Earnings News and Over-the-Counter Markets

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Abstract

A significant portion of trading costs in over-the-counter markets stems from investors having to search for and bargain with counterparties. Using a comprehensive sample of corporate bond transactions, we show that these search and bargaining costs decrease around earnings announcements. Specifically, we document significant improvements in execution prices (i.e., liquidity) for investors during earnings announcements relative to non-earnings announcement periods. Our evidence shows that the improvements in bond markets derive from two primary sources: (i) better access to dealers and reduced search costs, and (ii) increased participation from sophisticated investors. We also show that these improvements contrast with a concurrent deterioration of liquidity in equity markets for the same issuers, are primarily driven by information-based trade, and generalize to other firm-specific information events. Overall, our findings highlight new channels through which firm-specific information impacts asset prices and the importance of market structure in understanding the capital market effects of earnings news.

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1. Introduction

This study explores how firm-specific information arrival affects search and bargaining in over-the-counter (OTC) markets. Unlike exchange-traded markets (e.g., the NYSE), an important friction in OTC markets is associated with search and bargaining. An investor who wants to transact must first search for a counterparty and subsequently bargain over the terms of trade.[1] Despite the importance that search and bargaining has in OTC markets, little is known about how these frictions interact with firm-specific news.

To study these issues, we focus on the dynamics of transaction prices in the U.S. corporate bond market around earnings announcements, the most frequently recurring firm-specific information event with the greatest impact on asset prices. We provide evidence of significant improvements in bond transaction prices (i.e., liquidity) around earnings announcements stemming from reductions in search and bargaining frictions that investors face. Our evidence also shows that these improvements are primarily attributable to information-based trade and contrast with the deterioration of liquidity during earnings announcements found in equity markets for the same issuers. Overall, our study highlights the importance of search and bargaining frictions when evaluating the capital markets effects of information releases in OTC markets.

We motivate our study based on prior theoretical work on search and bargaining in OTC markets where investors search for, and then upon contact, bargain with counterparties for trade (e.g., Duffie, Garleanu, and Pedersen, 2005; Lagos and Rocheteau, 2017). In these models, the bargaining power of investors depends on their outside options. As a result,

[1]The OTC market structure is a common feature of many asset classes: corporate loans and bonds, nonstandard derivatives, and municipal bonds. We describe this market structure more in Figure 1 and Section 2.

investors' ability to find counterparties to trade with (i.e., their search ability) determines the transaction prices and transaction costs that investors face. We posit and provide evidence that the information released in earnings announcements can reduce search frictions and improve investors' bargaining power by both encouraging more counterparties to trade and affecting the types of investors trading, leading to improvements in realized transaction prices. We illustrate these channels through which information can induce reduction in search and bargaining costs in Figure 2.

We begin by constructing several commonly used measures of corporate bond liquidity (i.e., "markups" by dealers).[2] These measures are the average bid-ask spread (e.g., Hong and Warga, 2000; Green, Hollifield, and Schürhoff, 2007a), the ask-dealer ratio (e.g., Schultz, 2012; Cuny, 2018), and imputed roundtrip costs (e.g., Dick-Nielsen, Feldhütter, and Lando, 2012; Feldhütter, 2012). Each measure captures different aspects of the relative prices that dealers transact at with investors and are the primary outcomes of the search and bargaining process in corporate bond markets.

Leveraging these measures in an event-study design, we show that corporate bond liquidity improves during earnings announcements. Relative to non-earnings announcement periods, investors transacting during earnings announcements realize improvements of approximately 5.52 and 3.56 basis points in transaction costs, as measured by average bid-ask spreads and ask-dealer ratio, respectively. Similarly, for those transactions which are largely riskless for dealers (as measured by imputed roundtrip costs), these reductions in transaction costs are approximately 1.29 basis points.

[2]As highlighted by Dick-Nielsen and Rossi (2019), liquidity entails market participants transacting at a fair price and on short notice. Although our focus is on improvements in the prices obtained by investors, our results also highlight that market participants are more able to find counterparties in which to trade with. This indicates market participants' ability to trade on short notice also likely improves.

Economically, the aforementioned improvements in transaction costs during earnings announcements are non-trivial. Relative to non-earnings announcement periods, investors transacting during earnings announcements save approximately 6-7% in transaction costs. Because earnings announcements are periods of heightened trading activity, these savings map into large dollar cost savings for investors. For instance, we calculate that the total savings of transaction costs over our sample period approximate $44.1 billion. Moreover, we show that these improvements in transaction costs persist for approximately 10 days after the post-earnings period, increasing the total cost savings attributable to earnings announcements even further.

Next, we explore the two channels through which these liquidity effects can arise. First, we present evidence consistent with increased dealer accessibility and reduced search costs for market participants during earnings announcements. Consistent with prior studies (e.g., Easton, Monahan, and Vasvari, 2009; Ronen and Zhou, 2013), we show that trading activity in corporate bonds spikes significantly during earnings announcement periods indicating greater availability of trading counterparties. Accordingly, we document increased dealer activity during earnings announcements, suggesting that investors may access similar securities through more dealers. These dealers also experience reductions in search costs and improved abilities to match buyers and sellers during the earnings announcement period, as evidenced by a higher likelihood of observing offsetting transactions. Both these changes improve the relative bargaining power of investors with dealers leading to improvements in transaction prices (Duffie et al., 2005).

Second, we document that the aggregate level of investor sophistication increases during

earnings announcements.[3] Consistent with prior studies in equity markets, we find that both institutional and retail trading activities increase during earnings announcements in equity markets (e.g., Lee, 1992; Lee and Zhu, 2022). However, we find that there is a disproportionate increase in trading by sophisticated, institutional investors. As institutional investors have better search abilities and greater bargaining power (e.g., Duffie et al., 2005; Harris and Piwowar, 2006; Green, Hollifield, and Schürhoff, 2007b; Cuny, Even-Tov, and Watts, 2021), this leads to improved realized transaction prices by investors.

While our evidence shows liquidity is improved around earnings announcements through search and bargaining costs, a focus of prior studies has been on the heightened information asymmetry during earnings announcements which leads to lower liquidity (e.g., Lee, Mucklow, and Ready, 1993; Krinsky and Lee, 1996). Although our findings indicate that search and bargaining is the dominant force in U.S. corporate bond markets during earnings announcements, the extent to which information asymmetry may play a role in our findings is an important consideration given the significant amounts of informed trade documented in bond markets around earnings announcements (e.g., Wei and Zhou, 2016; Even-Tov, 2017).

Using matched pairs of equity and bond securities from the same issuing firm, we show that while executed transaction prices are improving in bond markets, they deteriorate in equity markets during earnings announcements.[4] This finding highlights the contrasting effects of improved transaction prices through search and bargaining in OTC markets. We further leverage equity market reactions to examine how search and bargaining interacts

[3]Throughout this paper, we follow Duffie et al. (2005) and refer to "sophsticated" investors as those with higher bargaining power, and those connected with more dealers. While these traders are typically "informed," in the sense they are likely to be trading on information, this need not be the case.

[4]Consistent with prior studies, we also find that both bond and equity securities experience significant increases in trading activity during earnings announcements.

with information asymmetry around earnings announcements. Specifically, when information asymmetry about a firm's underlying cash flow increases with an earnings announcement, expressed by increased equity bid-ask spreads, we show that the liquidity improvement of the corresponding bonds is muted.

We further explore these issues by exploring the dynamics of liquidity within various investor-sizes. While we find retail and small institutional investors experience liquidity improvements, we find that the largest institutional transactions experience slight deterioration around earnings announcements. As these investors are most likely to be informed, and their trades place the most capital at risk, we attribute these findings mainly to adverse selection concerns by market-makers. These findings highlight that the liquidity effects we document are a net effect of many forces, and suggest that documented liquidity improvements underestimate the reduction in search and bargaining cost because of the offsetting effect due to increased concerns of adverse selection.

In our final set of analyses, we show that reductions in search and bargaining costs are more pronounced when earnings announcements are more informative to securities pricing and when search and bargaining costs are highest.[5] We find that liquidity improvements are significantly larger for those earnings periods with more information content and securities more sensitive to earnings news. We also generalize our findings to show that several other scheduled and unscheduled firm-specific information events also lead to improvements in liquidity. However, we note that not all information events lead to liquidity improvements, highlighting important interactions between search and bargaining frictions and information

[5]In untabulated analyses, we provide evidence that these heterogeneous effects are attributable to the two channels discussed above, reductions in search costs and increases in investor sophistication. Therefore, the reductions in search and bargaining costs outweigh the heightened levels of information asymmetry during those more informative earnings announcements.

asymmetry. Finally, we explore how the liquidity improvements we document around earnings announcements have decreased over time, which we attribute to new technologies (i.e., electronic trading) that reduce search and bargaining costs in general.

The central contribution of our paper is to show a new avenue through which earnings announcements affect asset prices and liquidity: search and bargaining. A purely informational view of earnings announcements, the dominant paradigm in the equities literature, would predict results opposite to what we find in the corporate bond market. Specifically, extant theory posits that earnings announcements may heighten information asymmetries between market-makers (i.e., dealers) and traders around earnings announcements (Kim and Verrecchia, 1994). These predictions have been empirically verified in numerous studies documenting significant increases in information asymmetry during earnings announcements which are realized in the form of wider bid-ask spreads (e.g., Lee et al., 1993; Krinsky and Lee, 1996).[6] By contrasting our findings from the bond markets with those from the equity markets, we highlight the importance of market structure for the market reaction to earnings announcements.

We also add to a growing literature on the role of disclosure in bond markets. Prior studies in corporate bond markets mainly focus on investors' reaction to earnings announcements (Easton et al., 2009), or its relative reaction to equity markets (e.g., Hotchkiss and Ronen, 2002; Defond and Zhang, 2014; Even-Tov, 2017). We add to these studies by showing

[6]More generally, our study relates to the extensive empirical literature in the equity markets which explores various aspects of trading and liquidity dynamics around earnings announcements. For instance, see: Beaver (1968); Venkatesh and Chiang (1986); Lee (1992); Krinsky and Lee (1996); Affleck-Graves, Callahan, and Chipalkatti (2002); Landsman and Maydew (2002); Campbell, Ramadorai, and Schwartz (2009); Chakrabarty and Moulton (2012); So and Wang (2014); Levi and Zhang (2015); Beaver, McNichols, and Wang (2018, 2020); Johnson and So (2018); Blankespoor, Dehaan, Wertz, and Zhu (2019); Bhattacharya, Chakrabarty, and Wang (2020); Noh, So, and Verdi (2021); Lee and Zhu (2022).

that earnings announcements play an important role in the search and bargaining processes of these markets, affecting the realized transaction prices of customers and overall market liquidity. In doing so, we also add to the nascent literature that explores the role of disclosure in search and bargaining in OTC markets (e.g., Cuny, 2018; Cuny et al., 2021).

The rest of the paper proceeds as follows. Section 2 outlines the institutional environment and the main economic arguments related to search and bargaining in OTC markets most pertinent to our study. Section 3 describes the data used in the study and presents descriptive and summary statistics. Section 4 discusses the empirical strategy and provides the main results of the paper. Section 5 presents additional analyses showing heterogeneous effects across bonds, alternative information events, and time. Finally, in Section 6 we provide concluding remarks.

2. Institutional Background & Theoretical Motivation

Over-the-counter markets are decentralized markets in which market participants trade assets directly between themselves without a centralized exchange. At approximately $10 trillion outstanding and $34.4 billion in average daily trading volume, the U.S. corporate bond market represents one of the largest and most economically important examples of these markets.[7]

As in most OTC markets, corporate bond markets are characterized by the heavy involvement of dealers and limited market transparency (Bessembinder, Spatt, and Venkataraman, 2020).[8] To place a trade, investors need to search for a dealer willing to transact in the

[7] Calculated as of during in Q2 of 2021. See: `https://tinyurl.com/549v7xav`.
[8] We illustrate and contrast the setup of OTC markets vs. exchange markets in Figure 1.

security. Once an investor finds a dealer willing to trade, they bargain, and the resulting price reflects the outcome of these bilateral negotiations. Historically, much of this has been telephone- and voice-based, while in recent years, electronic trading has become more prevalent, but still remains limited (e.g., Hendershott and Madhavan, 2015; O'Hara and Zhou, 2021).[9]

Given this market structure, transaction costs are substantially higher in corporate bond markets than in equity markets (e.g., Edwards, Harris, and Piwowar, 2007; Goldstein, Hotchkiss, and Sirri, 2007). Although improvements in market transparency have led to reductions in transaction costs (e.g., Goldstein et al., 2007; Bessembinder and Maxwell, 2008), they remain high in comparison to their equity counterparts.[10]

A distinguishing feature of corporate bond markets is the dominance of institutional investors, such as insurance companies and mutual funds. Unsurprisingly, given the resources available to these investors, informed traders are active in corporate bond markets.[11] For instance, most relevant to our study, prior studies find a significant amount of informed trading around earnings announcements (e.g., Wei and Zhou, 2016; Even-Tov, 2017). Despite the fact that large, institutional investors are more likely to be informed, they will typically face lower transaction costs in OTC markets (e.g., Harris and Piwowar, 2006; Green et al., 2007b; Cuny et al., 2021). This finding is in contrast to the dynamics on equity markets and

[9]For instance, O'Hara and Zhou (2021) highlight that, while electronic trading has grown over the past decade, it still makes up less than 14% of market volume. They also highlight several impediments which limit the adoption of electronic trading, such as the market structure of corporate bond markets, which incumbent dealers dominate.

[10]For instance, in our sample of matched bond-equity pairs from the same firm described in Section 4.3.1, average bid-ask spreads are on average approximately 4 times larger in corporate bond markets than in equity markets as of 2020.

[11]Conversations with practitioners suggest that even among investors traditionally thought to be passive, such as insurance companies, significant resources are put into single-name security selection and trading. This may be taken care of in-house, such as at the insurer's asset management arm, or outsourced to an asset manager.

inconsistent with theories based on asymmetric information (e.g., Kyle, 1985; Easley and O'Hara, 1987).[12]

Prior theoretical work provides a basis for how search and bargaining in OTC markets can explain the large transaction costs and inverse relationship between transaction costs and transaction size found in corporate bond markets (e.g., Duffie et al., 2005; Lagos and Rocheteau, 2017). Assuming no inventory risk and symmetric information, these studies show that the availability of alternative trading counterparties (i.e., outside options) strengthens an investor's bargaining position when trading on OTC markets. When search frictions limit investors' ability to reach out to alternative trading counterparties, investors have limited outside options to trade with. As a consequence of their weakened bargaining positions relative to dealers, investors realize worse equilibrium transaction prices and wider bid-ask spreads. Furthermore, these models show that less sophisticated investors (i.e., those who have access to fewer trading counterparties), yield worse realized prices and wider bid-ask spreads.

Motivated by the above we predict that issuer-specific information releases, such as earnings announcements, can impact bond market liquidity by reducing search and bargaining

[12]We highlight that search and bargaining frictions are not the only forces changing during earnings periods. We explore the role that one critical countervailing force, increased information asymmetry, plays in Section 4.3.

frictions through two channels. We outline these channels in Figure 2.[13]

First, basic market microstructure theory has shown that willingness to trade and in turn trading volume increases with the extent of information released with a signal (e.g., Kyle, 1985; Kim and Verrecchia, 1994). Earnings announcements, arguably the most important regular information release for an individual company, induce investors and market-makers to trade in the announcing firms' securities.[14] An increase in potential trading counterparties improves the ability of market participants to find counterparties to trade with, which reduces search frictions. As a result, outside options improve for all market participants leading to lower transaction costs. Moreover, this surge in potential trading activity encourages more dealers to become active in the market for bonds of announcing firms further improving the bargaining position of all investors. The upper panel of Figure 2 illustrates this channel.

Second, because many investors trading on information during the earnings announcement period are also likely to be sophisticated investors, earnings announcements may increase the average level of investor sophistication in the marketplace. If the relative composition of sophisticated investors—who typically have higher bargaining power due to better outside options—increases, aggregate levels of liquidity may also improve. This possibility is

[13]As highlighted, both channels are directly related to the amount of information released, which induce increased market participation and encourage sophisticated traders to enter the marketplace. An alternative channel driving the liquidity improvements we document is "coordination" by investors around earnings events. Specifically, due to the relative illiquidity of these markets, investors may coordinate around an important scheduled information event, such as earnings announcements, to trade resulting in improved liquidity due to an increased number of counterparties present. This mechanism would be *similar to* predictions from Admati and Pfleiderer (1988) which, as noted by Kim and Verrecchia (1994), do not extend to public information releases. While we acknowledge such a coordination channel is possible, and cannot rule out entirely, our evidence is largely inconsistent with this channel playing a major role. For instance, as we show in Section 5.2, we find similar improvements in liquidity for some unscheduled events. Notably, this channel would also be independent of the amount of information released, but related to search and bargaining.

[14]Studies as early as Beaver (1968) have documented significant volume reactions in equity markets around earnings announcements due to its information content, with similar findings being extended to corporate bond markets more recently (e.g., Easton et al., 2009; Ronen and Zhou, 2013). Collectively, these studies show increased market participation by various market participants.

highlighted by prior studies in equity markets showing that institutional investors increase their trading behavior significantly around earnings announcements (e.g., Campbell et al., 2009; Lee and Zhu, 2022).[15] We illustrate this channel in the lower panel of Figure 2.

3. Data

3.1. Sample

To examine how earnings announcements affect search and bargaining in OTC bond markets, we focus on realized transaction prices of U.S. corporate bond trades available from the Enhanced Trade Reporting And Compliance Engine (Enhanced TRACE) database. Enhanced TRACE provides U.S. corporate bond trading data at the transaction level, including the following variables: CUSIP, date, time, price, quantity, purchase/sale distinction, and counterparty type (e.g., customer or dealer). Our sample period is from July 2002, which is the beginning of the Enhanced TRACE data, to September 2020.

Table 1 outlines our data cleaning procedures and sample selection. We first process the Enhanced TRACE data following Dick-Nielsen et al. (2012). Table 1 shows that after the data processing step, Enhanced TRACE reports 191,157,215 trades across 28,529,783 bond-days for 236,902 unique bonds during this sample period. We merge the Enhanced TRACE data with the Mergent Fixed Income Securities Database (FISD) bond characteristics data to include bond issue characteristics (e.g., issue size, bond ratings) in our analyses.

Next, we clean the data to only retain bond trades that were executed in a normal OTC

[15] At the same time, prior studies in equity markets also suggest that less sophisticated investors increase their trading activity around earnings announcements (e.g., Lee, 1992; Lawrence, Ryans, Sun, and Laptev, 2018). As aggregate liquidity in corporate bonds is a function of the *relative* proportions of these two investor types, whether liquidity improves or decreases around earnings is ex-ante unclear.

market environment, following prior studies (e.g., Bessembinder, Maxwell, and Venkataraman, 2006; Even-Tov, 2017; Cuny et al., 2021). We remove trades of privately issued and 144A bonds, which only qualified institutional investors can trade. We also drop trades of adjustable rate, foreign currency, and preferred bonds. Finally, we remove trades of bonds either at the beginning or close to the end of their life by eliminating trades within a year of the maturity date or those within 90 days of the issue date. Table 1 shows that the resulting sample has 135,568,749 trades 20,664,854 bond-days across 71,337 unique bonds.

Similar to Easton et al. (2009), who also study corporate bond trading around earnings announcements, we restrict our sample to bond-days that are within 30 trading days of a quarterly earnings announcement. We obtain quarterly earnings announcement dates from Compustat and I/B/E/S, and we use the earlier date if the two data sources disagree (e.g., Dellavigna and Pollet, 2009; Gipper, Leuz, and Maffett, 2020). Table 1 shows that this restriction leaves 107,122,643 trades across 15,718,358 bond-days for 58,143 unique bonds around 87,337 earnings announcements issued by 2,949 unique firms.

For our analysis of trading activity and transaction costs of equity securities, we use the Intraday Indicators database by WRDS, which summarizes the NYSE Trade And Quote (TAQ) data, to obtain daily measures of trading volume and bid-ask spread.

3.2. Variable Construction

To explore the impact of earnings announcements on search and bargaining in corporate bond markets, we focus on various measures of liquidity used in the literature. While there are multiple measures of bond liquidity, each imperfectly capturing different aspects of liq-

uidity (Schestag, Schuster, and Uhrig-Homburg, 2016), we focus on those most pertinent to our research question. Specifically, we are interested in those that best capture the realized prices obtained by investors and the bargaining power investors exhibit. Based on prior studies, we examine three measures of bond liquidity, commonly used in the literature, to triangulate our results: average bid-ask spread (Hong and Warga, 2000; Green et al., 2007a; Cuny et al., 2021), ask-dealer ratio (Schultz, 2012; Cuny, 2018), and imputed roundtrip cost (Dick-Nielsen et al., 2012; Feldhütter, 2012).

Our first measure is average bid-ask spread (also known as gross markup), which intuitively corresponds to the equity-market version of effective spreads. We define average bid-ask spread as:

$$Average\ Bid\text{-}Ask\ Spread_{it} = \frac{P_{it}^{Ask} - P_{it}^{Bid}}{P_{it}^{Bid}}$$

where P_{it}^{Ask} (P_{it}^{Bid}) is the volume-weighted (i.e., weighted by total par value traded) average customer purchase (sale) price of bond i on date t. Intuitively, this measure captures the average price at which investors, in aggregate, purchase and sell securities within the same trading day. To the extent that search and bargaining costs decline, these spreads are expected to be tighter (e.g., Duffie et al., 2005; Lagos and Rocheteau, 2017).[16]

Our second measure, the ask-dealer ratio, captures the prices that investors are able to purchase bonds relative to prices that dealers, who are well-connected and sophisticated

[16] An inherent limitation of all transaction-based liquidity measures is that it necessitates trade which understates liquidity costs (e.g., Dick-Nielsen and Rossi, 2019). While each liquidity measure we consider is subject to its own data requirements, this condition inherently biases our sample towards the most liquid securities. In Section 4.2, we provide evidence in the cross-section that those securities with lower average liquidity (i.e., securities with high yield, longer maturity, and conversion options) experience greater improvements in liquidity during earnings announcements. Therefore, we conclude our findings are likely to underestimate liquidity improvements due to earnings announcements.

market participants, transact amongst themselves. We define this measure as:

$$Ask\text{-}Dealer\ Ratio = \ln\left[\frac{P_{it}^{Ask}}{P_{it}^{Dealer}}\right]$$

where P_{it}^{Dealer} is the volume-weighted average inter-dealer trade price of bond i on date t, and P_{it}^{Ask} is defined as above. The rationale of the ask-dealer ratio is to measure dealer markup from inter-dealer trade prices, which are plausibly closer to the bond's "true" value of the security, rather than bid prices (e.g., Duffie et al., 2005).[17] While only capturing one-side of round-trip transactions (i.e., ignoring the customer sells), one advantage of this measure is it can be calculated for days that contain only customer purchases. Table 1 shows that the ask-dealer ratio is based on a greater number of trading days for fewer earnings announcements.

The final measure which we consider is imputed roundtrip cost. Following Feldhütter (2012), we assume that any group of two or more trades on a bond with the same volume that occur within 15 minutes to be offsetting trades executed by the same dealer (i.e., imputed roundtrip trades).[18] Given these trades, we calculate the imputed roundtrip cost as:

$$Imputed\ Roundtrip\ Cost_{it} = \frac{1}{N_{it}}\sum_{it}\frac{P_{max} - P_{min}}{P_{min}}$$

where P_{max} and P_{min} are the highest and lowest prices in each imputed roundtrip trade and

[17] We follow Cuny (2018) in our calculation. However, the measure is effectively equivalent to $\frac{P_{it}^{Ask} - P_{it}^{Dealer}}{P_{it}^{Dealer}}$, as used in Schultz (2012).

[18] The imputed roundtrip trade can go through inter-dealer trades in between as long as all trades satisfy our criteria. It is relatively rare for an imputed roundtrip trade to have only one purchase and one sale trade without inter-dealer trades (Feldhütter, 2012). For instance, a customer purchases a bond another dealer offers, resulting in a dealer-dealer transaction followed immediately by a dealer-customer transaction. As noted in (Feldhütter, 2012), this measure can most accurately be interpreted as a half-spread, as it nearly always captures one side of a trade.

N_{it} is the number of imputed roundtrip trades for bond i on date t. The short time frame in the matched trades effectively identifies trades likely executed by the same dealer, but it has its drawbacks as it relies on far fewer trades on any particular day than the other two measures. At the same time, its focus on a short time frame effectively reduces concerns that it may be changes to inventory holding costs or information asymmetry that drives our findings. For example, trades that occur in such a short time frame are more likely pre-arranged, riskless principal transactions in which the dealer does not bear inventory risks, naturally resulting in lower markup than ordinary trades the dealer engages in (Feldhütter, 2012).

In subsequent analyses, we follow prior conventions and classify bond trades into retail-sized and institutional-sized trades using the cutoff $100,000 in several of our analyses. While being a noisy classification, it is commonly used in prior studies to proxy for investor type and sophistication (e.g., Bessembinder, Jacobsen, Maxwell, and Venkataraman, 2018; Cuny et al., 2021).[19]

All other variables we use in our analyses are defined in the Appendix. All continuous variables are Winsorized at the 1st and 99th percentiles.

3.3. Descriptive Statistics

Table 2 Panel A presents descriptive statistics for our main variables. The mean (median) value for our bond liquidity variables are 96.00 (45.85) basis points (bps) for *Avg. Bid-Ask Spread*, 53.10 (21.59) bps for *Ask-Dealer Ratio*, and 54.65 (28.74) bps for *Imputed*

[19]For a fuller discussion of this design choice see: deHaan, Li, and Watts (2021); O'Hara and Zhou (2021).

Roundtrip Cost, consistent with prior studies.[20] We see that *Avg. Bid-Ask Spread* has a larger magnitude than the other two liquidity measures, which is expected since *Ask-Dealer Ratio* more accurately captures half-spreads and *Imputed Roundtrip Cost* likely captures pre-arranged principal transactions that do not impose inventory risks to the dealers.

On an average bond-day in our sample, $3.13 million in bond par value are traded across 6.43 trades (of which 2.60 are dealer trades), which results in an average volume per trade of around $494,000. The low number of transactions per bond-day (median is only 3) illustrates the relative infrequency of trade in corporate bond markets. Bonds in our sample have an average issue size of $651 million and an average time remaining to maturity of 9.10 years.

Table 2 Panel B reports pairwise Pearson and Spearman correlations between our main variables. While the three bond liquidity measures are all positively correlated, there is also substantial individual variation across the proxies, suggesting each may capture a slightly different aspect of bond liquidity. Consistent with prior studies, we see that transaction costs are generally higher for longer-maturity securities and lower-rated securities and lower for those with larger issuance sizes and greater trading volume.

Table 2 Panel C previews our main findings, and presents univariate comparisons of our main variables across earnings announcements periods ($EA\ Date = 1$) and non-earnings announcement periods ($EA\ Date = 0$). As we see, trading volume is higher, and trades are more frequent during earnings announcements. However, we see the opposite is true for each liquidity variable explored. For example, *Avg. Bid-Ask Spread* is on average 90.76 bps during earnings announcements but on average 96.20 bps on non-earnings announcement

[20] For example, the mean (median) value of *Avg. Bid-Ask Spread* is approximately 128 (93) bps and that of *Imputed Roundtrip Cost* is 61 (51) bps in Schestag et al. (2016) for a sample period from October 2004 to September 2012.

periods, showing a significant 6% difference. This preliminary result suggests that earnings announcements reduce search and bargaining costs in corporate bond markets and improve liquidity. We turn to multivariate analyses to more precisely investigate this possibility in the next section.

4. Main Results

4.1. Bond Market Liquidity Around Earnings Announcements

This section explores the impact of earnings announcements on each market liquidity variable outlined in Section 3.2. We follow prior studies (e.g., Easton et al., 2009; Even-Tov, 2017) and use an event-study design to explore how these variables respond around earnings announcements relative to non-earnings announcement periods.

We estimate:

$$Bond\,Liquidity_{it} = \beta_0 + \beta_1 EA\,Date_{it} + \gamma Controls_{it} + \lambda_{iv} + \epsilon_{it}. \tag{1}$$

using our sample of bond-day observations within 30 trading days of an earnings announcement from the bond's issuer, described in Section 3, which we denote as event v. *Bond Liquidity* is one of the three bond liquidity measures we define in Section 3.2. $EA\,Date_{it}$ is an indicator equal to 1 on the day of and the day after the earnings announcement, i.e., $t \in (0, 1)$. In our most restrictive specification, we control for bond-event fixed effects, λ_{iv}. As a result, any bond or issuer characteristic that does not vary within the event window (i.e., 30 trading days before and after the earnings announcement) are absorbed in the spec-

ification, which removes the need for many controls that prior studies find to be related to bond liquidity. Still, to increase the precision of our estimates, when showing specifications without fixed effects, we include several time-invariant controls: the bond's issue size, the coupon rate, and whether a bond is a convertible bond. In all specifications, for increased precision, we include time-variant controls for a bond's credit rating, its time to maturity, and time since issuance.[21] Furthermore, we add the issuing firm's equity market capitalization and the number of analysts following to control for the overall information environment of the firm. Standard errors are robust and clustered at the event level (i.e., the level of "treatment") following Abadie, Imbens, and Athey (2017).

Table 3 presents the results. In each panel, Column (1) does not control for any fixed effects, Column (2) controls for bond fixed effects, and Column (3), the most restrictive specification, controls for bond-event fixed effects. The coefficient of interest, β_1, is significantly negative in all columns across all panels, showing that bond liquidity increases around earnings announcements. These findings demonstrate that earnings announcements have an important role in corporate bond markets in reducing search and bargaining costs and improving liquidity.

The economic magnitudes of our findings are also significant. For instance, our estimates when including bond-event fixed effects (i.e., Column (3)) indicate *Avg. Bid-Ask Spread*, *Ask-Dealer Ratio*, and *Imputed Roundtrip Cost* are 5.52 bps, 3.56 bps, and 1.29 bps lower during earnings announcements compared to non-earnings announcement periods in the same event window, respectively. This difference is 5.75%, 6.71%, and 2.36% (12.05%, 16.50%,

[21] Prior studies have shown these variables to be important determinants of bond liquidity (e.g., Harris and Piwowar, 2006; Cuny, 2018; Cuny et al., 2021).

and 4.49%) of each variable's sample mean (median), respectively. These reductions are also economically meaningful in dollar terms. For example, the 5.52 bps reduction in *Avg. Bid-Ask Spread* translates to $44.1 billion in saved trading costs over the sample period.[22]

To better understand the dynamics of these effects, Figure 3 presents plots of daily average bond liquidity around earnings announcements for each measure discussed above. In each plot, the horizontal axis denotes the number of days relative to the earnings announcement, and the vertical axis indicates the level of spread. Consistent with a reduction in search and bargaining costs during earnings announcements, we observe that liquidity significantly increases on the earnings announcement date. We also see this increase in bond liquidity does not dissipate immediately after the earnings announcement. Although the most significant increase is focused around the earnings announcement, the effect partially persists for approximately 10 days.

We further explore the dynamics of these effects in Table 4. We regress each liquidity variable on our earnings announcement and post-earnings indicators broken out into five-day increments. Consistent with Figure 3, our estimates confirm that the reduction is largest during earnings announcements but persists to be statistically significant until two weeks (11 trading days) after the earnings announcement date.[23]

[22]This back-of-the-envelope calculation assumes that all trading happening on earnings announcement days would otherwise be conducted on non-earnings announcement days with wider spreads.

[23]Since the control variables mostly explain variation in bond liquidity across different bonds or larger time frames, most of the coefficients are statistically insignificant in our primary specification with bond-event fixed effects, which only captures variation within a short time frame for a single bond-event. In the specification without fixed effects or with only bond fixed effects (e.g., Table 3 Columns (1) and (2)), the coefficients of the control variables are statistically significant with consistent patterns with prior studies (e.g., Harris and Piwowar, 2006; Cuny et al., 2021).

4.2. Mechanism

The increase in bond liquidity around earnings announcements suggests that earnings news significantly reduces search and bargaining costs in OTC bond markets. This section examines the two mechanisms through which these reductions in search and bargaining costs occur: (i) greater availability of trading counterparties and dealers and (ii) greater investor sophistication.

We begin by investigating how earnings announcements affect investors' ability to find counterparties to trade with and access to dealers. Specifically, we consider how several key market participation variables change around earnings announcements. To do so, we re-estimate equation (1), replacing our bond liquidity measures with several market participation measures. We present in Table 5 Panel A the results showing that counterparty search and dealer accessibility improve during earnings days.

In Columns (1) and (2), we report regression results using the natural logarithm of total trading volume and the number of total trades as dependent variables, both of which capture overall levels of market participation by investors and dealers. The coefficient of interest, β_1, is positive and statistically significant in both columns. This increase in trading activity suggests that earnings announcements attract attention to the firms' bonds, making it easier for market participants to find counterparties to transact with, thus resulting in lower search costs.

As dealers are the primary counterparty with which investors transact, we next consider how dealer activity changes around earnings announcements. Column (3) of Table 5 Panel A provides evidence that market participants experience improved dealer accessibility around

earnings announcements, by showing that there are more dealer trades around earnings announcements. Column (4) provides evidence that one reason earnings announcements encourage more dealers to participate in marketmaking is that it is easier for them to offload their positions around earnings announcements due to the heightened levels of trading. This increase in dealer accessibility allows investors to access similar securities through more dealers. Thus, investors enjoy an improvement in their relative bargaining power stemming from the competition among dealers, which results in better transaction prices (e.g., Duffie et al., 2005).[24]

Next, we explore whether the level of trader sophistication changes during earnings announcement periods. We proxy for sophistication by considering whether the transaction is from a retail or institutional trader. As has been highlighted in prior research, institutional traders, who have larger dealer networks, yield more bargaining power and therefore realize lower trading costs (Harris and Piwowar, 2006; Green et al., 2007b; Cuny et al., 2021). To the extent there is an increased prevalence of institutional traders in the market, which increases the aggregate level of sophistication in these marketplaces, we would expect the aggregate level of customer bargaining power to be higher, and thus liquidity to improve.

We investigate this possibility in Panel B of Table 5. Column (1) shows that the number of institutional trades on average increases by 0.30 during earnings announcements, which is more than half of the increase in all trades (0.56 in Panel A Column (2)), despite institutional trades being far less frequent than retail trades in general. Columns (2) and (3) corroborate this finding by examining natural logarithms of institutional and retail trading volume. The

[24] Although our data does not allow us to observe dealer identities, observing more dealer trades is evidence consistent with this interpretation. Even if we could observe dealer identities, we may not see multiple dealers transacting in equilibrium. The mechanism only relies on traders having more and hence better outside options, which are not necessarily observable.

coefficient estimate on *EA Date* implies that trading volume from retail investors increases by 4% while it increases by 20% from institutional investors, i.e., the rate of increase in trading volume is 5 times higher for institutional trades than retail trades. Consequently, the proportion of retail trading volume of all trading volume significantly decreases (see Column (4)).

Figure 4 graphically presents several key empirical results, discussed above. Panel (a) of Figure 4 shows the daily incidence of trade within the event window. We plot average daily incidence, which is the ratio of daily trading volume to aggregated event-window trading volume, to have a scaled comparison between retail and institutional trade. The plot shows that incidence of trade increases around earnings announcements for all types of trade (consistent with Table 5 Panel B), but the increase is much more pronounced for institutional trade than retail trade (also consistent with Table 5 Panel B). Panel (b) of Figure 4 shows the daily number of trades within the event window, showing similar patterns to Panel (a). Overall, all types of trades experience an increase in trading frequency, but the increase is more pronounced for institutional trade.

Collectively, our findings in this section present evidence consistent with two channels through which earnings announcements result in lower search and bargaining costs in corporate bond markets. The first is expanded dealer and counterparty accessibility, which results in reduced search costs for each trader and thus aggregated market-wide benefits. The second is an increase in the aggregate level of investor sophistication, which results in greater bargaining power for the average investor.

4.3. Information Asymmetry

Prior studies highlight a deterioration in equity market liquidity around earnings announcements due to increased information asymmetry (e.g., Lee et al., 1993; Krinsky and Lee, 1996). Given the significant amounts of informed trading found around earnings announcements in corproate bond markets (e.g., Wei and Zhou, 2016; Even-Tov, 2017), we expect similar increases in information asymmetry in corporate bond markets. We briefly explore this possibility, and its implications for our findings, in this section.[25]

4.3.1. Matched Bond-Equity Analyses

We leverage the variation in equity securities to highlight the existence of information asymmetry in corporate bond markets around earnings. First, we compare our findings with the empirical patterns in equity markets for the same issuers to show the existence of increased adverse selection concerns in equity markets for the subset of companies we study. Second, we leverage variation in equity market reactions for these issuers to highlight the offsetting effects of adverse selection on general improvements in corporate bond liquidity around earnings announcements.

For each bond-event, we match the issuers' common stock and examine how trading volume and liquidity in both bond and equity markets evolve within the same event window. Table 6 Panel A presents the results using the natural logarithm of stock trading volume and effective stock bid-ask spread following Lee and Ready (1991). Consistent with prior

[25]This has two important implications for our main findings. First, any improvements in liquidity we document will underestimate the total improvement in search and bargaining frictions, given offsetting changes in liquidity results from information asymmetry. Second, while we expect corporate bond liquidity to improve around earnings announcements, given the dominant force of search and bargaining frictions in OTC markets, there are instances where this may not be the case.

studies (e.g., Lee et al., 1993; Krinsky and Lee, 1996), Column (1) shows that stock trading volume increases during earnings announcements. In contrast, Column (2) shows that stock liquidity deteriorates during earnings announcements.

Comparing this finding to that from bond markets highlights the differing role earnings announcements have on liquidity in both markets. Figure 5 graphically presents this comparison. The first plot shows that the incidence of trade sharply increases during earnings announcements in both bond and equity markets. However, the second plot shows that liquidity (*Avg. Bid-Ask Spread*) improves during earnings announcements in bond markets while deteriorating in equity markets. Despite evidence that trading volume is increasing in both markets around earnings announcements, the divergent changes in liquidity highlight that the primary economic force in each market is likely different. Earnings announcements primarily reduce search and bargaining costs in bond markets while primarily exacerbating adverse selection in equity markets.

We next leverage equity market reactions to show that the dominance of search and bargaining costs does not preclude the presence of an adverse selection channel in corporate bond markets during earnings announcements. We show evidence supporting this in Table 6 Panel B. To explore whether adverse selection affects the impact of earnings announcements on bond liquidity, we augment our main regression specification (1) and estimate:

$$\begin{aligned} Bond\,Liquidity_{it} = \beta_0 + \beta_1 EA\,Date_{it} + \beta_2 EA\,Date_{it} \times XS\text{-}Var_{iv} \\ + \gamma Controls_{it} + \lambda_{iv} + \epsilon_{it}. \end{aligned} \tag{2}$$

We estimate this equation using the cross-sectional variable $Increased\ Info.\ Asymm.$ as

$XS\text{-}Var$, which is an indicator variable that equals one if the matched stock-event exhibits an increase in bid-ask spread during the earnings announcement.[26] The results in Table 6 Panel B show that for *Avg. Bid-Ask Spread* and *Ask-Dealer Ratio*, deterioration in stock liquidity corresponds to smaller liquidity improvements in bond markets as well.[27] For example, *Avg. Bid-Ask Spread* decreases by 6.62 bps during earnings announcements if the matched stock liquidity does not deteriorate, but the decrease falls to 4.58 bps if the matched stock liquidity does deteriorate.

Collectively, these findings highlight that information asymmetry is increasing for the set of issuers we study during earnings announcements, which leads to offsetting decreases in liquidity.

4.3.2. Heterogeneity in Effects Across Transaction Sizes

To provide further evidence of the interaction between search and bargaining and information asymmetry within bond markets, we also examine whether our main finding varies across trader types based on their trade sizes. As noted in prior sections, trade size not only reflects the overall level of sophistication of investors, but also increases the propensity for these investors to be informed. Therefore, we may expect heterogeneity in the impact of earnings on transaction costs *across* trade sizes for two reasons. First, sophisticated traders are more likely to be informed and place the most capital at risk for dealers to transact with. Second, sophisticated traders already experience better liquidity due to their superior bar-

[26] Many prior studies leverage increases in equity market bid-ask spread around earnings announcements as evidence of increased information asymmetry during these events. While imperfect, it allows us to identify earnings events where information asymmetry is of significant concern, orthogonal to characteristics that also affect search and bargaining frictions.

[27] In the cross-sectional analyses, the cross-sectional variable, $XS\text{-}Var$, is defined at the event level. As a result, the main effect of the cross-sectional variable is subsumed by bond-event fixed effects.

gaining power, so a further reduction in search and bargaining costs may be marginal. Given the above, earnings announcements may result in smaller liquidity gains or even deterioration in liquidity during earnings announcements for larger trades.

We estimate specification (1) with separate bond liquidity measures for retail-sized (less than or equal to $100,000 in par value) and institutional trades, the latter further divided into small (greater than $100,000 but less than or equal to $1 million in par value) and large institutional trades (greater than $1 million in par value) (e.g., O'Hara and Zhou, 2021). For example, we calculate three versions of *Avg. Bid-Ask Spread* for each trading day, each only using average prices across small, medium, or large trades. This separation is similar to size-based calculations of spreads in prior studies (e.g., Edwards et al., 2007; Schestag et al., 2016; Cuny et al., 2021).

Table 7 presents our findings. Across all measures, bond liquidity significantly improves around earnings announcements for retail-sized and small institutional trades. In contrast, bond liquidity deteriorates around earnings announcements for large institutional trades, significantly for *Avg. Bid-Ask Spread* and *Imputed Roundtrip Cost*. For example, *Avg. Bid-Ask Spread* decreases by 1.07 bps (1.25 bps) during earnings announcements for retail-sized (small institutional) trades but increases by 0.91 bps for large institutional trades.[28] These findings are consistent with increases in information asymmetry in bond markets during earnings announcements, highlighting that the bond liquidity effects we document are a net effect of multiple economic forces.

[28]Since large institutional investors already experience a lower level of transaction costs in general, their larger presence around earnings announcements contribute to an overall market-wide improvement in bond liquidity (through the investor sophistication channel we describe in Section 4.2), despite them experiencing higher transaction costs themselves during earnings announcements.

5. Additional Analyses

5.1. The Role of Information Content in Search and Bargaining

Given the channels we outline in Section 2, we expect improvements in liquidity to be most significant in cases where earnings announcements provide more information relevant for bond market participants.[29] To explore these issues, we leverage cross-sectional variation across two dimensions: characteristics of earnings announcements and bond characteristics.

We first examine variation across earnings announcements. We consider two measures that prior studies show to lead to heterogeneous reactions to earnings announcements: loss (*Loss*) and absolute unexpected earnings ($|SUE|$ *Rank*). As prior studies highlight, a bond's payoff may be less sensitive to positive earnings news given its payoff profile, so losses are more relevant for bondholders than profits (e.g., Easton et al., 2009). Similarly, the magnitude of the absolute earnings surprise is likely a signal about the variance of the underlying cash flows (e.g., Affleck-Graves et al., 2002; Back, Crotty, and Li, 2018).

Table 8 presents the results of these cross-sectional analyses. Panels A and B show cross-sectional analyses using *Loss* and $|SUE|$ *Rank*, respectively. The results show that the coefficient of interest, β_2, is negative across all columns in all panels, significantly so in five of those six columns (the exception being *Imputed Roundtrip Cost* for *Loss*). The main coefficient of *EA Date*, β_1, is also negative and significant in all cases. Therefore, for earnings announcements where firms report losses and which contain the most surprising earnings

[29] Specifically, it is in these cases where earnings announcements are likely to induce more investors to change their positions, making it easier for a bond trader or dealer to search for counterparties. The information also facilitates the bargaining process since these parties may be more sophisticated. These inferences corroborate our findings in previous sections that bond liquidity increases around earnings announcements primarily because investors find it easier to search for dealers and have increased bargaining power.

news, we see they exhibit even greater improvements in bond liquidity. For example, *Avg. Bid-Ask Spread* decreases by 4.26 bps around positive earnings announcements, but the decrease jumps to 11.19 bps for negative earnings announcements, showing an incremental decrease of 6.93 bps. This finding is consistent with our prediction that earnings characteristics that are more informationally useful to investors lead to a larger reduction in search and bargaining costs around earnings announcements.[30]

Our second set of cross-sectional analyses examines three bond characteristics that make bonds more information-sensitive. Prior studies have shown that bonds with more equity-like payoffs, those with high yield (*High Yield*) and longer maturities (*Long Maturity*), are more sensitive to news and risk factors (e.g., Even-Tov, 2017; Painter, 2020). Relatedly, convertible securities (*Convertible*), which are hybrid instruments that directly increase in value from equity price gains (e.g., Choi, Getmansky, and Tookes, 2009), are likely to behave the most like equities and be most responsive to earnings news.

We present our cross-sectional findings related to bond characteristics in Table 9. Panels A, B, and C show cross-sectional analyses using *High Yield*, *Long Maturity*, and *Convertible*, respectively. The results show that the coefficient of interest, β_2, is significantly negative across all columns in all panels. The main coefficient of *EA Date*, β_1, is also negative and significant in all cases. Therefore, while we find that all bonds experience increases in liquidity around earnings announcements, high-yield bonds, bonds with long maturities, and

[30]These earnings characteristics have been associated with increased levels of information asymmetry, as measured by increased spreads, in equity markets (e.g., Affleck-Graves et al., 2002; Wittenberg-Moerman, 2008; Ng, Verrecchia, and Weber, 2009; Back et al., 2018). While this result may seemingly contrast with our findings in Section 4.3.1, we note that in untabulated analyses, we find that these earnings characteristics lead to substantially more significant impacts on the mechanisms related to search and bargaining (i.e., those described in Section 4.2). Moreover, our analyses in Section 4.3.1 more precisely capture earnings events with increases in information asymmetry.

convertible bonds exhibit even greater improvements. For example, *Avg. Bid-Ask Spread* decreases by 3.75 bps around earnings announcements for investment-grade bonds, but the decrease jumps to 9.99 bps for high-yield bonds, showing an incremental decrease of 6.24 bps. This finding is consistent with our prediction that more information-sensitive bonds experience a larger reduction in search and bargaining costs around earnings announcements, and as a result, increased liquidity.

Collectively, our findings in this section suggest that the reduction in search and bargaining costs around earnings announcements is more prominent the more information content the earnings announcement has for the relevant payoff of the security.[31] Consistent with this reasoning, untabulated analyses show that the cross-sectional variables are associated with increased market participation and aggregate investor sophistication during earnings announcements.

5.2. Alternative Events

Although we focus on earnings announcements, our results likely generalize to other information events that provide issuer-specific information. To provide some evidence of this generalizability, we examine two other information events, 10-K publications and credit rating changes. For these analyses, we re-estimate specification (1) using samples around 10-K publications or credit rating changes instead of earnings announcements as the focal event. We present the results in Table 10.

[31] These findings also alleviate the concern that our main findings are not driven by sophisticated traders' informed trading but by liquidity traders' portfolio rebalancing. For instance, in the case of high yield bonds, regulatory restrictions prevent many more passive institutions (e.g., pension funds and insurance companies) from transacting in the securities (e.g., White, 2010). Therefore, these transactions are more likely to be related to informed transactions during the earnings period.

We first examine 10-K publications, which are qualitatively similar to earnings announcements, but contain less information (e.g., Basu, Duong, Markov, and Tan, 2013). Therefore, we can also examine whether an event's effect on liquidity is proportional to its informativeness.[32] Table 10 Panel A shows that 10-K publications have a similar effect on bond liquidity as earnings announcements, evidenced by the significantly negative coefficients in all three columns. However, since 10-K publications are less informative than earnings announcements, the coefficients are smaller in magnitude than their counterparts in Table 3. The three coefficients, −2.70, −1.54, and −0.96 for *Avg. Bid-Ask Spread*, *Ask-Dealer Ratio*, and *Imputed Roundtrip Cost*, respectively, are 51.12%, 56.78%, and 25.63% smaller in magnitude than in Table 3, suggesting a smaller effect of 10-K publications on search and bargaining costs.

We also examine credit rating changes as an alternative event. Credit rating changes are comparable to earnings announcements in terms of informational importance, but they have a noticeable difference in that they are *unscheduled* events. Table 10 Panel B presents the results. In the analysis, we examine the effect of credit rating changes based on the nature of the change. The main coefficient of *Rating Date* is negative across all columns, significantly so in two of the three columns (the exception being *Ask-Dealer Ratio*), showing that bond liquidity generally improves for credit rating upgrades, similar to earnings announcements. This finding suggests that our main finding can generalize into unscheduled events as well.[33]

[32]The other event we examine, credit rating changes, are different from earnings announcements in various aspects, so a comparison of economic magnitudes does not provide much insight.

[33]Prior studies suggest that these findings may be partially due to reductions in adverse selection around credit rating upgrades (e.g., He, Wang, and Wei, 2011). Similar to findings in Amiram, Owens, and Rozenbaum (2016), who study analyst revisions, these reductions may stem from the new information primarily benefiting uninformed investors. This finding also alleviates the concern that our findings are driven by simple "coordination" in the market, since credit rating changes are unscheduled events.

However, the coefficients for interactive terms capturing credit rating downgrades show that such improvements in liquidity largely disappear or even reverse in some instances. The result could be attributable to spikes in information asymmetry dominating any search and bargaining benefits of the event (e.g., He et al., 2011). Alternatively, it could be that credit rating downgrades have detrimental effects directly on search and bargaining costs as well. This is because credit rating downgrades can limit investors who can own the bonds due to regulation-based holding rules (e.g., for insurance companies and banks), reducing market participation.[34] These results suggest that although our main findings are generalizable to many other events, there are exceptions based on the nature of the information event that could make search and bargaining costs increase or make information asymmetry the dominant effect.

5.3. Time-series Analyses

In our final analysis, we examine whether the effects we document are changing over time. Given technological improvements in OTC markets over time, such as the spread of electronic trading, which reduce search and bargaining frictions (O'Hara and Zhou, 2021), we may expect to find attenuated effects over time. In effect, the passage of time is an indirect way to capture the gradual and monotonic improvements in bond market technologies which reduces search costs.[35]

Table 11 presents the results. Panel A uses $Year\ Trend$, a variable that captures a linear time-trend in years (i.e., the number of years elapsed since the start of our sample period

[34]The triggering of regulation-based holding rules is a major aspect that distinguishes credit rating downgrades from loss announcements, which lead to improved bond liquidity in Section 5.1.

[35]We caveat that passage of time can capture multiple developments in bond markets, not necessarily limited to technological aspects.

in 2002) as the cross-sectional variable, $XS\text{-}Var$, in specification (2). The results show that the coefficient of interest, β_2, is significantly positive across all three columns, suggesting that the improvement in bond liquidity around earnings announcements is attenuated in more recent years. Panel B examines the same time trend in a more non-linear fashion using separate indicator variables for subperiods 2011-2013, 2014-2016, and 2017-2020 for interactions, with largely similar results. These findings are consistent with technological improvements dampening the search and bargaining benefits of earnings announcements, since search and bargaining becomes less of a concern in general with such developments.

6. Conclusion

This study documents that earnings announcements improve liquidity in U.S. corporate bond markets, one of the world's largest OTC markets, through reductions in search and bargaining frictions. We further show that the reductions in search and bargaining costs are primarily driven by information-based trade and mask the opposing effect of increased information asymmetry, which dominates equity markets over the same period. Our findings also highlight that these effects generalize to several other important firm-specific information events. Overall, we provide new evidence on an important channel through which earnings announcements impact asset prices and liquidity: search and bargaining.

While our findings are primarily based on U.S. corporate bond markets, our inferences likely generalize to many other issuer-specific news events and OTC market settings. Two characteristics of OTC markets are necessary for our results to generalize. First, markets must exhibit high search and bargaining frictions, mainly a function of the relative frag-

mentation and illiquidity of the market. Second, issuer-specific information must be an important component of markets and drive trading activity. While many markets meet the above qualifications (e.g., municipal securities or corporate loan markets), some do not, such as U.S. treasury or agency bond markets. These limitations noted, our collective findings highlight an important channel through which information can impact asset prices and liquidity in many OTC markets, which exhibit high search and bargaining frictions and trade on issuer-specific information.

Appendix. Variable Definitions

This table contains descriptions of the primary variables used throughout this paper. These include bond trading activity and pricing data, bond characteristics, and bond issuer-level fundamentals. Sources include: Enhanced TRACE (TRACE), Compustat (COMP), the Center for Research in Security Prices (CRSP), Thompson Reuters I/B/E/S (IBES), Intraday Indicators by WRDS (WRDS), and Mergent FISD (FISD). All continuous variables are Winsorized at 1% and 99%.

Variable	**Description**
	Liquidity variables
Avg. Bid-Ask Spread	The percentage difference between volume-weighted average bid and ask price for a bond in a trading day (measured in basis points). "Volume-weighted" prices use total par value of bonds traded as weights. For details see Section 3.2. (TRACE)
Ask-Dealer Ratio (AD-Ratio)	The natural logarithm of the ratio of volume-weighted average ask and dealer price for a bond in a trading day (measured in basis points). "Volume-weighted" prices use total par value of bonds traded as weights. For details see Section 3.2. (TRACE)
Imputed Roundtrip Cost (IRC)	The percentage difference between the high and the low price for transactions of the same par value of a bond occurring within a 15-minute window (measured in basis points). For details see Section 3.2. (TRACE)
Effective Spread	The percentage daily effective spread of a stock (measured in basis points). (WRDS)
	Earnings announcement variables
EA Date	An indicator of whether a date is on or one day after an earnings announcement. (COMP, IBES, TRACE)
Increased Info. Assym.	An indicator variable of whether the effective spread of a firm's stock increases during the earnings announcement period. (TAQ)
Loss	An indicator of whether the company announced negative earnings. (COMP)
SUE	Standardized unexpected earnings. Defined as the realized EPS minus EPS from four quarters prior, scaled by price. (COMP)
|SUE| Rank	Within-quarter quintile-ranked absolute SUE that takes value from 0-4. (COMP)
Year Trend	A linear trend variable counting from 0 for the year 2002 to 18 for the year 2020.
	Trading activity variables
# Trades	Number of daily distinct trades in one bond. (TRACE)
# Trades (Dealers)	Number of daily distinct trades in one bond between dealers. (TRACE)
# Trades (Inst)	Number of daily distinct customer trades in one bond over $100,000. (TRACE)
Avg. Trade Size	Total trading volume divided by the number of trades (measured in thousands). (TRACE)
Incidence of Trade	Percentage of all trading volume occurring on trading day $t \in (-30, 30)$ from an earnings announcement by the sum of all trading volume in the 61 day window around the earnings announcement. (TRACE, WRDS)

Inst. Volume	Total transacted amount in non-dealer trades valued at or above $100,000 (measured in thousands). (TRACE)
Retail Trades	Ratio of retail trading volume divided by Total trading volume (measured in percent). (TRACE)
Retail Volume	Total transacted amount in non-dealer trades valued below $100,000 (measured in thousands). (TRACE)
Total Volume	Total trading volume per bond per day (measured in thousands). (TRACE)
LVol	The natural logarithm of a security's total daily trading volume. (TRACE, WRDS)
P(Offset)	An indicator whether both a customer buy and sell transaction of a bond occur in the same day. (TRACE)
	Bond characteristics
Coupon rate	Coupon offered by bond (measured in percentages). (FISD)
Convertible	An indicator of whether a bond is a convertible bond. (FISD)
High Yield	An indicator of whether the bond rating is not considered investment grade according to its S&P rating (i.e., at least BBB-). (FISD)
Issuance Size	Total dollar amount of bond issued (measured in millions). (FISD)
Long Maturity	An indicator of whether a bond's maturity is longer than the yearly sample median. (FISD, TRACE)
Rating	A number from 1-23 corresponding to the bond's S&P rating (AAA = 1, NR = 23) following Avramov, Chordia, Jostova, and Philipov (2007). (FISD, TRACE)
Years since Issuance	Time from issuance of each bond (measured in years). (FISD, TRACE)
Years to Maturity	Time to maturity of each bond (measured in years). (FISD, TRACE)
	Firm characteristics
# Analyst Following	Number of analysts following as measured by earnings forecasts available in the 90 days prior to an earnings announcement (IBES)
Equity Market Cap	Stock market capitalization (measured in millions). (CRSP)
	Alternative information event variables
10-K Date	An indicator of whether a date is on or one day after a 10-K publication date on SEC's EDGAR website.
Rating Date	An indicator of whether a date is on or one day after a credit rating change date following Ellul, Jotikasthira, and Lundblad (2011).
Downgrade	An indicator of whether the ratings change is a downgrade.
to Junk	An indicator of whether the credit rating change is a downgrade from investment grade to junk grade.

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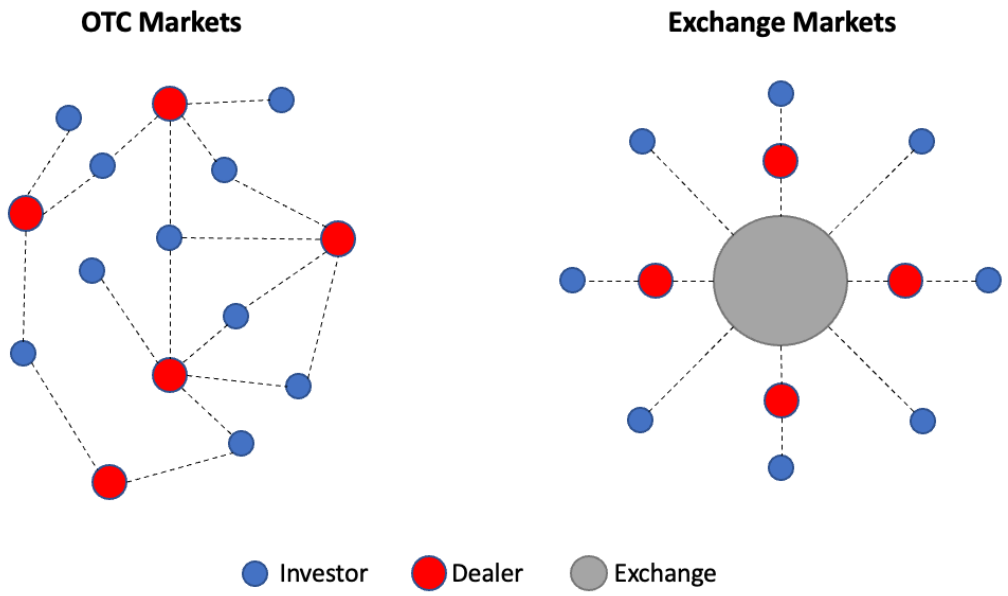


Fig. 1 Comparison of Market Structures
This figure illustrates the market structure of OTC markets vs. exchange-traded markets. In the case of OTC markets (on the left), each investor is connected to disparate dealers through which they transact. In contrast, in the case of equity markets, investors (occasionally through dealers) place transactions through a centralized exchange.

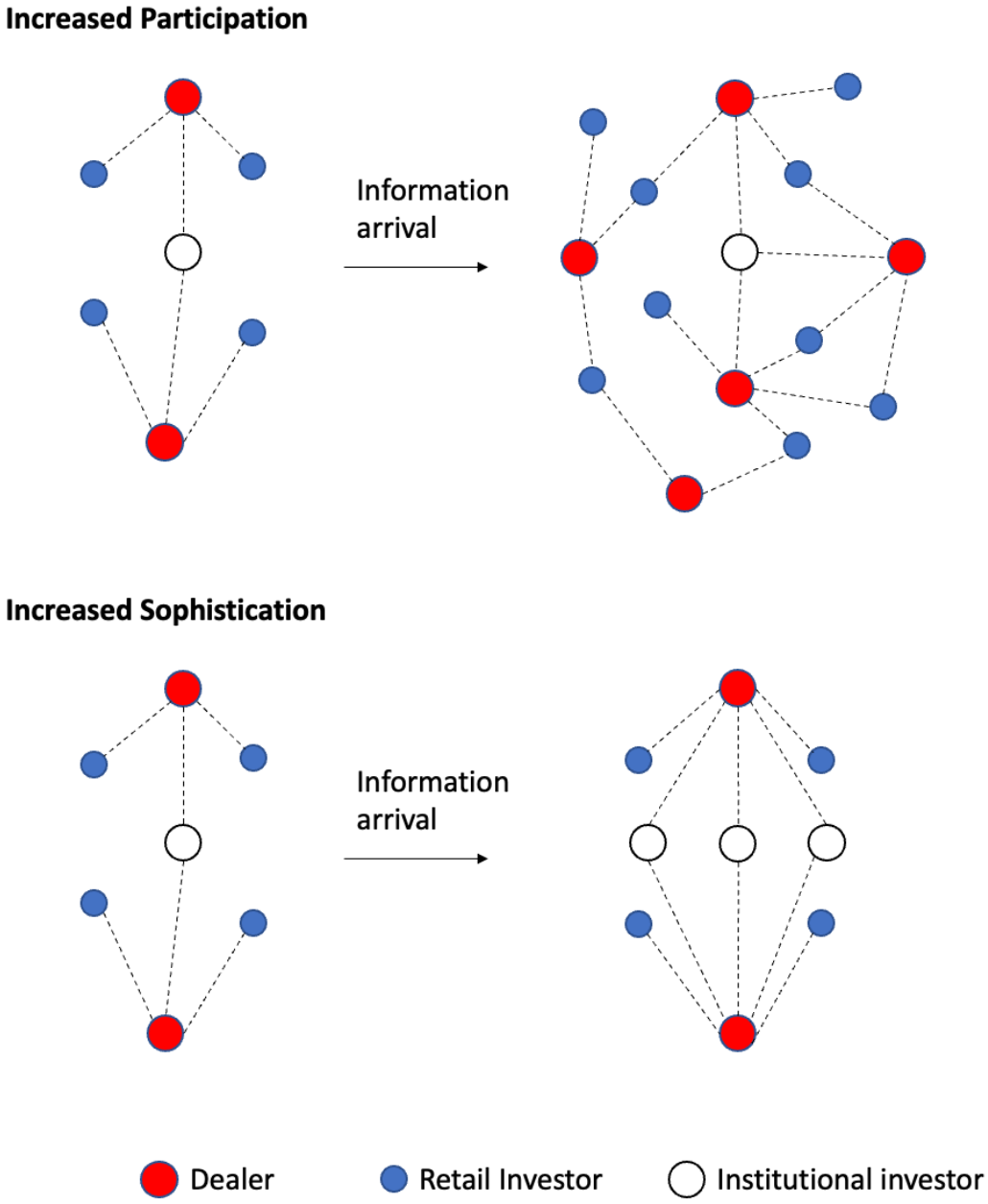
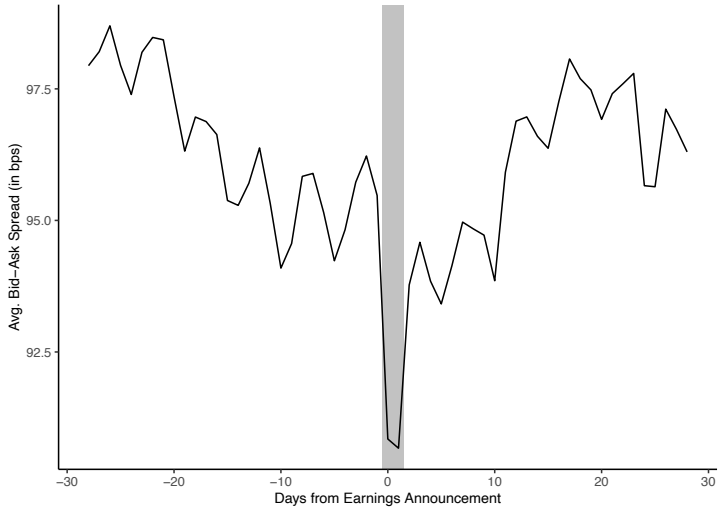
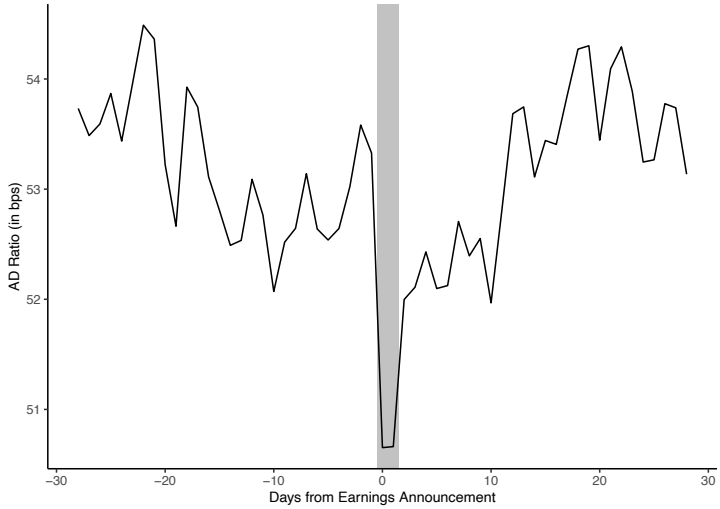


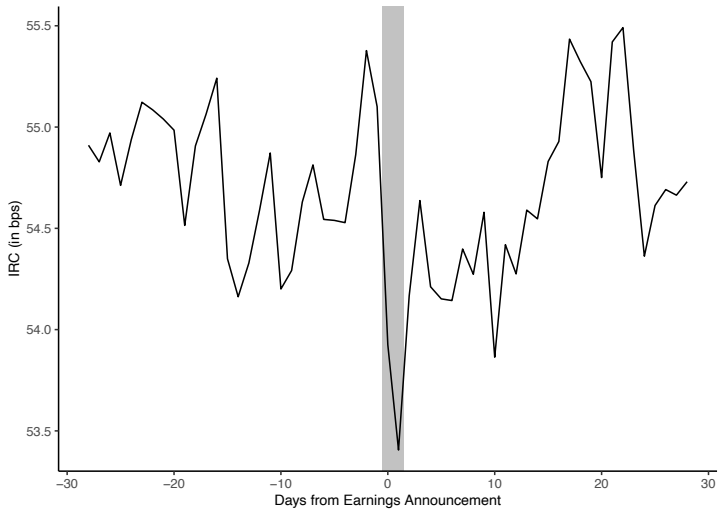
Fig. 2 Theoretical Mechanisms
This figure illustrates the theoretical mechanisms that lead to reductions in search and bargaining costs during earnings announcements. The upper panel highlights how information may cause increased market participation, which reduces search costs. The lower panel illustrates that information will lead to an increased presence of sophisticated (institutional) investors, who have higher bargaining power.



(a) Avg. Bid-Ask Spread

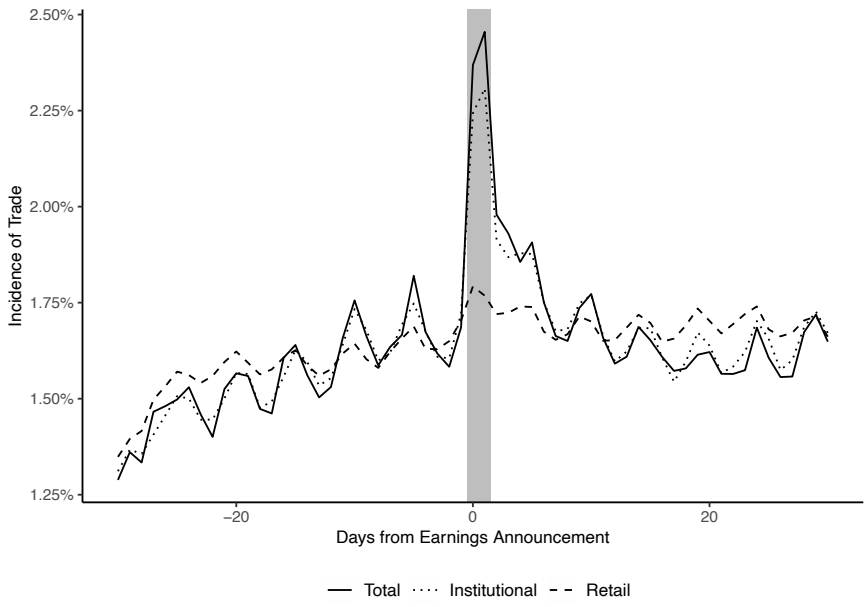


(b) Ask-Dealer Ratio

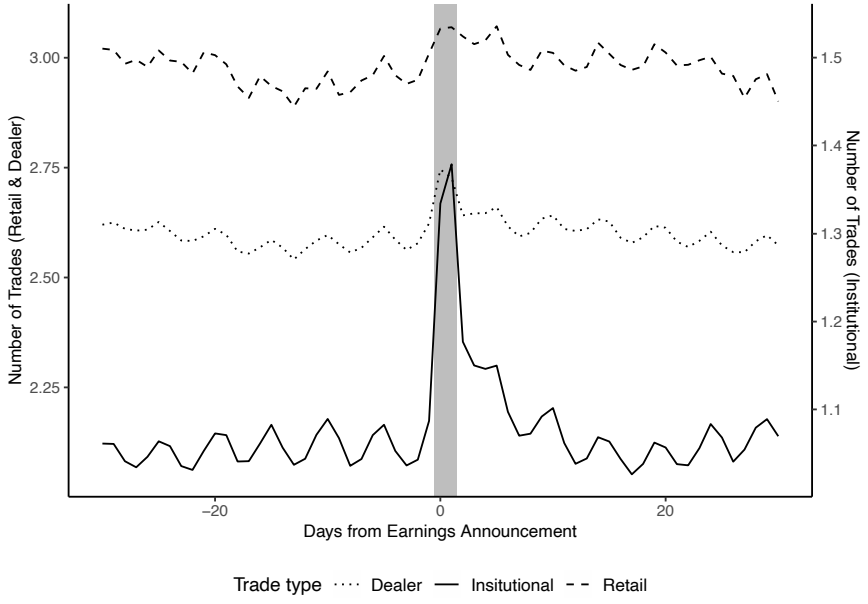


(c) Imputed Roundtrip Cost

Fig. 3 Liquidity Measures around Earnings Announcements
This figure presents average bond liquidity around earnings announcements. Panels (a), (b), and (c) present average values of Avg. Bid-Ask Spread, Ask-Dealer Ratio, and Imputed Roundtrip Cost, respectively, for each trading day relative to the issuers' earnings announcement. The grey, vertical shaded area presents our defined earnings period ($t \in \{0, 1\}$). All measures are as defined in the Appendix and Section 3.2. Calculations are based on the full sample, described in Section 3.

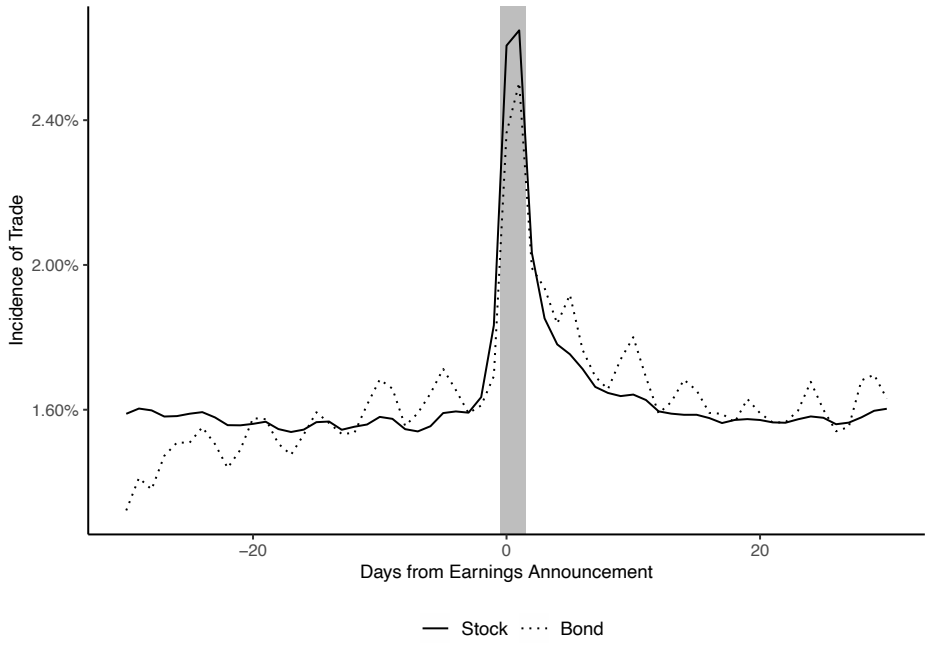


(a) Incidence of Trade

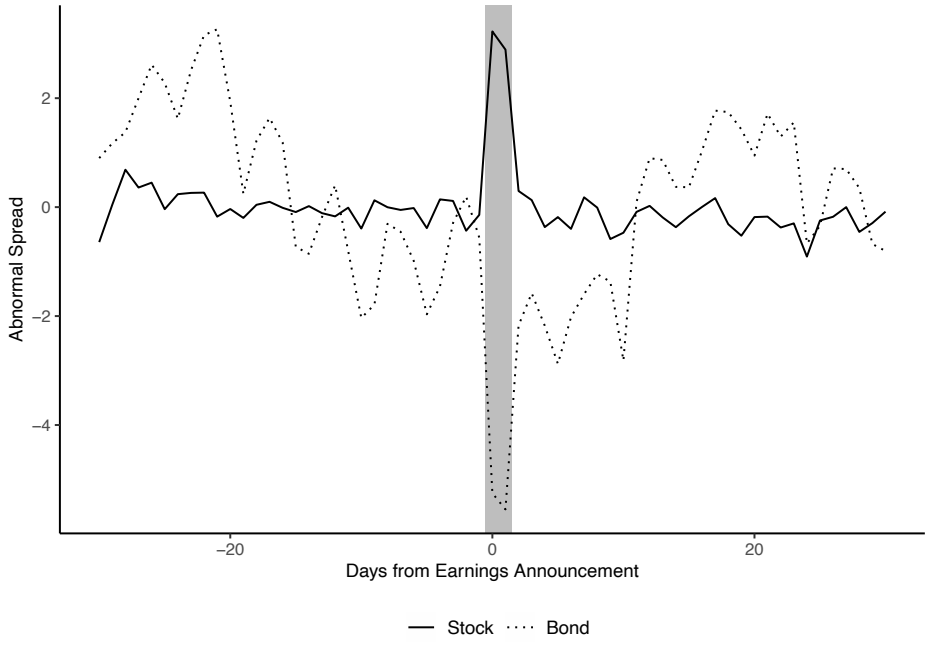


(b) Number of Trades

Fig. 4 Trading activity around earnings announcements
This figure presents average bond trading activity around earnings announcements. Panel (a) presents average total, retail, and institutional incidence of trade for each trading day relative to the issuers' earnings announcement. Incidence of trade is calculated by dividing the sum of all trading volume occurring on trading day $t \in (-30, 30)$ from an earnings announcement by the sum of all trading volume in the 61 day window around the earnings announcement. Panel (b) presents the average number of retail, institutional, and dealer trades for each trading day relative to the issuers' earnings announcement. The grey, vertical shaded area presents our defined earnings period ($t \in \{0, 1\}$). All measures are as defined in the Appendix. Calculations are based on the full sample, described in Section 3.



(a) Incidence of Trade



(b) Spreads

Fig. 5 Matched-pair analysis
This figure presents average stock and bond trading activity and liquidity around earnings announcements. Panel (a) shows the aggregate incidence of trade for both bonds and matched stocks for each trading day relative to the issuers' earnings announcement. Incidence of trade is calculated by dividing the sum of all trading volume occurring on trading day $t \in (-30, 30)$ from an earnings announcement by the sum of all trading volume during the full period. Panel (b) shows the mean abnormal spread for both bonds (Avg. Bid-Ask Spread) and matched stocks for each trading day relative to the issuers' earnings announcement. Abnormal spread is the respective spread measure less the mean spread measure in trading days $t \in (-30, -11)$. The grey, vertical shaded area presents our defined earnings period ($t \in \{0, 1\}$). All measures are as defined in the Appendix and Section 3.2. Calculations are based on the full sample, described in Section 3.

Table 1
Sample Selection

	EAs	Firms	Bonds	Trades	Trading Days
TRACE					
Enhanced TRACE sample after cleaning following Dick-Nielsen et al. (2012)			236,902	191,157,215	28,529,783
Drop:					
Missing Mergent FISD match			-50,208	-9,641,019	-2,067,842
Privately issued and 144A bonds			-2,634	-792,935	-132,021
Adjustable rate, foreign currency, and preferred bonds			-77,232	-19,782,090	-2,774,925
Trades within 1 year of bond maturity			-3,233	-11,432,410	-1,875,625
Trades within or 90 days of bond issuance			-32,258	-13,940,012	-1,014,516
Cleaned TRACE Sample			71,337	135,568,749	20,664,854
CUSIP - PERMNO match			-11,429	-12,040,043	-2,464,957
TRACE sample to be merged with EA sample		3,053	59,908	123,528,706	18,199,897
Earnings Announcements					
Full EA sample	395,598	11,583			
GVKEY - PERMNO match	-6,002	-50			
No concurrent outstanding bonds	-283,816	-8,369			
EA sample to be merged with TRACE sample	105,780	3,164	156,732		
Merge TRACE and EA sample:					
Merged EA-TRACE sample	87,337	2,949	58,143	107,122,643	15,718,358
Availability of liquidity measures					
Avg. Bid-Ask Spread	81,424	2,927	43,714	81,736,643	7,134,356
AD Ratio	77,347	2,855	44,089	89,453,806	8,246,006
IRC	81,501	2,924	50,569	80,193,812	7,758,629

This table summarizes the sample selection process. The full sample period spans from July 2002, the beginning of the Enhanced TRACE data, until September 2020. A full description of the sample and data steps is described in Section 3.

Table 2
Summary Statistics

Panel A: Descriptive Statistics

	Mean	StDev	$p^{10\%}$	$p^{25\%}$	$p^{50\%}$	$p^{75\%}$	$p^{90\%}$
Avg. Bid-Ask Spread	95.999	127.372	2.941	16.512	45.853	129.400	267.444
Ask-Dealer Ratio	53.104	104.298	-4.473	4.267	21.591	75.321	164.716
IRC	54.651	62.857	4.920	9.674	28.739	79.123	142.940
Total Volume ($M)	3,130.009	24,824.735	18.000	50.000	300.000	2,000.000	7,500.000
Retail Volume ($M)	118.227	188.101	0.000	10.000	50.000	140.000	313.000
Inst. Volume ($M)	2,562.297	6,283.250	0.000	0.000	150.000	1,870.000	7,295.000
Avg. Trade Size ($M)	493.618	1,067.693	9.000	18.571	65.000	400.000	1,475.000
# Trades	6.425	8.384	1.000	2.000	3.000	7.000	15.000
# Trades (Dealer)	2.601	3.858	0.000	0.000	1.000	3.000	7.000
Issuance Size ($MM)	651.331	701.794	21.630	250.000	500.000	850.000	1,500.000
Years to Maturity	9.102	8.001	1.992	3.422	6.137	10.874	24.005
Rating	9.037	4.884	4.000	6.000	8.000	10.000	15.000
SUE	-0.003	0.067	-0.027	-0.005	0.001	0.006	0.022

Panel B: Pairwise Correlations

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
[1] Avg. Bid-Ask Spread		0.691	0.511	-0.396	0.119	-0.415	-0.453	0.014	0.085	-0.323	0.240	-0.002	-0.041
[2] Ask-Dealer Ratio	0.663		0.505	-0.209	0.059	-0.249	-0.255	-0.002	0.040	-0.224	0.219	0.049	-0.027
[3] IRC	0.508	0.428		-0.218	0.098	-0.228	-0.280	0.008	-0.006	-0.221	0.215	0.009	-0.028
[4] Total Volume ($M)	-0.072	-0.041	-0.031		0.195	0.929	0.908	0.514	0.332	0.505	-0.025	0.139	-0.008
[5] Retail Volume ($M)	0.038	0.012	0.025	0.073		-0.035	-0.086	0.717	0.672	0.253	-0.130	-0.070	-0.024
[6] Inst. Volume ($M)	-0.229	-0.129	-0.102	0.361	0.178		0.888	0.358	0.189	0.468	0.003	0.138	-0.002
[7] Avg. Trade Size ($M)	-0.229	-0.124	-0.141	0.239	-0.134	0.670		0.133	-0.013	0.402	0.020	0.149	0.005
[8] # Trades	-0.017	-0.020	-0.006	0.140	0.864	0.359	-0.042		0.859	0.398	-0.114	0.018	-0.027
[9] # Dealer Trades	0.012	-0.011	-0.024	0.115	0.813	0.292	-0.086	0.926		0.303	-0.126	-0.001	-0.030
[10] Issuance Size ($MM)	-0.251	-0.148	-0.152	0.109	0.330	0.315	0.114	0.418	0.364		-0.048	-0.040	-0.006
[11] Years to Maturity	0.239	0.213	0.264	0.009	-0.107	0.028	0.079	-0.099	-0.111	0.001		-0.035	-0.009
[12] Rating	-0.006	0.044	-0.011	0.019	-0.030	0.067	0.095	-0.001	-0.007	-0.083	-0.079		0.011
[13] SUE	-0.061	-0.046	-0.030	-0.005	-0.027	-0.017	-0.002	-0.031	-0.030	0.010	0.007	-0.038	

Panel C: Univariate Comparisons

	EA Date	Non-EA Date	Difference
Avg. Bid-Ask Spread	90.759	96.195	-5.436***
Ask-Dealer Ratio	50.658	53.194	-2.536***
IRC	53.667	54.687	-1.020***
Total Volume ($M)	4,348.097	3,086.192	1,261.905***
Retail Volume ($M)	121.229	118.119	3.110***
Inst. Volume ($M)	3,357.884	2,533.678	824.205***
Avg. Trade Size ($M)	579.888	490.514	89.373***
# Trades	6.842	6.410	0.432***
# Trades (Dealers)	2.736	2.596	0.140***

Panel A summarizes descriptive statistics of the data. Panel B shows pairwise correlation coefficients. Pearson correlation coefficients are shown in the upper triangle and Spearman coefficients in the lower triangle. Panel C shows the result of a test for mean differences in a subset of the variables of interest between earnings announcement periods and non-earnings announcement periods. $M stands for $1,000 and $MM stands for $1,000,000. All statistics are calculated using the full sample of data described in Section 3. Levels of significance (calculated using two-sided t-tests) are presented as follows: *p<0.1; **p<0.05; ***p<0.01. All variables are as defined in the Appendix.

Table 3
The Effect of Earnings Announcements on Bond Liquidity

Panel A: Average Bid-Ask Spread

	(1)	(2)	(3)
EA Date	-6.566***	-5.463***	-5.524***
	(0.280)	(0.252)	(0.248)
Controls	Yes	Yes	Yes
Bond fixed effects	No	Yes	No
Bond-Event fixed effects	No	No	Yes
Observations	6,689,845	6,689,845	6,689,845
Adjusted R^2	0.214	0.390	0.521

Panel B: Ask-Dealer Ratio

	(1)	(2)	(3)
EA Date	-3.715***	-3.532***	-3.563***
	(0.259)	(0.238)	(0.245)
Controls	Yes	Yes	Yes
Bond fixed effects	No	Yes	No
Bond-Event fixed effects	No	No	Yes
Observations	7,761,877	7,761,877	7,761,877
Adjusted R^2	0.093	0.181	0.262

Panel C: Imputed Roundtrip Cost

	(1)	(2)	(3)
EA Date	-1.428***	-1.354***	-1.291***
	(0.135)	(0.125)	(0.125)
Controls	Yes	Yes	Yes
Bond fixed effects	No	Yes	No
Bond-Event fixed effects	No	No	Yes
Observations	7,295,142	7,295,142	7,295,142
Adjusted R^2	0.131	0.267	0.353

This table presents estimates of the effect of earnings announcements on measures of corporate bond liquidity. Panels A, B, and C examine these effects on Avg. B-A Spread, A-D Ratio, and IRC, respectively. The variable of interest is EA Date, an indicator variable equal to one in the earnings announcement period of the bonds' issuing firm. All estimates are calculated using the full sample of data described in Section 3, and all variables are described as in the Appendix. Robust standard errors, clustered by earnings announcement, are reported in parentheses. Levels of significance are presented as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 4
Event-day Analysis

	Avg. B-A Spread (1)	A-D Ratio (2)	IRC (3)
EA Date	-5.949***	-3.819***	-1.405***
	(0.257)	(0.251)	(0.128)
$t \in (2, 6)$	-3.167***	-1.791***	-0.684***
	(0.199)	(0.163)	(0.092)
$t \in (7, 11)$	-1.743***	-1.070***	-0.481***
	(0.219)	(0.173)	(0.090)
$t \in (12, 16)$	0.281	0.092	-0.090
	(0.235)	(0.197)	(0.088)
Rating	-0.107	0.798**	0.098
	(0.371)	(0.313)	(0.114)
Years to Maturity	1.114	2.985	1.003
	(9.025)	(5.935)	(2.418)
Years since Issuance	-8.211	-0.032	-3.823
	(8.933)	(5.901)	(2.449)
Log Equity Market Cap	3.311	4.456***	3.067***
	(4.798)	(1.710)	(0.802)
Analyst Following	0.401	0.218	0.037
	(0.942)	(0.439)	(0.238)
Controls	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes
Observations	6,689,891	7,761,931	7,295,209
Adjusted R^2	0.522	0.262	0.353

This table presents estimates of the post-announcement dynamic effects of earnings announcements on measures of corporate bond liquidity. The variable of interest is EA Date, an indicator variable equal to one in the earnings announcement period of the bonds' issuing firm. All estimates are calculated using the full sample of data described in Section 3, and all variables are described as in the Appendix. Robust standard errors, clustered by earnings announcement, are reported in parentheses. Levels of significance are presented as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 5
Mechanisms

Panel A: Search and Intermediation

	LVol	# Trades	# Trades (Dealers)	P(Offset)
	(1)	(2)	(3)	(4)
EA Date	0.205***	0.564***	0.202***	0.023***
	(0.004)	(0.015)	(0.006)	(0.001)
Controls	Yes	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes	Yes
Observations	14,700,477	14,700,477	14,700,477	14,700,477
Adjusted R^2	0.440	0.662	0.607	0.286

Panel B: Investor Sophistication

	# Trades (Inst)	LVol (Inst)	LVol (Retail)	Retail Trades (%)
	(1)	(2)	(3)	(4)
EA Date	0.295***	0.199***	0.039***	-0.027***
	(0.006)	(0.004)	(0.002)	(0.001)
Controls	Yes	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes	Yes
Observations	14,700,477	7,650,742	12,136,684	14,700,477
Adjusted R^2	0.369	0.224	0.400	0.368

This table presents analyses that examine two potential economic mechanisms underlying the liquidity effect around earnings announcements. Panel A presents estimates to explore changes in dealer and counterparty accessibility around earnings announcements. The dependent variable in each column represents a measure of market participation and trading activity, as defined in the Appendix. Panel B examines how aggregate investor sophistication changes around earnings announcements by analyzing the composition of retail and institutional presence in the market. Each dependent variable of interest represents measures of institutional and retail investor market participation around earnings announcement. All estimates are calculated using the full sample of data described in Section 3, and all variables are described as in the Appendix. Robust standard errors, clustered by earnings announcement, are reported in parentheses. Levels of significance are presented as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 6
Stock-Bond Matched Pair Analysis

Panel A: Stock Market Effects

	LVol	Effective Spread
	(1)	(2)
EA Date	0.533***	2.540***
	(0.003)	(0.138)
Controls	Yes	Yes
Stock-Event fixed effects	Yes	Yes
Observations	3,873,960	3,871,100
Adjusted R^2	0.612	0.367

Panel B: Information Asymmetry

	Avg. B-A Spread	A-D Ratio	IRC
	(1)	(2)	(3)
EA Date	-6.623***	-4.006***	-1.030***
	(0.439)	(0.379)	(0.222)
EA Date × Increased Info. Assym.	2.046***	0.921*	-0.383
	(0.581)	(0.534)	(0.296)
Controls	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes
Observations	4,797,815	5,715,498	5,405,912
Adjusted R^2	0.537	0.275	0.351

This table presents analyses of bond and stock market liquidity around earnings announcements using matched pairs of firms' bonds and equity from the same issuer. Panel A reports the changes in the natural logarithm of trading volume (LVol) and effective spread around earnings announcements for the corresponding stocks during earnings. Panel B explores whether changes in the underlying information asymmetry around the earnings announcement, as measured by equity market reactions, affect the impact of earnings announcements on bond market liquidity. EA Date is an indicator variable equal to one in the earnings announcement period of the bonds' issuing firm. All estimates are calculated using the full sample of data described in Section 3 and 4.3.1, and all variables are described as in the Appendix. Robust standard errors, clustered by earnings announcement, are reported in parentheses. Levels of significance are presented as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 7
Cross-Sectional Analyses: Transaction Size

Panel A: Average Bid-Ask Spread

Trade Size	Retail (1)	Small Inst. (2)	Large Inst. (3)
EA Date	-1.069***	-1.249***	0.907***
	(0.348)	(0.365)	(0.282)
Controls	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes
Observations	4,461,263	1,372,097	1,085,935
Adjusted R^2	0.602	0.329	0.262

Panel B: Ask-Dealer Ratio

Trade Size	Retail (1)	Small Inst. (2)	Large Inst. (3)
EA Date	-0.750***	-0.825***	0.349
	(0.190)	(0.255)	(0.414)
Controls	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes
Observations	6,437,474	1,659,083	535,264
Adjusted R^2	0.423	0.256	0.108

Panel C: Imputed Roundtrip Cost

Trade Size	Retail (1)	Small Inst. (2)	Large Inst. (3)
EA Date	-0.858***	-0.460**	1.585***
	(0.145)	(0.181)	(0.237)
Controls	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes
Observations	6,092,852	1,704,969	672,394
Adjusted R^2	0.354	0.255	0.414

This table examines whether earnings announcements have a differential impact on the liquidity of bond trades of different types. The dependent variables of interest are Avg. Bid-Ask Spread in Panel A, AD Ratio in Panel B, and IRC in Panel C. Each dependent variable of interest represents measures of corporate bond liquidity, as defined in the Appendix and described in Section 3.2. Column headers indicate whether the measure of corporate bond liquidity is constructed from transactions which are classified as retail (less or equal to $100,000 in par value), small institutional-sized (Small Inst.) (greater than $100,000 but less than or equal to $ 1 million in par value), or large institutional-sized (Large Inst.)(more than $ 1 million in par value). All estimates are calculated using the full sample of data described in Section 3, and all variables are described as in the Appendix. Robust standard errors, clustered by earnings announcement, are reported in parentheses. Levels of significance are presented as follows: *p<0.1; **p<0.05; ***p<0.01..

Table 8
Cross-sectional Analyses: Earnings Characteristics

Panel A: Earnings Sign

	Avg. B-A Spread (1)	A-D Ratio (2)	IRC (3)
EA Date	-4.255***	-2.650***	-1.190***
	(0.247)	(0.223)	(0.134)
EA Date × Loss	-6.931***	-5.351***	-0.541
	(0.803)	(0.957)	(0.357)
Controls	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes
Observations	6,687,394	7,759,416	7,292,496
Adjusted R^2	0.522	0.262	0.353

Panel B: Absolute Earnings Surprise

	Avg. B-A Spread (1)	A-D Ratio (2)	IRC (3)
EA Date	-1.914***	-0.882***	-0.651***
	(0.351)	(0.327)	(0.198)
EA Date × |SUE| Rank	-2.021***	-1.522***	-0.353***
	(0.199)	(0.219)	(0.096)
Controls	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes
Observations	6,664,907	7,734,948	7,269,059
Adjusted R^2	0.522	0.262	0.353

This table presents estimates of the cross-sectional effect of earnings characteristics on the impact of earnings announcements on corporate bond liquidity. In Panel A, Loss is an indicator variable equal to one if the firm reported negative earnings on the earnings announcement corresponding to the event period. In Panel B, |SUE| Rank is the year-quarter quintile-ranked absolute standardized unexpected earnings for the earnings announcement corresponding to the event period. Note that higher ranks correspond to higher values of |SUE|. EA Date is an indicator variable equal to one in the earnings announcement period of the bonds' issuing firm. All estimates are calculated using the full sample of data described in Section 3, and all variables are described as in the Appendix. Robust standard errors, clustered by earnings announcement, are reported in parentheses. Levels of significance are presented as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 9
Cross-sectional Analyses: Bond Characteristics

Panel A: High Yield

	Avg. B-A Spread (1)	A-D Ratio (2)	IRC (3)
EA Date	-3.749***	-1.952***	-1.003***
	(0.281)	(0.236)	(0.143)
EA Date × High Yield	-6.244***	-6.746***	-1.161***
	(0.557)	(0.729)	(0.292)
Controls	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes
Observations	6,689,845	7,761,877	7,295,142
Adjusted R^2	0.521	0.262	0.353

Panel B: Longer Maturity

	Avg. B-A Spread (1)	A-D Ratio (2)	IRC (3)
EA Date	-4.735***	-3.098***	-0.890***
	(0.287)	(0.282)	(0.127)
EA Date × Long Maturity	-1.637***	-1.005**	-0.825***
	(0.435)	(0.435)	(0.241)
Controls	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes
Observations	6,689,845	7,761,877	7,295,142
Adjusted R^2	0.521	0.262	0.353

Panel C: Convertibles

	Avg. B-A Spread (1)	A-D Ratio (2)	IRC (3)
EA Date	-5.224***	-3.084***	-1.250***
	(0.256)	(0.244)	(0.127)
EA Date × Convertible	-5.189***	-13.772***	-1.248*
	(0.975)	(1.881)	(0.741)
Controls	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes
Observations	6,689,845	7,761,877	7,295,142
Adjusted R^2	0.521	0.262	0.353

This table presents estimates of the cross-sectional effect of bonds characteristics on the impact of earnings announcements on measures of corporate bond liquidity. Panel A examines the differential effect of earnings announcements for investment grade (High Yield = 0) and non-investment grade (High Yield = 1) bonds as determined by their S&P rating. Panel B examines the differential effect of earnings announcements for bonds of different maturity. Long Maturity is defined as an indicator equal to one if a bond's maturity is longer than the yearly sample median. Panel C examines the differential effect on convertible bonds. EA Date is an indicator variable equal to one in the earnings announcement period of the bonds' issuing firm. All estimates are calculated using the full sample of data described in Section 3, and all variables are described as in the Appendix. Robust standard errors, clustered by earnings announcement, are reported in parentheses. Levels of significance are presented as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 10
Alternative Information Events

Panel A: 10-K Publications

	Avg. B-A Spread (1)	A-D Ratio (2)	IRC (3)
10-K Date	-2.695***	-1.536***	-0.961***
	(0.268)	(0.247)	(0.125)
Controls	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes
Observations	6,146,790	7,155,101	6,748,939
Adjusted R^2	0.520	0.263	0.354

Panel B: Credit Rating Changes

	Avg. B-A Spread (1)	A-D Ratio (2)	IRC (3)
Rating Date	-4.697***	-1.139	-1.774***
	(1.190)	(0.918)	(0.575)
Rating Date × Downgrade	4.773**	1.170	0.662
	(2.170)	(1.689)	(0.751)
Rating Date × Downgrade × to Junk	5.382	2.555	0.468
	(5.157)	(6.135)	(1.900)
Controls	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes
Observations	1,045,159	1,172,359	1,158,332
Adjusted R^2	0.492	0.213	0.353

This table presents estimates of how other firm-specific information events affect measures of corporate bond liquidity. Panel A examines the liquidity changes around the 10-K publication date on SEC's EDGAR website. The variable of interest is 10-K Date, an indicator variable equal to one on the day of the 10-K release and the following day. Panel B examines the liquidity responses around changes in a bond's credit rating. We follow Ellul et al. (2011) and only consider those dates when the first rating agency changes its rating. Rating Date is an indicator variable equal to one on the day of the credit rating change and the following day. Downgrade indicates that the credit rating change was a downgrade and *to Junk* indicates a downgrade from investment grade to junk grade. All estimates are calculated using the full sample of data described in Section 3, and all variables are described as in the Appendix. Robust standard errors, clustered by event (either 10-K publication or credit rating change), are reported in parentheses. Levels of significance are presented as follows: *p<0.1; **p<0.05; ***p<0.01.

Table 11
Time-series Analyses: Exploring the Impact of Improved Technologies

Panel A: Year-trend

	(1)	(2)	(3)
EA Date	-7.155***	-6.198***	-2.175***
	(0.697)	(0.766)	(0.347)
EA Date × Year Trend	0.154***	0.240***	0.081***
	(0.054)	(0.055)	(0.027)
Controls	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes
Observations	6,689,845	7,761,877	7,295,142
Adjusted R^2	0.521	0.262	0.353

Panel B: Sub-periods

	(1)	(2)	(3)
EA Date	-6.827***	-5.050***	-1.688***
	(0.551)	(0.640)	(0.262)
EA Date × (2011, 2013)	1.303*	0.978	0.178
	(0.760)	(0.765)	(0.400)
EA Date × (2014, 2016)	2.389***	2.043***	0.057
	(0.692)	(0.761)	(0.368)
EA Date × (2017, 2020)	2.080***	2.904***	1.146***
	(0.663)	(0.697)	(0.321)
Controls	Yes	Yes	Yes
Bond-Event fixed effects	Yes	Yes	Yes
Observations	6,689,845	7,761,877	7,295,142
Adjusted R^2	0.521	0.262	0.353

This table presents estimates of how the effect of earnings announcements on measures of corporate bond liquidity has changed over time with the increase in electronic trading on corporate bond markets. Both Panels examine Avg. B-A Spread, A-D Ratio, and IRC as measures of bond liquidity. Panel A examines how the estimated effect of EA Date changes with a linear time-trend in years. Panel B examines the effect of EA Date in different sub-periods. The reference period is 2002 – 2010. The variable of interest is EA Date, an indicator variable equal to one in the earnings announcement period of the bonds' issuing firm. All estimates are calculated using the full sample of data described in Section 3, and all variables are described as in the Appendix. Robust standard errors, clustered by earnings announcement, are reported in parentheses. Levels of significance are presented as follows: *p<0.1; **p<0.05; ***p<0.01.