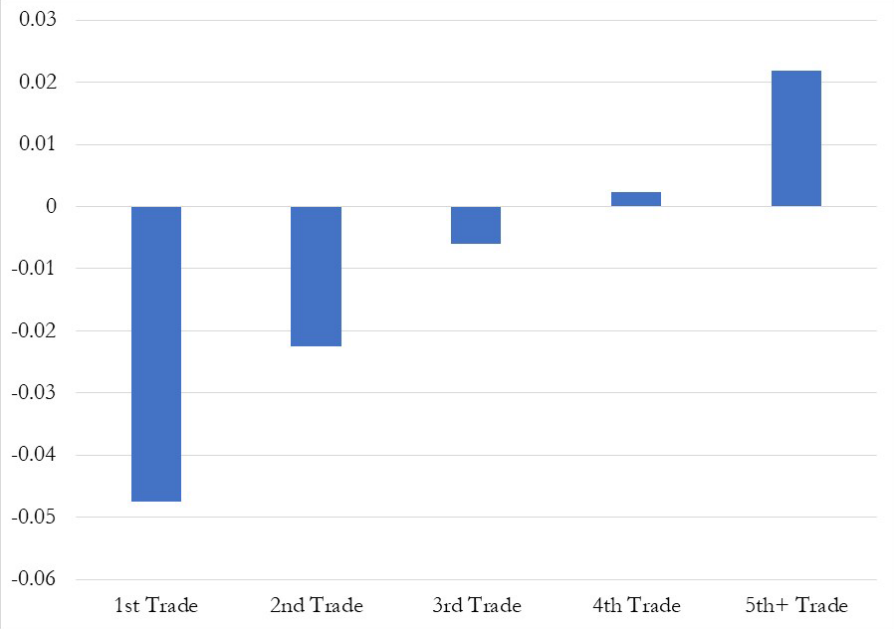


Table I
Block Trade Sample Description

Panel A summarizes the sample construction. Corporate bond trade data are from TRACE (Trade Reporting and Compliance Engine) and bond descriptive data are from the Mergent Fixed Income Securities Database (FISD). The sample period is July 2002 to November 2021. Our final sample consists of 38,762 cusips and 138,526,671 trades. Panel B describes the sample of block trades for four definitions of blocks. We only retain block trades with non-missing block cost measures. We exclude block trades that are fully offset by the block dealer in a single trade within 15 minutes, with cost measures that exceed $50, and with prices below $5.00.

Panel A: Sample Construction

	# Cusips	# Trades
Corporate bonds in FISD After FISD cleaning	55,842	
Corporate bonds in TRACE and FISD	39,801	147,886,718
Exclude bonds having less than 5 trades over the sample period	39,147	147,885,137
Exclude trades with a trade size > issue size	39,143	147,882,961
Exclude primary market transactions	39,106	146,212,835
Exclude trades reported after amount outstanding falls to zero	38,863	145,987,174
Exclude trades reported by dealer w/ offshore trades	38,861	143,677,740
Exclude trades immediately following offering date	38,767	138,528,434
Exclude 2002 trades with pre-July execution dates	38,762	138,526,671

Panel B: Sample Description

	Block >= $15M	Block $15M - $20M	Block $20M - $30M	Block >= $30M
# Observations	205,104	106,157	92,990	35,341
Investment Grade	146,052	73,286	67,015	26,160
High Yield	59,052	32,871	25,975	9,181
Large Dealer Counterparty	163,940	85,086	74,292	27,983
Small Dealer Counterparty	41,164	21,071	18,698	7,358
Average Block Size ($)	22,631,802	16,162,489	22,595,263	44,400,226
Single Block Size/Total Bond-Level Volume for Day	51%	48%	50%	53%

Table II

Receiving Investor Trade Sample Description

This table reports receiving investor trade sample statistics. Panel A reports the sample size of receiving investor trades and the number of block trades with more than one offsetting receiving investor. Panel B reports receiving investor trade size statistics. Panel C reports statistics on the total amount of block offsets by receiving investors. Panel C statistics are computed at the block-level then averaged across all blocks. We report statistics for block trades that exceed $15 million.

	Block >= $15M	Block $15M - $20M	Block $20M - $30M	Block >= $30M
Panel A: Sample Statistics				
# Block Observations	205,104	106,157	92,990	35,341
# Receiving Investors	690,418	326,626	318,584	142,617
# Offsetting Trades by Receiving Investors Days [1,5]	3.37	3.08	3.43	4.04
# Block Observations w/ Multiple Receiving Investors	148,601	73,712	67,757	27,299
% Block Observations w/ Multiple Receiving Investors	72%	69%	73%	77%
% Offsetting Trades w/ Customer Receiving Investors	71%	72%	71%	74%
Panel B: Receiving Investor Trade Size Statistics				
Receiving Investor Trade Size	8,913,353	7,730,210	9,798,451	15,572,302
% Receiving Investor Trades >= $15M	22%	21%	26%	35%
Distribution by Trade Size				
=<$100K	17%	18%	17%	15%
>$100K - <$1M	17%	17%	16%	15%
>=$1M - <$5M	26%	27%	26%	23%
>=$5M - <$10M	17%	18%	17%	16%
>=$10M - <$15M	11%	11%	11%	10%
>=$15M	12%	10%	14%	20%
Panel C: Amount of Offsets				
% Offset in Days [1,5]	64%	64%	64%	67%
% Fully Offset in Days [1,5]	41%	44%	42%	42%

Table III
Block Trading Cost Decomposition

This table reports mean summary statistics of block trading costs. We examine block trades that exceed $15 million, greater than or equal to $15 and less than $20 million, greater than or equal to $20 million and less than $30 million, and greater than or equal to $30 million. Panel A reports block initiator costs. In Panel B, we decompose block initiator costs into a permanent price impact and temporary price impact component. In Panel C, we decompose block initiator costs into three components: 1) the permanent price impact and the two components of temporary price impact, 2) dealer spread, and 3) receiving investor spread. In Panel D, we report trading cost estimates for investment grade and high yield bonds for the sample of block trades of at least $15 million. Initiator cost is defined as the log difference between the price of the bond one week prior to the block trade and the block price. Permanent price impact is defined as the log difference between the price of the bond one week following and one week prior to the block trade. Temporary price impact is defined as the log difference between the price of the bond one week following the block trade and the block price. Dealer spread is the log difference between the weighted average price that the dealer offsets the block trade and the block price. Receiving investor spread is the log difference between the price of the bond one week following the block trade and the weighted average price that the dealer offsets the block trade. The unit of analysis is at the individual block-level. Variables are winsored at the 1% and 99% levels.

Panel A: Block Initiator Costs					
	Block >= $15M		Block $15M - $20M	Block $20M - $30M	Block >= $30M
	Mean	Median		Mean	
Block Initiator Trading Cost	0.18	0.08	0.16	0.17	0.21
Panel B: Two-Way Decomposition					
Permanent Price Impact	0.00	0.01	0.00	0.01	-0.01
Temporary Price Impact	0.18	0.06	0.16	0.17	0.23
Panel C: Three-Way Decomposition					
Permanent Price Impact	0.00	0.01	0.00	0.01	-0.01
Dealer Spread	0.22	0.13	0.22	0.22	0.22
Receiving Investor Spread	-0.03	-0.03	-0.06	-0.05	0.00

Panel D: By Credit Rating				
	Investment Grade		High Yield	
	Mean	Median	Mean	Median
Block Initiator Cost	0.16	0.07	0.22	0.10
Permanent Price Impact	0.03	0.02	-0.08	0.00
Temporary Price Impact	0.13	0.05	0.32	0.11
Dealer Spread	0.18	0.11	0.31	0.23
Receiving Investor Spread	-0.05	-0.02	0.01	-0.04

Table IV
Receiving Investor and Imputed Block Cost

This table reports hypothetical block trading costs for the receiving investor. We examine block trades that exceed $15 million, greater than or equal to $15 and less than $20 million, greater than or equal to $20 million and less than $30 million, and greater than or equal to $30 million. The unit of analysis is at the individual block-level. Panels A-D report mean summary statistics of hypothetical block trading costs for the receiving investor for the full sample, investment grade and high yield bonds, and by the number of receiving investor counterparties offsetting the block. To calculate imputed initiator cost, we use the regression coefficients reported in Appendix Table IV Column 1 and replace block size with the weighted average size of the offsetting trades by the receiving investors and the corporate bond index return is measured around the time of the offsetting trades rather than the time of the triggering block trade. We then use the predicted values from this regression to calculate imputed initiator cost. We report imputed costs * (-1) so that receiver spreads are comparable to imputed costs. Receiving investor spread is computed as in previous tables and is the log difference between the price of the bond one following the block trade and the weighted average price that the dealer offsets the block trade. Receiving investor savings is the (pairwise) difference between the imputed initiator cost and the realized receiving investor spread. *** on Receiving Investor Savings indicates the receiving investor spread is statistically different from the imputed cost as a trade initiator.

	Block >= $15M	Block $15M - $20M	Block $20M - $30M	Block >= $30M
Panel A: Full Sample				
Receiving Investor Spread	-0.03	-0.06	-0.05	0.00
Imputed Initiator Cost * (-1)	-0.14	-0.13	-0.14	-0.15
Receiving Investor Savings	0.10***	0.07***	0.09***	0.16***
Panel B: Investment Grade				
Receiving Investor Spread	-0.05	-0.06	-0.06	-0.04
Imputed Initiator Cost * (-1)	-0.12	-0.11	-0.12	-0.13
Receiving Investor Savings	0.07***	0.05***	0.07***	0.10***
Panel C: High Yield				
Receiving Investor Spread	0.01	-0.05	-0.04	0.11
Imputed Initiator Cost * (-1)	-0.18	-0.18	-0.19	-0.21
Receiving Investor Savings	0.19***	0.13***	0.15***	0.32***
Panel D: By # Counterparties				
	1-2 Offsetting Trades	3-5 Offsetting Trades	6-9 Offsetting Trades	10+ Offsetting Trades
Receiving Investor Spread	-0.08	0.00	0.04	0.12
Imputed Initiator Cost * (-1)	-0.15	-0.13	-0.12	-0.11
Receiving Investor Savings	0.07***	0.13***	0.16***	0.22***

Table V

Block Trading Cost Decomposition - Buys vs. Sells

This table reports summary statistics of block trading costs for block buys and block sells by trade size subsamples. We examine block trades that exceed $15 million, greater than or equal to $15 and less than $20 million, greater than or equal to $20 million and less than $30 million, and greater than or equal to $30 million. We decompose block initiator costs into two components: permanent price impact and temporary price impact; we then further decompose temporary price impact into two components: dealer spread and receiving investor spread. The unit of analysis is at the individual block-level. Panel A reports costs reported by trade size subsamples. Variables are winsored at the 1% and 99% levels. Panel B reports summary statistics of hypothetical block trading costs for the receiving investor separately for block buys and block sells. To compute imputed initiator cost, we use the regression coefficients reported in Appendix Table V Columns 1 and 6 and replace block size with the weighted average size of the offsetting trades by the receiving investors and corporate bond index return is measured around the time of the offsetting trades rather than the time of the triggering block trade. We then use the predicted values from this regression to compute imputed initiator cost. Receiving investor savings is the difference between the imputed initiator cost and the realized receiving investor cost. The unit of analysis is at the individual block-level. *** on Receiving Investor Savings indicates the receiving investor spread is statistically different from the imputed cost as a trade initiator.

Panel A: Cost Decomposition					
	Block >= $15M		Block $15M - $20M	Block $20M - $30M	Block >= $30M
	Mean	Median		Mean	
	Block Sells by Customer				
Block Initiator Cost	0.19	0.08	0.17	0.19	0.27
Permanent Price Impact	-0.04	0.01	-0.06	-0.03	-0.03
Temporary Price Impact	0.24	0.08	0.23	0.22	0.29
Dealer Spread	0.23	0.13	0.23	0.22	0.23
Receiving Investor Spread	0.01	-0.01	0.00	0.00	0.05
	Block Buys by Customer				
Block Initiator Cost	0.15	0.07	0.14	0.15	0.10
Permanent Price Impact	0.07	0.03	0.09	0.07	0.01
Temporary Price Impact	0.09	0.03	0.06	0.08	0.10
Dealer Spread	0.21	0.13	0.21	0.21	0.21
Receiving Investor Spread	-0.12	-0.06	-0.15	-0.13	-0.10
Panel B: Imputed Receiving Investor Block Cost					
	Block Sells by Customer				
Receiving Investor Spread	0.01	-0.01	0.00	0.00	0.05
Imputed Initiator Cost * (-1)	-0.19	-0.18	-0.19	-0.18	-0.17
Receiving Investor Savings	0.20***	0.16***	0.19***	0.19***	0.22***
	Block Buys by Customer				
Receiving Investor Spread	-0.12	-0.06	-0.15	-0.13	-0.10
Imputed Initiator Cost * (-1)	-0.13	-0.13	-0.13	-0.15	-0.17
Receiving Investor Savings	0.01**	0.03***	-0.03***	0.01	0.07***

Table VI
Block Trading Costs and Transparency Events

This table reports changes in block costs for bonds that experienced a transparency event. We include three events: 144A bonds that experienced a transparency event in June 2014 and public bonds that experienced a transparency event in March 2003 or October 2004. We focus on the 16-month period surrounding the event and 'Post' refers to trades that occur on or after the transparency event. To be included in the sample, bonds must have at least one block trade in the pre- and post-TRACE period. For both samples, we only retain observations with non-missing block initiator, block dealer, and receiving investor spread and price impact measures. Blocks are trades of $15 million or more. These filters yield 912 block trades for the June 2014 event, 622 block trades for the March 2003 event, and 863 block trades for the October 2004 event. Panel A reports univariate statistics. Column (7) reports the standard deviation (within block) of receiving investor spread for the subsample of block trades that have offsets by multiple receiving investors. Panel B reports multivariate tests. Regressions include trade-level and issue-level (the natural log of trade size and bond age, and indicators for on-the-run bonds and block trades intermediated by small dealers) and market controls (the trailing weekly corporate bond market index return, trailing weekly S&P index return, the change in the average three-month LIBOR interest rate, and the change in the VIX index over the previous week) and are estimated using issue-level fixed effects and standard errors clustered at the issue level. Dependent variable averages for the full sample are reported at the top of the regression and *p*-Values are reported below coefficients. Variables are winsored at the 1% and 99% levels. ***, **, and * indicate statistical signicance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Initiator Cost		Dealer Spread		Receiving Investor Spread		
Panel A: Univariate Statistics							
	Mean	Median	Mean	Median	Mean	Median	Std. Dev
Pre-Transparency	0.18	0.12	0.22	0.19	-0.10	-0.05	0.24
Post-Transparency	0.19	0.08	0.18	0.14	-0.02	-0.03	0.27
Chg.	0.02	-0.05	-0.04	-0.05	0.08	0.02	0.03
Panel B: Multivariate Tests							
Dependent Variable Average	0.18		0.20		-0.06		0.25
Post-Transparency	-0.069		-0.070**		0.116*		0.044
	(0.239)		(0.012)		(0.070)		(0.171)
Issue-level fixed effect	YES		YES		YES		YES
Trade-level controls	YES		YES		YES		YES
Market conditions controls	YES		YES		YES		YES
Observations	2,389		2,389		2,393		1,549
Adjusted R^2	0.061		0.180		0.111		0.214

Table VII
Block Trading Costs and Trade Reporting Changes

This analysis considers block trading costs over four regulatory periods that reduced the time dealers were required to report trades and in 2021 (the most recent year in the sample). To construct the sample, we exclude statistics for blocks that are reported more than 24 hours following the trade execution time and blocks trades for bonds that are not yet disseminated. We only retain observations with non-missing block initiator, block dealer, and receiving investor spread and price impact measures. We exclude block trades that are fully offset by the block dealer in a single trade within 15 minutes. Dollar spreads with absolute values that exceed $50 are deleted and block trades with prices below $5.00 are deleted. We require an offsetting trade by a receiving investor both before and after the trade is reported and we compute the weighted-average spread for both periods, resulting in two observations for each block trade. In Panel A Column 1 reports statistics when trades were required to be reported within 75 minutes. Columns 2 and 3 report statistics when trades were required to be reported within 45 and 30 minutes, respectively. Column 4 reports statistics in the early one-year period when trades were required to be reported within 15 minutes. Column 5 reports statistics in 2021 (the last year in our sample). Panel B reports regressions with a 'Trades after Report' indicator for dealer and receiver spreads after the trade has been reported. All regressions include block-level fixed effects and in columns (2) and (4) we also include controls for the average offsetting trade size and the percent of offsetting trades with a customer in the pre- and post-report periods. Standard errors are estimated using the Huber-White sandwich estimator. All variables are winsorized at the 1% and 99% levels. ***, **, and * indicate statistical signicance at the 1%, 5%, and 10% level, respectively.

Panel A: Summary Statistics, By Period

	(1)	(2)	(3)	(4)	(5)
	July 2002-Sep. 2003	October 2003-Sep. 2004	October 2004-June 2005	July 2005-June 2006	2021
	75 Minutes	45 Minutes	30 Minutes	15 Minutes	15 Minutes
Dealer Spread					
- Before Report	0.30	0.16	0.26	0.23	0.22
- After Report	0.22	0.11	0.15	0.18	0.19
Chg. Dealer Spread	-0.08	-0.06	-0.11	-0.05	-0.03
Receiving Investor Spread					
- Before Report	-0.16	-0.08	-0.12	-0.02	-0.08
- After Report	-0.07	-0.02	0.01	0.00	-0.05
Chg. Receiver Spread	0.08	0.06	0.11	0.05	0.03

Panel B: Multivariate Tests

	(1)	(2)	(3)	(4)	(5)	(6)
	July 2002-June 2006				2021	
	Dealer Spread		Receiving Investor Spread		Dealer Spread	Receiver Spread
Dependent Variable Average	0.20	0.20	-0.06	-0.06	0.21	-0.06
Trades after Report	-0.075***	-0.054***	0.074***	0.049***	-0.029***	0.027***
	(0.000)	(0.000)	(0.000)	(0.002)	(0.001)	(0.010)
Block-Level Fixed Effect	YES	YES	YES	YES	YES	YES
Offset Trade Controls	NO	YES	NO	YES	NO	NO
Observations	10,670	10,670	10,670	10,670	8,510	8,510
Adjusted R-squared	0.216	0.224	0.780	0.782	0.166	0.809

Table VIII

Strategic Dealer Trade Reporting and Offsetting Behavior

This analysis considers dealers' strategic block reporting and offsetting behavior. Panel C and Panel D examine reporting and offsetting behavior over various trade reporting regimes. To construct the sample, we exclude statistics for blocks that are reported more than 24 hours following the trade execution time and blocks trades for bonds that are not yet disseminated. We only retain observations with non-missing block initiator, block dealer, and receiving investor spread and price impact measures. We exclude block trades that are fully offset by the block dealer in a single trade within 15 minutes. Block trades with dollar spreads with absolute values that exceed $50 or with prices below $5.00 are deleted. Panel C reports statistics on the timing of dealer trade reporting for the four reporting regimes used in Table VI and for 2021 (the most recent year in our sample). Panel D reports regressions of block activity and dealer offsetting behavior with indicators for whether the block occurred during the 45-minute, 30-minute, or 15-minute reporting regime and the 75-minute regime is the reference period. Regressions are estimated over the July 2002-June 2006 period. Regressions include trade-level (except the regression in Column (1)) and issue-level (the natural log of trade size, bond age, issue size, and indicators for bonds issued by financial firms, on-the-run bonds, and block trades intermediated by small dealers) and market controls (the trailing weekly corporate bond market index return, trailing weekly S&P index return, the average three-month LIBOR interest rate, and the VIX index over the previous week) and are estimated using robust standard errors. Regressions in Column (1) are based on cusip-week trading activity and do not include trade-level or small dealer controls. All variables are winsorized at the 1% and 99% levels. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel B: Reporting Changes - Univariate

	July 2002-Sep. 2003	October 2003-Sep. 2004	October 2004-June 2005	July 2005-June 2006	2021
	75 Minutes	45 Minutes	30 Minutes	15 Minutes	15 Minutes
Reporting Delay (in minutes)	25.08	17.76	15.14	13.72	14.58
% Reported w/ in 75 minutes	92%	93%	94%	96%	95%
% Reported w/ in 45 minutes	81%	90%	92%	94%	94%
% Reported w/ in 30 minutes	75%	88%	90%	93%	94%
% Reported w/ in 15 minutes	70%	82%	86%	90%	93%
% Offset Volume Before Block Trade Report	20%	17%	20%	20%	20%
% Reported Outside Regulation: >= $15M	8%	10%	10%	10%	7%
% Reported Outside Regulation: $15M - $20M	8%	8%	9%	9%	4%
% Reported Outside Regulation: $20M - $30M	7%	10%	11%	11%	12%
% Reported Outside Regulation: >= $30M	10%	13%	13%	13%	7%
% Reported Outside Regulation: all trades	7%	7%	4%	5%	
% Block Volume / Total Volume	3.43	3.21	3.29	3.43	2.50
% Offset Days[1,5]	54%	53%	54%	54%	64%
% Fully Offset	34%	33%	35%	34%	40%

Panel C: Reporting Changes - Multivariate

Dependent Variable	% Block Volume / Total Volume	% Offset Days[1,5]	% Fully Offset	% Offset Volume Before
	(1)	(2)	(3)	(4)
45 Minute Regime	-0.107	-0.007	0.015	0.001
	(0.201)	(0.524)	(0.247)	(0.947)
30 Minute Regime	-0.226	0.015	0.037*	0.006
	(0.107)	(0.400)	(0.072)	(0.703)
15 Minute Regime	-0.404*	0.020	0.027	-0.024
	(0.058)	(0.486)	(0.398)	(0.334)
Trade-level controls	NO	YES	YES	YES
Issue-level controls	YES	YES	YES	YES
Market conditions controls	YES	YES	YES	YES
Observations	453,544	22,695	22,695	22,695
Adjusted R^2	0.040	0.013	0.006	0.018

Table IX

Strategic Block Trade reporting

This table reports summary statistics for the sample of 187,531 block trades of at least $15 million (the full sample of 205,104 less trades that occurred prior to TRACE initiation). In Column (1) we report average values for the sample of block trades that were reported "fast", or before two minutes of the execution time. In Column (2) we report average values for the sample of block trades that were reported "slow", or within five minutes of the required reporting time or beyond the required time. In Column (3) we report average values for the sample of block trades that were reported "late", or outside of the required reporting time. In Column (4) and (5) we report percent differences and *p*-Values from *t*-tests of differences between Slow and Fast trades. In Column (6) and (7) we report percent differences and *p*-Values from *t*-tests of differences between Late and Fast trades.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Fast: w/in 2 Minutes after Execution	Slow: w/in 5 Minutes of Requirement	Late: Outside Regulation	Slow vs. Fast		Late vs. Fast	
Obs	115,679	20,758	9,670	% Diff	*p*-Value	% Diff	*p*-Value
Block Size	22,400,000	23,200,000	23,500,000	4%	***	5%	***
Mega Block ($30M)	13%	15%	17%	14%	***	26%	***
HY	27%	31%	19%	17%	***	-28%	***
Mega Block*HY	3%	4%	3%	33%	***	-5%	ns
Small Dealer	9%	28%	23%	219%	***	161%	***
Block Buy Indicator	36%	39%	43%	10%	***	20%	***
% Offset Before Report	21%	27%	23%	26%	***	7%	***
% Fully Offset	40%	40%	37%	-2%	**	-9%	***
# Receiver Trades	3.39	3.33	3.31	-6%	*	-2%	*

Appendix for

Receiving Investors in the Block Market for Corporate Bonds

Appendix A
Identifying Receiving Investor Trades

Having identified the initiating block trade (based on various definitions), we retain all trades by the block dealer in the bond during the week (i.e., five trading days) after the block trade (e.g., if the block occurs on Wednesday, the block week is from Wednesday to Friday, and the following Monday to Tuesday). We then, starting with block volume, cumulate the dealer's (signed) trading volume in the bond. If the cumulative imbalance reaches or crosses zero over the block week, we classify the block as being "fully offset".[28] For a block trade that is not fully offset, the percent that is offset equals [(block quantity-ending cumulative inventory)/block quantity)].

We define the "block end" time as the earlier of the time the block is fully offset or the end of the block week. We focus on one week for the following reasons. First, Bessembinder et al. (2018) show that the proportion of weekly trading volume that is carried into dealers' weekend inventory is generally less than 10%. Goldstein and Hotchkiss (2020) report median (mean) dealer holding periods of one (ten days). Hollifield et al. (2020) show more than 70% of large trades are matched within a week. Second, as the time from block trade increases, the link between a triggering block trade and the dealers' offsetting trades of opposite sign becomes less clear.

Receiving investor trades are identified as those that offset dealer's block position before the block end time. Specifically, we categorize the *earliest* large trade as the "trigger" block and opposite sign trades – both block and non-block - in the bond by the same dealer that occur before the block end time as receiving investor trades. After the block end time, the next block trade by the dealer in the bond is included in the initiating block sample. For each block trade, we calculate the price effects described in Section 4.1, and the percent of the block that is offset, defined as: Max [0, (block quantity-ending cumulative inventory)/block quantity)].

Below, we describe several examples, beginning with the easiest scenario. Suppose for Dealer A, we observe a $25 million customer buy at 10:00am, a $15 million sell at 11:00am, and a $10 million sell at 11:05am. Our approach identifies the trigger trade as the $25 million block buy and the receiving investor

[28] This follows the spirit of Goldstein and Hotchkiss (2020) who construct a measure of dealer roundtrip costs.

trades as the two subsequent customer sells. Notably, while the $25 million trade is classified as initiating block trade, the $15 million and $10 million trade are classified as receiving investor trades. In this example, the block is fully offset, as cumulative imbalance equals zero, and the block period is defined as one day (i.e., the block start and end date are the same).

Alternatively, suppose we observe a $25 million customer buy at 10:00am and then observe several sell trades but the cumulative imbalance of Dealer A in the bond does not equal or cross zero during the block week. In this example, we classify the initiating block trade as not being fully offset and define the block period as the full week (i.e., block end date equals the block start date plus four trading days).

A.1. Classification Issues

One scenario is when the size of the triggering block trade is smaller than size of the receiving investor trade. For example, suppose we observe a block sell trade of $15 million at 10:15am and a block buy trade of $20 million at 11:30am. Our approach identifies the trigger block trade as the $15 million even though the receiving investor trade has a larger size. One concern is that our approach may incorrectly identify the $15 million as the trigger trade.

We address this concern as follows. First, FINRA's reporting rules stipulate 15 minutes as the maximum reporting delay during the majority of our sample period. Thus, when the difference in trade timestamp between the trigger block and receiver trades exceeds the stipulated reporting delay, it is unlikely that our approach leads to misclassification. To minimize classification errors, we remove prearranged trades from the analyses; scenarios where a trigger block trade is fully offset by the Dealer A with a single trade within 15 minutes.

Second, we define block trades using three thresholds, $15 million, $20 million and $30 million. For mega (e.g., $30 million) blocks, it is less likely that initiating block trade is incorrectly classified. Third, in Appendix Table I below, we show that the percentage of fully offset blocks where the receiving investor trade occurs on the same day as the trigger block and exceeds the block trade size is only 6%. Further, the percentage of fully offset blocks where the receiving investor trade occurs within 15 minutes and exceeds the block trade size is only 0.8%. These results suggest that the misclassification rate in the overall sample

is likely to be low. Fourth, in Appendix Table II, we show that the main results of Table III analyses are unchanged when we exclude the 6% of block trades that are fully offset by a larger trade, described above.

A.2. Examples of Classification

Example 1, $15 million block trade threshold:

Trade Execution Date	Initiator (I) or Receiver (R)	Signed Trade Size	Trade Hour	Trade Minute	Trade Second	Dealer ID	Cumulative Inventory	Percent Offset	Block End Date
3/4/2021	I	27,000,000	11	33	1	3341	27,000,000		
3/4/2021	R	-27,000,000	16	43	34	3341	0	100%	4-Mar-21
3/9/2021		15,000,000	11	53	41	3341	15,000,000		
3/9/2021		3,310,000	14	30	51	3341	18,310,000		
3/9/2021		1,000,000	15	3	53	3341	19,310,000		
3/9/2021		-20,000,000	17	1	55	3341	-690,000		

Dealer ID 3341 buys a block from customer of $27 million at 11:33 on 3/4/2021. We retain *all* trades for this dealer over the next five trading days (3/4-3/10). Although we observe many block trades during the five-day period, the block buy of $27 million at 11:33 is identified as the initiating "trigger" block (identified by I in column 2) as it is the earliest trade. Sorting the data by trigger trade, then by execution time, we calculate the cumulative imbalance in the bond for the dealer. The dealer has an opposite sign sell trade of $27 million at 16:43. Since the cumulative imbalance equals zero at this time, we classify the block as being "fully offset" after this trade. The $27 million sell at 16:43, although it is a block, is classified as "receiving investor" trade (identified by R in column 2). Because the imbalance equals zero on 3/4/21, the $15 million block buy on 3/9/21 at 11:53 is allowed to enter the initiating block sample.

Example 2, $15 million block trade threshold:

Trade Execution Date	Initiator (I) or Receiver (R)	Signed Trade Size	Trade Hour	Trade Minute	Trade Second	Dealer ID	Cumulative Inventory	Percent Offset	Block End Date
8/30/2021	I	-15,724,000	12	51	55	204	-15,724,000		
8/31/2021		-10,000	16	0	26	204	-15,734,000	0%	5-Sep-21

Dealer 204 sells a $15.7 million block to a customer on 8/30/21. We only observe one other trade for dealer over the block-week, and this trade is not offsetting the inventory position. This block program ends on 9/5/21 (Trading Day 5), and the percentage offset is set to 0%. This block is not included in our sample because the decomposition of trading costs requires at least one receiving investor trade.

Example 3, $15 million block trade threshold:

Trade Execution Date	Initiator (I) or Receiver (R)	Signed Trade Size	Trade Hour	Trade Minute	Trade Second	Dealer ID	Cumulative Inventory	Percent Offset	Block End Date
3/9/2021	I	15,000,000	11	53	41	3341	15,000,000		
3/9/2021		3,310,000	14	30	51	3341	18,310,000		
3/9/2021		1,000,000	15	3	53	3341	19,310,000		
3/9/2021	R	-20,000,000	17	1	55	3341	-690,000	100%	3/9/2021

Dealer 3341 buys $15 million from a customer at 11:53 (the initiating block trade, identified as I). We retain all trades for the dealer over the next five days. The dealer has two additional buys that brings the cumulative inventory to $19.3 million, and then has a large $20 million sell. The sell trade brings the dealer's cumulative imbalance below zero over the block week. Thus, the block is considered fully offset and the $20 million sell at 17:01 is classified as receiving investor trade, identified as R. The $3.3 and $1 million trades are used for calculating the cumulative imbalance but are not included in the initiating block sample or receiving investor trade sample.

Example 4, $15 million block trade threshold:

Trade Number	Initiator (I) or Receiver (R)	Trade Execution Date	Signed Trade Size	Trade Hour	Trade Minute	Trade Second	Dealer ID	Cumulative Inventory	Percent Offset	Block End Date
1	I	6/8/2021	(15,000,000)	15	34	23	28	(15,000,000)		
2		6/8/2021	(165,000)	16	1	5	28	(15,165,000)		
3		6/8/2021	(1,000,000)	16	16	52	28	(16,165,000)		
4		6/8/2021	(1,050,000)	16	23	29	28	(17,215,000)		
5		6/9/2021	(2,000,000)	10	3	58	28	(19,215,000)		
6	R	6/9/2021	5,000,000	15	57	9	28	(14,215,000)		
7		6/9/2021	(500,000)	16	2	52	28	(14,715,000)		
8	R	6/9/2021	65,000	16	30	22	28	(14,650,000)		
9	R	6/10/2021	3,000,000	9	21	54	28	(11,650,000)		
10	R	6/10/2021	10,000,000	9	49	4	28	(1,650,000)		
11	R	6/10/2021	32,000	16	0	37	28	(1,618,000)		
12		6/11/2021	(5,000,000)	13	13	55	28	(6,618,000)		
13		6/11/2021	(300,000)	13	18	56	28	(6,918,000)		
14		6/11/2021	(30,000)	13	33	13	28	(6,948,000)		
15		6/11/2021	(100,000)	16	1	7	28	(7,048,000)		
16	R	6/14/2021	500,000	15	0	4	28	(6,548,000)	56%	14-Jun-21

Dealer 28 sells $15 million to a customer at 15:34 (the initiating block trade, identified as I) on 6/8/21. The dealer has 15 additional trades over the block week, of which nine are sell trades that increase the imbalance and six are buys trades that offset the imbalance. By the end of the block week on 6/14/21, the receiving investor buy trades (i.e., trades 6, 8, 9, 10, 11 and 16 identified as R) total $18.6 million and the additional

sell trades total $10.1 million, bringing the cumulative inventory to $6.55 million. Thus, the block is not considered fully offset, and the percent offset of the block position is set to ($15M-$6.55M)/ $15M = 56%.

Example 5, $15 million block trade threshold:

Trade Execution Date	Initiator (I) or Receiver (R)	Signed Trade Size	Trade Hour	Trade Minute	Trade Second	Dealer ID	Cumulative Inventory	Percent Offset	Block End Date
10/22/2021	I	20,000,000	11	17	35	204	20,000,000		
10/22/2021	R	(10,000,000)	10	57	25	204	10,000,000		
10/22/2021	R	(10,000,000)	11	2	11	204	0	100%	10/22/2021
10/26/2021		5,000,000	16	12	25	204	5,000,000		
10/26/2021		(5,000,000)	16	13	23	204	0		
10/28/2021		2,000,000	13	45	5	204	2,000,000		

Dealer 3341 buys $20 million from a customer at 11:17 on 10/22/21. Note that $10 million sell to customer at 10:57 on 10/22/21 occurs prior to the $20 million trade; however, it is not a block trade under the $15 million block trade threshold. Thus, the $20 million trade at 11:17 is identified as initiating block trade, identified as I. Trades are sorted first by the trigger trade, and then execution time on the block day. The two $10 million sell trades are classified as receiving investor trades identified as R. These two trades fully offset the block, so the additional trades by the block dealer on 10/26 and 10/28 are not classified as I or R.

Example 6, $15 million block trade threshold:

Trade Number	Initiator (I) or Receiver (R)	Trade Execution Date	Signed Trade Size	Trade Hour	Trade Minute	Trade Second	Dealer ID	Cumulative Inventory	Percent Offset	Block End Date
1	I	10/21/2021	15,000,000	8	2	41	28	15,000,000		
2		10/21/2021	1,000,000	7	37	23	28	16,000,000		
3	R	10/21/2021	(10,000,000)	8	35	28	28	6,000,000		
4	R	10/21/2021	(5,000,000)	9	34	52	28	1,000,000		
5	R	10/21/2021	(5,000,000)	9	35	7	28	(4,000,000)	100%	10/21/2021
6		10/21/2021	35,000,000	9	36	41	28	31,000,000		
7		10/21/2021	(10,000,000)	9	39	55	28	21,000,000		
8		10/21/2021	(10,000,000)	9	55	48	28	11,000,000		
9		10/21/2021	(5,000,000)	10	13	58	28	6,000,000		
10		10/21/2021	(5,000,000)	10	57	10	28	1,000,000		
11		10/21/2021	35,000,000	11	35	4	28	36,000,000		
12		10/21/2021	(10,000,000)	11	44	17	28	26,000,000		
13		10/22/2021	(500,000)	10	52	17	28	25,500,000		
14		10/25/2021	(12,600,000)	9	51	54	28	12,900,000		
15		10/25/2021	(5,000,000)	13	18	14	28	7,900,000		
16		10/25/2021	20,000,000	13	39	40	28	27,900,000		
17		10/25/2021	(2,000,000)	14	59	18	28	25,900,000		
18		10/26/2021	(2,000,000)	7	51	38	28	23,900,000		
19		10/26/2021	30,000,000	8	51	21	28	53,900,000		
20		10/26/2021	(10,000,000)	8	55	7	28	43,900,000		
21		10/26/2021	(5,000,000)	9	3	34	28	38,900,000		
22		10/26/2021	(10,000,000)	9	20	6	28	28,900,000		
23		10/26/2021	(5,000,000)	10	21	40	28	23,900,000		
24		10/26/2021	(5,000,000)	10	52	45	28	18,900,000		
25		10/26/2021	(195,000)	16	4	25	28	18,705,000		
26		10/27/2021	(2,090,000)	8	25	14	28	16,615,000		
27		10/27/2021	20,000,000	10	15	42	28	36,615,000		
28		10/27/2021	3,000,000	12	46	2	28	39,615,000		
29		10/27/2021	340,000	12	59	27	28	39,955,000		
30		10/27/2021	1,500,000	13	58	31	28	41,455,000		

Dealer 3341 buys $15 million from a customer (the initiating block trade, identified as I) on 10/21/21 at 8:02. There are 30 additional trades during the block week. The second trade increases cumulative balance to $16 million. The third and fourth trades are opposite sign trades that reduce the cumulative balance to $1 million. The fifth trade further reduces the cumulative balance to -$4 million, resulting in cumulative imbalance switching signs (i.e., zero crossing). We consider the block to be fully offset and Trades 3, 4, and 5 are classified as receiving investor trades, denoted as R. Because the block trade 1 is fully offset, we allow the $35 million block buy on 10/21/21 at 9:36 to enter the sample as an initiating block trade.

Example 7, $20 million block trade threshold sample:

Trade Execution Date	Initiator (I) or Receiver (R)	Signed Trade Size	Trade Hour	Trade Minute	Trade Second	Dealer ID	Cumulative Inventory	Percent Offset	Block End Date
3/9/2021	I	-20,000,000	17	1	55	3341	-20,000,000		
3/9/2021	R	15,000,000	11	53	41	3341	-5,000,000		
3/9/2021	R	3,310,000	14	30	51	3341	-1,690,000		
3/9/2021	R	1,000,000	15	3	53	3341	-690,000	96.6%	3/15/2021

Note that example 7 is identical to Example 3. Dealer 3341 buys $15 million from a customer at 11:53 on 3/9/21. However, the trade size of $15 million is below the block trade threshold for the $20 million analysis. Thus, the $20 million sell trade by the customer is identified as the trigger block trade, identified by I. We retain all trades for the dealer over the next five days, including the block trade day. The dealer has three buy trades that are classified as R and they add up to $19.3 million, and the cumulative imbalance on Day 5 is -$690,000. Thus, the percent offset for the block is 96.6% (i.e., (20,000,000-690,000)/20,000,000). In the study, we present results based on three block trade samples using thresholds $15 million, $20 million and $30 million.

A.3. Example of Trading Cost Measures Computation

Trade Execution Date	Signed Trade Size	Trade Price	Trade Time	Weight	Weight*Price
8/10/2021	-15,000,000	122.855	10:05		
8/10/2021	10,000,000	122.599	11:15	67%	81.733
8/10/2021	4,000,000	122.600	3:15	27%	32.693
8/11/2021	1,000,000	122.679	10:00	7%	8.179
			WA Offset Price		122.605
WA $Price_{t-7}$	122.650				
WA $Price_{t+7}$	122.680				

In this example, a dealer sold $15 million to a customer for $122.855 (the block price). The bond was trading at $122.650 the week prior (the weighted average trade price at t-7). Therefore,

Initiator cost = 0.17 = ((ln(122.855)-ln(122.650)*100).

The dealer offsets the block with three R trades at a weighted average buy price of $122.605.

Dealer spread = 0.20 = ((ln(122.855)-ln(122.605)*100).

The bond was trading at $122.680 the week after (the weighted average trade price at t+7).

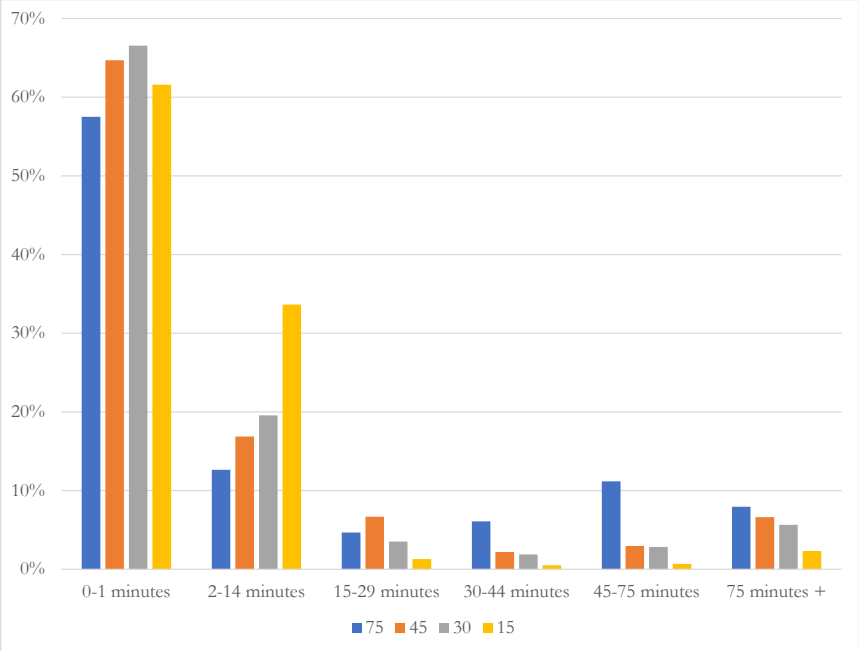
Receiving investor spread = -0.06 = ((ln(122.605)-ln(122.680)*100).

Permanent Price Impact = -0.02 = ((ln(122.680)-ln(122.650)*100).

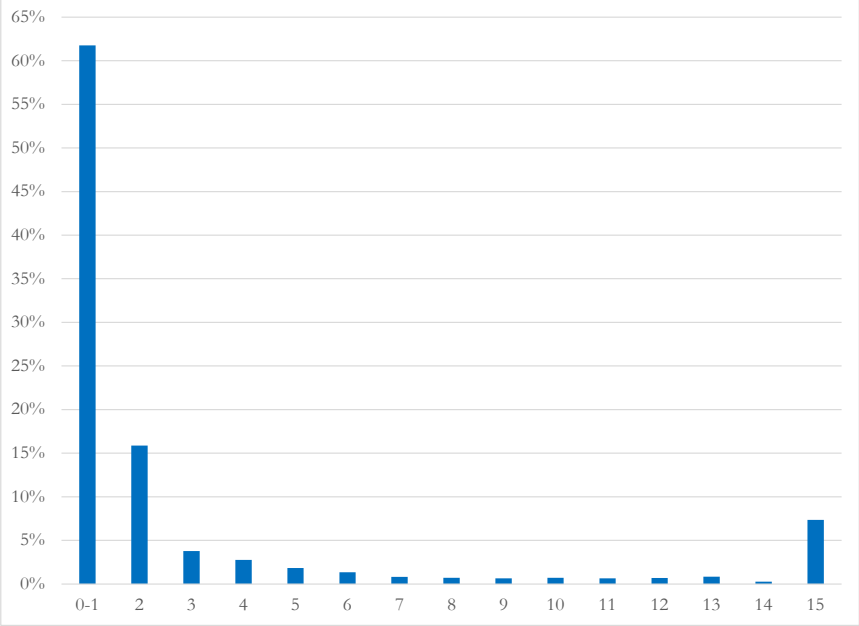
Appendix Figure 1
Block Trade Time to Report

This figure shows the average time for dealers to report block trades (relative to the execution time) for the sample of trades of at least $15 million. In 2.a, we report a histogram of time to report for block trades conducted in the 75-minute, 45-minute, 30-minute, and 15-minute reporting regimes. In 2.b, we report a histogram of time to report for block trades conducted in the most recent sample year (2021) when the required report time was 15-minutes.

A: Full Sample



B. 2021 Sample



Appendix Table I
Initiator Trade Classification Analysis

This table reports statistics on cases for which the initiating block trade is difficult to classify. In the first row, we report the percent of blocks with at least one offsetting receiving investor trade that exceeds the trade classified as the initiating block trade. In the second row, we report the percent of fully offset blocks with at least one offsetting receiving investor trade on the day of the initiating block trade that exceeds the size of the initiating block trade. In the third row, we report the percent of fully offset blocks with at least one offsetting receiving investor trade within 15 minutes of the initiating block trade that exceeds the size of the initiating block trade.

	Block >= $15M	Block $15M - $20M	Block $20M - $30M	Block >= $30M
% Receiving Investor Trade Size > Block Size	10%	16%	12%	9%
% Receiving Investor Trade Size > Block Size and Offset in 1 Day	6%	10%	8%	5%
% Receiving Investor Trade Size > Block Size and Offset in 15 Minutes	0.8%	1.3%	1.0%	0.7%

Appendix Table II
Block Trading Cost Decomposition-Robustness

This table reports mean summary statistics of block trading costs for block trades that exceed $15 million. In Columns (1)-(2), we further refine the sample utilized in Table III by excluding fully offset blocks with an offset trade size that exceeds the triggering initiator trade size on the same day as the block. In Columns (3)-(4), we further refine the sample utilized in Table III by excluding "reversal" block trades, cases for which the block trade price exceeds both the weighted average price in the week prior and the weighted average price in the week following the block trade by at least 15%, or the block price is less than both prices by the same magnitude. Panel A reports block initiator costs. In Panel B, we decompose block initiator costs into a permanent price impact and temporary price impact component. In Panel C, we decompose block initiator costs into three components: 1) the permanent price impact and the two components of temporary price impact, 2) dealer profit, and 3) receiving investor profit. In Panels D and E, we report trading cost estimates for investment grade and high yield bonds, respectively. Initiator cost is defined as the log difference between the price of the bond one week prior to the block trade and the block price. Permanent price impact is defined as the log difference between the price of the bond one week following and one week prior to the block trade. Temporary price impact is defined as the log difference between the price of the bond one week following the block trade and the block price. Dealer spread is the log difference between the weighted average price that the dealer offsets the block trade and the block price. Receiving investor spread is the log difference between the price of the bond one week following the block trade and the weighted average price that the dealer offsets the block trade. The unit of analysis is at the individual block-level. Variables are winsored at the 1% and 99% levels.

	Mean	Median	Mean	Median
	Exclude blocks with offset trade > initiator trade		Exclude "reversal" block trades >=15%	
Panel A: Block Initiator Costs				
Block Initiator Trading Cost	0.19	0.08	0.17	0.08
Panel B: Two-Way Decomposition				
Permanent Price Impact	0.00	0.02	0.00	0.01
Temporary Price Impact	0.19	0.06	0.18	0.06
Panel C: Three-Way Decomposition				
Permanent Price Impact	0.00	0.02	0.00	0.01
Dealer Spread	0.22	0.13	0.22	0.13
Receiving Investor Spread	-0.03	-0.02	-0.04	-0.03
Panel D: Investment Grade				
Block Initiator Cost	0.17	0.07	0.16	0.07
Permanent Price Impact	0.04	0.02	0.03	0.02
Temporary Price Impact	0.13	0.05	0.13	0.05
Dealer Spread	0.18	0.11	0.18	0.11
Receiving Investor Spread	-0.05	-0.02	-0.05	-0.02
Panel E: High Yield				
Block Initiator Cost	0.23	0.11	0.21	0.10
Permanent Price Impact	-0.08	0.00	-0.08	0.00
Temporary Price Impact	0.33	0.11	0.30	0.11
Dealer Spread	0.31	0.23	0.31	0.23
Receiving Investor Spread	0.02	-0.04	0.00	-0.04

Appendix Table III
Receiving Investor Spread: by Counterparty Type

This table reports receiving investor srpeads by counterparty type. We examine block trades that exceed $15 million. The unit of analysis is at the individual block-level. 'Majority customer counterparty' are block trades for which 50% or greater of the offsetting trades with receiving investors are customers. 'Majority small dealer counterparty' are block trades for which 50% or greater of the offsetting trades with receiving investors are with small dealers. 'Majority large dealer counterparty' are block trades for which 50% or greater of the offsetting trades with receiving investors are with large dealers. 'Mix of counterparties' are block trades that do not fit any of the above definitions. Large dealers are defined as the thirty-four most active dealers studied by Bessembinder, Jacobsen, Maxwell, and Venkataraman (2018). All other dealers are coded as 'small dealers'.

	Obs	Receiving Investor Spread
Majority Customer Counterparty	160,366	-0.04
Majority Small Dealer Counterparty	36,335	-0.03
Majority Large Dealer Counterparty	6,246	0.00
Mix of Counterparties	2,154	-0.04

Appendix Table IV
Determinants of Block Trading Costs

This table shows regressions of measures of block trading costs on bond characteristics, intermediating dealer size, and market conditions. All regressions are estimated using year fixed effects and robust standard errors. The unit of analysis is at the individual block-level. Dependent variables are winsored at the 1% and 99% levels. Dependent variable averages are reported at the top of the regression.

	(1)	(2)	(3)	(4)	(5)
	Block Initiator	Permanent Price Impact	Temporary Price Impact	Dealer Spread	Receiving Investor Spread
Dependent Variable Average	0.179	0.000	0.185	0.220	-0.034
Log(Block Size)	0.039***	-0.007	0.064***	-0.003	0.067***
	(0.002)	(0.620)	(0.000)	(0.345)	(0.000)
Log (Bond Age)	0.008*	-0.016***	0.026***	0.020***	0.005*
	(0.069)	(0.000)	(0.000)	(0.000)	(0.084)
Log (Issue Size)	-0.041***	0.030***	-0.074***	-0.047***	-0.024***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
High Yield Indicator	0.043**	-0.101***	0.157***	0.105***	0.054***
	(0.030)	(0.000)	(0.000)	(0.000)	(0.000)
Financial Indicator	-0.039***	-0.006	-0.035***	-0.036***	-0.000
	(0.001)	(0.526)	(0.000)	(0.000)	(0.943)
On-the-run Indicator	0.007	0.006	-0.002	0.004	-0.007
	(0.495)	(0.624)	(0.819)	(0.169)	(0.428)
144A Indicator	-0.017	-0.030*	0.015	0.007*	0.006
	(0.140)	(0.066)	(0.232)	(0.067)	(0.600)
Small Dealer Indicator	0.014*	0.024**	-0.008	0.007**	-0.011
	(0.058)	(0.048)	(0.409)	(0.025)	(0.179)
Corp Bond Index Return over Relevant Period	-0.140***	-0.101***	0.151***	0.072***	0.053***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ave. Stock Market Index Return (t-1 to t-5)	-4.204***	-9.617***	3.691***	-0.334	4.215***
	(0.001)	(0.000)	(0.007)	(0.361)	(0.000)
Ave. 3-Month Libor (t-1 to t-5)	0.046**	0.024	0.030	0.019***	0.015
	(0.038)	(0.376)	(0.138)	(0.003)	(0.389)
Ave. VIX (t-1 to t-5)	0.003*	-0.012***	0.016***	0.011***	0.004***
	(0.095)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.043	0.046	-0.393**	0.556***	-0.974***
	(0.805)	(0.853)	(0.044)	(0.000)	(0.000)
Observations	205,021	205,072	205,021	205,021	205,058
Adjusted R-squared	0.008	0.007	0.013	0.063	0.003

Appendix Table V
Determinants of Block Trading Cost Regressions: Buys vs. Sells

This table shows regressions of measures of block trading costs on bond characteristics, intermediating dealer size, and market conditions. All regressions are estimated using year fixed effects and robust standard errors. Columns (1)-(5) show results for block sells and columns (6)-(10) show results for block buys. To be included in the sample, we retain observations with non-missing block initiator, block dealer, and receiving investor spread and price impact measures. Blocks are trades of $15 million or more. We exclude block trades that are fully offset by the block dealer in a single trade within 15 minutes. Dollar spreads with absolute values that exceed $50 are deleted. We exclude block trades with prices below $5.00. The unit of analysis is at the individual block-level. Dependent variables are winsored at the 1% and 99% levels.

	Block Sells					Block Buys				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Initiator	Perm. Price Impact	Temp. Price Impact	Dealer	Receiving	Initiator	Price Impact	Temp. Price Impact	Dealer	Receiving
Dependent Variable Average	0.19	-0.04	0.24	0.23	0.01	0.15	0.07	0.09	0.21	-0.12
Log(Block Size)	0.074***	0.053***	0.051***	-0.008**	0.054***	-0.026*	-0.077***	0.042**	-0.000	0.056***
	(0.000)	(0.001)	(0.000)	(0.046)	(0.000)	(0.094)	(0.001)	(0.032)	(0.976)	(0.001)
Log (Bond Age)	-0.010***	-0.033***	0.025***	0.021***	0.003	0.032***	0.009	0.026***	0.020***	0.005
	(0.002)	(0.000)	(0.000)	(0.000)	(0.431)	(0.000)	(0.151)	(0.000)	(0.000)	(0.278)
Log (Issue Size)	-0.043***	0.053***	-0.105***	-0.046***	-0.051***	-0.035***	-0.021*	-0.009	-0.049***	0.037***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.067)	(0.332)	(0.000)	(0.000)
High Yield Indicator	0.018	-0.189***	0.213***	0.124***	0.088***	0.076***	0.016	0.078***	0.076***	0.011
	(0.108)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.450)	(0.000)	(0.000)	(0.467)
Financial Indicator	-0.039***	-0.022**	-0.021**	-0.033***	0.005	-0.042***	0.003	-0.039***	-0.035***	-0.007
	(0.000)	(0.040)	(0.012)	(0.000)	(0.461)	(0.000)	(0.867)	(0.002)	(0.000)	(0.482)
On-the-run Indicator	0.013	0.030**	-0.022*	0.003	-0.025**	0.001	-0.020	0.030*	0.006	0.014
	(0.180)	(0.035)	(0.056)	(0.409)	(0.010)	(0.945)	(0.298)	(0.069)	(0.230)	(0.308)
144A Indicator	0.003	0.007	-0.009	0.012***	-0.016	-0.065***	-0.128***	0.073***	0.002	0.058***
	(0.828)	(0.709)	(0.557)	(0.006)	(0.208)	(0.000)	(0.000)	(0.000)	(0.777)	(0.001)
Small Dealer Indicator	0.001	0.007	-0.011	0.007*	-0.009	0.034***	0.029	0.013	0.009*	0.007
	(0.885)	(0.622)	(0.305)	(0.060)	(0.346)	(0.004)	(0.112)	(0.396)	(0.093)	(0.589)
Corp Bond Index Return over Period	-0.677***	-0.773***	1.266***	0.438***	0.776***	0.722***	0.862***	-1.527***	-0.469***	-0.922***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ave. Stock Market Index Return (t-1 to t-5)	-23.634***	-16.250***	8.923***	-1.704***	-2.331*	28.117***	13.112***	-8.480***	1.399**	7.033***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.062)	(0.000)	(0.000)	(0.000)	(0.018)	(0.000)
Ave. 3-Month Libor (t-1 to t-5)	0.065***	-0.026	0.075***	0.044***	0.046**	0.017	0.141***	-0.058*	-0.023**	-0.061**
	(0.001)	(0.390)	(0.002)	(0.000)	(0.024)	(0.530)	(0.001)	(0.084)	(0.034)	(0.031)
Ave. VIX (t-1 to t-5)	0.006***	-0.016***	0.027***	0.011***	0.009***	0.006***	0.011***	-0.008***	0.009***	-0.009***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.517***	-0.932***	0.005	0.579***	-0.518***	0.704***	1.116***	-0.410	0.627***	-1.321***
	(0.009)	(0.001)	(0.984)	(0.000)	(0.007)	(0.008)	(0.007)	(0.233)	(0.000)	(0.000)
Observations	130,056	130,087	130,056	130,056	130,079	74,965	74,985	74,965	74,965	74,979
Adjusted R-squared	0.111	0.170	0.090	0.134	0.136	0.126	0.203	0.089	0.111	0.188

Appendix Table VI
Block Volume and Offsetting Behavior following TRACE

This analysis considers changes to dealers' propensity to intermediate blocks and propensity and speed of offsetting block positions following the introduction of TRACE. This table is based on the sample utilized in Table V. Panel A shows univariate results and Panel B shows the impact of transparency on block activity and dealer offsetting behavior in a multivariate setting. The regression in Column (1) is estimated using cusip-week block activity, includes the trailing weekly S&P index and the change in the average three-month LIBOR interest rate and VIX index over the previous week, and is estimated using issue-level fixed effects and standard errors clustered at the issue level. Regressions in Columns (2)-(4) include trade-level and issue-level (the natural log of trade size, bond age, and indicators for on-the-run bonds and block trades intermediated by small dealers) and market controls (the trailing weekly corporate bond market index return, trailing weekly S&P index return, the change in the average three-month LIBOR interest rate, and the change in the VIX index over the previous week) and are estimated using issue-level fixed effects and standard errors clustered at the issue level. Regressions in Column (1) are based on cusip-week trading activity and do not include trade-level or small dealer controls. All variables are winsorized at the 1% and 99% levels. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)
Panel A: Transparency - Univariate				
	% Block Vol / Tot Volume	% Offset Days[1,5]	% Fully Offset	Hours to Offset
Pre-Transparency	4.84	60%	37%	117.2
Post-Transparency	4.77	63%	41%	110.0
Chg.	-0.06	3%	4%	-7.3
Panel B: Transparency - Multivariate				
	% Block Vol / Tot Volume	% Offset Days[1,5]	% Fully Offset	Hours to Offset
Post-Transparency	-0.156	0.057**	0.061**	-8.437**
	(0.419)	(0.018)	(0.035)	(0.043)
Issue-level fixed effect	YES	YES	YES	YES
Trade-level controls	NO	YES	YES	YES
Issue-level controls	YES	YES	YES	YES
Market conditions controls	YES	YES	YES	YES
Observations	31,150	2,389	2,389	2,389
Adjusted R^2	0.018	0.114	0.103	0.126

Appendix Table VII

Block Trading Costs and Trade Reporting Changes - Full Sample Results

This analysis considers block trading costs over four regulatory periods that reduced the time dealers were required to report trades and in 2021 (the most recent year in the sample). To construct the sample, we exclude statistics for blocks that are reported more than 24 hours following the trade execution time and blocks trades for bonds that are not yet disseminated. We only retain observations with non-missing block initiator, block dealer, and receiving investor spread and price impact measures. We exclude block trades that are fully offset by the block dealer in a single trade within 15 minutes. Dollar spreads with absolute values that exceed $50 are deleted and block trades with prices below $5.00 are deleted. We compute the weighted-average spread for both the before and after trade report periods. Column (1) reports statistics when trades were required to be reported within 75 minutes. Columns (2) and (3) report statistics when trades were required to be reported within 45 and 30 minutes, respectively. Column (4) reports statistics in the early one-year period when trades were required to be reported within 15 minutes. Column (5) reports statistics in 2021 (the last year in our sample). All variables are winsorized at the 1% and 99% levels.

	(1)	(2)	(3)	(4)	(5)
	July 2002-September 2003	October 2003-September 2004	October 2004-June 2005	July 2005-June 2006	2021
	75 Minutes	45 Minutes	30 Minutes	15 Minutes	15 Minutes
Dealer Spread					
- Before Report	0.28	0.15	0.23	0.20	0.21
- After Report	0.19	0.09	0.12	0.13	0.16
Diff. Dealer Spread	-0.09	-0.06	-0.11	-0.07	-0.05
Receiving Investor Spread					
- Before Report	-0.10	-0.07	-0.11	0.01	-0.07
- After Report	-0.06	-0.03	-0.07	-0.05	-0.07
Diff. Receiver Spread	0.05	0.04	0.04	-0.06	0.00