Bank-affiliation and Information Leakage around Earnings Announcement: Evidence from Turkish REITs*

Murat Tiniç[1] and Zeynep Onder[2]

[1] Kadir Has University, Department of International Trade and Finance, 34083 Cibali Fatih İstanbul, Turkey. Corresponding author: murat.tinic@khas.edu.tr

[2] Ihsan Dogramaci Bilkent University, Faculty of Business Administration, 06800 Bilkent Ankara Turkey.

* Authors gratefully acknowledge the financial support of the Scientific and Technological Research Council of Turkey (TUBITAK). The grant number is 123K234.

This draft: January 14, 2025

Preliminary and incomplete

Abstract

This paper examines whether the bank-affiliated brokerage houses actively use the private information they possess about their affiliated publicly traded real estate investment trusts (REITs) around earnings announcements in Borsa Istanbul (BIST) between 2005 and 2015. The legal framework surrounding Turkish Real Estate Investment Trusts makes it particularly interesting to investigate the secondary market implications of the information asymmetry between majority and minority shareholders within BIST. We propose bank affiliation as a potential mechanism for disseminating private information about the official quarterly earnings announcements for the first time in the literature by assigning exogenous classifications across different investor types at high frequency. Our results indicate a substantial informed trading activity passing through bank-affiliated brokerage houses around earnings announcements, especially with the increase in earnings (when the announcement carries good news). Through intraday panel regressions, we also document that private information attributed to trades submitted through affiliated brokerage houses significantly enhances market quality by increasing future liquidity and reducing future volatility levels, whereas private information percolated through unaffiliated brokerage houses demand liquidity and increases volatility, reducing overall market quality.

1. Introduction

The corporate governance structures widely differ between developed and emerging markets. In developed (mostly Anglo-Saxon) markets, managers have financial interests that often conflict with the incentives of the outside shareholders (Jensen and Meckling, 1976). The seminal work of Shleifer and Vishney (1997) underline the role of large shareholders (blockholders) who can influence managerial decisions due to their ability to enforce control over the firm. Blockholders also have higher incentives to monitor corporate actions as they internalize the benefits from their monitoring effort (Meuller, 1969; Jensen, 1986). Even though the influence of large shareholders partially eliminates the agency problems between outside shareholders and managers, it creates

incentive conflicts between majority and minority shareholders. The theoretical framework of Stulz (1988) indicates a concave relationship between managerial ownership and firm value where the entrenchment effect of blockholders limits growth after a certain level of ownership, expropriating minority shareholders. The corporate governance structures in developing economies (and non-Anglo-Saxon developed markets) provide weaker protections towards expropriation. Most emerging economies have a limited number of publicly listed firms. Moreover, the control of public firms is mainly concentrated in a single large shareholder, usually a controlling family who is also directly involved in the management of the firm (La Porta et al., 1999; Claessens et al., 2000; Faccio and Lang, 2002). While outstanding shareholders can usually benefit from substantial cash-flow rights in these governance structures, control over corporate decisions stays within a concentrated group through pyramidal structures, cross-ownership, dual-class shares, and other control-enhancing devices (Nenova, 2003).

Business groups are formed when several different firms operating in various industries come together via formal and informal ties. The group-affiliated firms tend to be considerably large and systematically important in many emerging (and non-Anglo-Saxon developed) economies, even though the diversification of business groups varies across different countries. Large shareholders have the incentive and, in most cases, control right to appoint "right-hand" managers, which enables them to directly monitor the managerial/activities/corporate decisions within the business group.

The long-term relationship *within* the firms in a business group can be more potent, especially in countries with limited contract enforcement, weak rule of law, or judicial system and corruption. In such countries, forming outside connections can be expensive and inefficient (Khanna and

Yafeh, 2007). A business group's involvement in developing financial conglomerates[1] would be more substantial when the transaction costs associated with outside connections are higher (Leff, 1978; Khanna and Yafeh, 2007). Controlling shareholders can actively use group-based financial institutions, especially when access to external capital is scarce. In addition, information sharing within group-affiliated financial institutions or between affiliated financial and non-financial firms can lead to better investment decisions.

The role of bank affiliation is extensively studied in different areas in the literature, such as mutual fund performance (Massa and Rehman, 2008: Bhattacharya et al., 2013), hedge fund performance (Zheng and Yan, 2021), and around corporate activities such as mergers and acquisitions (Allen et al., 2004; Bittner et al., 2023). Group-affiliated financial institutions can also play an active role in secondary markets. In their seminal work, Golez and Marin (2015) document that ownership of asset management companies systematically influences capital allocation and impacts the asset prices of affiliated commercial banks.

While several empirical studies highlight a positive relationship between concentrated ownership and information asymmetry in developed markets (Heflin and Shaw, 2000; Rubin, 2007; Jiang et al., (2011)), these studies rely on endogenous classification of informed trades, which may depend on the interaction between different types of traders (Menkveld and Soru, 2023). This paper examines whether business group-affiliated brokerage houses actively use the private information they possess about publicly traded real estate investment trusts (REITs) around earnings announcements in the Turkish stock market, Borsa Istanbul (BIST), between 2005 and 2015. In that regard, we can explore bank affiliation as a potential mechanism for disseminating private information about the official announcements of quarterly earnings for the first time in the

[1] Financial conglomerates can be define as business groups that engage in deposits, issuing loans, securities underwriting, mutual fund services, and brokerage operations in secondary markets (Laeven and Levine, 2007).

literature by assigning exogenous classifications across different investor types. In this study, we also examine whether bank-affiliated brokers play an active role in establishing market quality at the intraday frequency.

BIST is an order-driven market where the buy and sell orders match electronically concerning price and time priority (Aktas and Kryzanowski, 2014). The Capital Markets Law in Turkey mandates that all publicly traded firms to disclose their corporate announcements *first* on the fully electronic and centralized disclosure system called the Public Disclosure Platform. Unlike many emerging and developed markets, this mandate provides reliable and accurate identification of exact time stamps on corporate announcements (Simsir and Simsek, 2022). During our sample period, no broker serves as a designated market maker. In addition, there is no heterogeneity across investors vis-à-vis order submission or trade execution latency. Therefore, none of the brokerage houses in our sample can serve as voluntary market makers. These attributes allow us to isolate the role of business group affiliation in disseminating private information about earnings announcements and establishing market quality in the secondary markets.

In an emerging economy, BIST provides an ideal environment for examining the role of market intermediaries in disseminating the private information they obtain from the real world to financial markets around corporate events. Firstly, the corporate governance structure surrounding Turkish firms resembles the "insider" system (Yurtoglu, 2000; Orbay and Yurtoglu, 2006), where the number of publicly traded firms is limited. Yurtoglu (2000) and Orbay and Yurtoglu (2006) also argue that Turkish firms exhibit highly concentrated ownership and centralized control structures. A significant proportion of the public corporations in BIST operate under a business group. Yurtoglu (2000) also argues that every private bank established in Turkey is part of a business group, ultimately owned and managed by a family. While some groups sold their banks to foreign

investors in recent years, the tendency for large business groups to structure themselves around a commercial bank continues to be prominent. This tendency aligns with the standard theoretical arguments that predict business groups' significant participation in the financial sector as a substitute for imperfect capital markets (Leff, 1978; Khanna and Yafeh, 2007).

Secondly, Turkey provides a distinct opportunity to investigate bank affiliation on information dissemination in secondary markets. Commercial and investment banks (that are already part of a business group) are usually structured as financial conglomerates with various operations, such as insurance companies, closed-end funds, brokerage firms operating in BIST, and REITs[2]. Bank affiliation has direct consequences in the Turkish equity markets. Guner and Onder (2022) have recently shown that bank-affiliated closed-end funds are trading at a discount compared to independent funds, controlling for fund characteristics and market conditions.

Lastly, unlike many studies for emerging and developed economies, we distinguish traders in the intraday limit order book data at the broker level for BIST stocks. We, therefore, can assign exogenous classifications for informed traders across different investor types depending on their affiliation with any stock around earnings announcements at high frequency.

The legal framework surrounding Turkish Real Estate Investment Trusts makes it particularly interesting to investigate the secondary market implications of the information asymmetry between majority and minority shareholders within BIST. More specifically, unlike any other sector within the BIST, Turkish Capital Markets Law exempts REITs from income tax while allowing them complete flexibility in their capital distribution policies. More specifically, the Turkish legal code enables REITs to retain the free cash flows entirely within the company, allowing them to use it for new investments. However, the high levels of cash held within the company and under the

[2] Many affiliated firms actively use the name of their parent bank to benefit from its reputation (Guner and Onder, 2022).

control of REIT managers may lead to agency problems (Jensen, 1986). Shareholders may, therefore, demand the company management increase debt levels (try to rely on the monitoring power of banks) (Erol and Tirtiroglu, 2011), make high dividend payments to investors (Rozeff, 1982), or redirect the retained earnings towards positive net-present value projects (Jensen, 1986). In this context, agency problems may arise, potentially influencing secondary market quality for Turkish REITs. However, unlike their counterparts in developed or other emerging economies, Turkish Capital Markets Law mandates that at least one-fourth of a company formed within the Turkish REIT structure must be owned by a "lead entrepreneur."[3] More importantly, existing studies in the literature indicate that lead entrepreneurs for Turkish REITs are typically financial institutions, primarily deposit and investment banks, and these institutional investors often hold a significant portion of GYO shares well beyond the legal limit (Yurtoglu, 2000; Erol and Tirtiroglu, 2011).

The highly concentrated ownership structures uniquely position Turkish REITs in the existing literature for uncovering the relationship between ownership structures and secondary market quality. Grier and Zychowicz (1994) argue that concentrated owners in publicly traded companies can effectively control company managers and wield significant influence over corporate decisions. Under the Turkish setting, previous literature underlines that financial conglomerates have the desire and, in many cases, the ownership right to appoint right-hand managers in publicly traded REITs (Yurtoglu, 2000; Erol and Tirtiroglu, 2011). Due to their strong supervisory capabilities and high ownership percentages, financial conglomerates, as lead entrepreneurs, may have effective decision-making power in company management, mitigating agency problems between shareholders and managers in Turkish REITs. However, considering the information

[3] The mandate on lead-entrepreneurs was subject to a change in 2013. Yonder (2015) provides an excellent review on the legal structure surrounding Turkish Real Estate Investment Trusts.

advantage that managers (and, therefore, the financial conglomerate) may have regarding the true value of the company compared to outsiders (Damadoran and Liu, 1993), the Turkish legal code creates significant information asymmetries between majority shareholders and minority shareholders for REITs in secondary markets.

We form a sample of 767 different earnings announcements for all publicly traded REITs between 2005 and 2015 and classify each announcement as "Good" or "Bad" news, depending on the earnings per share changes. Our results indicate that the 20-day cumulative abnormal returns before Good (Bad) earnings releases are positive (negative) and statistically significant. In particular, the cumulative average abnormal return in the pre-announcement period, CAR(-20,0) for the Good News (Bad News) events is around 1.1% (-1.6%) and statistically significant at a 10% (1%) level. Our results indicate that both the statistical and the economic significance of the cumulative abnormal returns and the persistence of post-announcement drift seem more evident for events that carry Bad News.

Importantly, we observe that the price reaction to earnings announcements (whether they carry good or bad news) is considerably more limited than responses observed in developed markets (see, for example, Vega, 2006). The narrow magnitude of price reaction may be attributable to information leakage problems, particularly evident in BIST (Hekimoglu and Tanyeri, 2011; Simsir and Simsek, 2022).

We then examine whether there is an information leakage problem before the earnings announcement in BIST. More importantly, we explore the prospect of business group affiliation as a plausible economic mechanism for the information leakage problem. Our results suggest that the cumulative net (buy minus sell) trades of the affiliated brokerage houses reach up to 80 million TL (around 40 million U.S. Dollars) in the pre-announcement period covering four weeks prior to the

official announcement day. Therefore, we argue that the clients of brokerage houses in the same business group with the underlying REIT firm initiate to take net buy positions on the REIT stock much earlier than the earnings announcements. To the extent that trade imbalances proxy for information asymmetry, these findings may suggest that there is substantial informed trading activity passing through affiliate brokerage houses around earnings announcements, which further underscore the importance of bank affiliation in disseminating private information about earnings prospects for Turkish REITs.

We further document a statistically significant increase in net (informed) trade flow passing through affiliated brokers in the pre-announcement period in a panel regression setting where we control for potential unobserved heterogeneity across brokers, REITs, and time. In particular, we show that the net trade flow passing through the affiliated brokerage houses in the pre-announcement window, on average, increases by 15%, suggesting that the rise in informed trading activity is also economically significant. The informed trading activity seems more evident for the earnings announcements carrying Good News for the underlying REIT stock. In particular, for the events where an EPS increase is announced, the net trade flow through affiliated brokerage houses in the pre-announcement window increases by 26%. On the contrary, we observe no significant change in the net trade flow when the announcement carries Bad News.

The asymmetry in the informational content of affiliated brokerage houses is reminiscent of the results presented by Tiniç, Savaser, and Salih (2022), which document a significant additional price impact associated with proprietary buy trades in BIST but not proprietary sell trades. Prior literature also demonstrates these asymmetric price impacts of institutional investors, and studies argue such asymmetric price effects may arise because stock sales decisions are primarily

motivated by liquidity-related reasons rather than information-based decisions (Chan and Lakonishok, 1993; Keim and Madhavan, 1995; Griffiths et al., 2000; Saar 2001).

Finally, we examine the predictive relationship between informed trading activity (proxied by market toxicity measures) associated with affiliated and unaffiliated brokers and secondary market quality (proxied by liquidity and volatility) via intraday panel regressions. Our results suggest that private information percolated through business group-affiliated brokerage houses can positively impact the market quality of the stocks of group REITs. We show that private information attributed to trades submitted through affiliated brokerage houses significantly enhances future liquidity and reduces future volatility levels. On the contrary, private information percolated through unaffiliated brokerage houses demand liquidity and increases volatility, reducing overall market quality.

Overall, our findings support the conjecture that the private information about earnings announcements is (at least in part) disseminated by the business group affiliated brokerage houses, particularly when the announcement carries positive news about the underlying firm. Further, our results indicate brokerage houses can actively increase the intraday market quality of business group affiliated firms through informed trading activities. To the best of our knowledge, this study is first to propose business group affiliation as an information dissemination mechanism. Consequently, we argue that business group affiliations may lead to the intentional disclosure of private information by affiliated brokers before corporate events, even in order-drive markets where brokers are assumed to be passive agents, transmitting clients' orders to the exchange.

Our results directly contribute to the literature on insider trading. Early studies reveal a significant impact of illicit trades by insiders on price formation and overall trade volume (Muelbroek, 1992; Chakravarty and McConnell, 1997; Fishe and Robe, 2004, among others). Intraday analyses of

legal insider trades support the argument that such trades contribute to faster price discovery in the short term (Aktas et al., 2004; Inci et al., 2010; Inci and Seyhun, 2012). McNally et al. (2017) emphasize brokers tipping their clients about insider trades, while Barbon et al. (2019) argue that brokers can leak information about the order flow of connected clients. Simsir and Simsek (2022) examine the short-term impact of legal insider trading on the price discovery process for BIST. In many emerging markets, including BIST, informed trading activity is observed several days before the official announcement of corporate events. Information shocks, measured by changes in the adverse selection components of the spread, are also found to systematically impact equity prices in BIST (Savaser and Tiniç, 2023). Prior studies refer to insider trading, tipping, and other methods of disseminating private information as sources of information leakage before corporate events (Bhattacharya et al., 2000; Bhattacharya and Douk, 2002; Hekimoglu and Tanyeri, 2011; Griffin et al., 2011; Arslan and Simsir, 2016), even though the identity of informed investors is not always confirmed. These studies rely on the endogenous classification of informed traders, which may depend on the interaction between different types of traders (Menkveld and Soru, 2023). In this context, we propose linking the endogenous informativeness of trades with the exogenous affiliation within business groups, providing a direct economic mechanism for disseminating private information before the earnings announcements.

We also contribute to the literature examining the role of intermediaries in order-driven markets where there are no designated or voluntary market makers. In such trading environments, classical market microstructure models assume brokers to be passive agents whose primary role is to transmit client orders to the exchange (Harris, 2003). While numerous studies focus on the price discovery process in order-driven settings (Parlour, 1998; Ranaldo, 2004; Foucault et al., 2007; Cao et al., 2009), the number of studies examining brokers' roles as information aggregators

remains limited. The increasing prevalence of order-driven markets globally might suggest that the information role of market intermediaries in the price discovery process will be restricted in the future. However, we argue that bank affiliations can result in the intentional disclosure of private information surrounding earnings announcements, which implies that even in order-driven settings without designated (or voluntary) market makers, market intermediaries can significantly influence information dissemination and market quality as information aggregators.

2. Data

2.1. Turkish REITs and business group ownership

Our sample consists of all real estate investment trusts (REITs) traded in Borsa Istanbul (BIST) between March 2005 and November 2015. There are 36 different REIT tickers traded in BIST during our sample period[4]. For each firm in our sample and each quarter, we obtained the majority shareholder from the firm's financials obtained through the Public Disclosure Platform (PDP) and BIST website. The ownership of Turkish REITs is highly concentrated. In line with Erol and Tirtiroglu (2011), we observe that across all quarters and the REITs in our sample, the majority owners, on average, hold 40% of all public shares. The sample maximum is around 91%, even before controlling for preferred stocks[5]. We can also trace whether the majority owner of a given REIT is a financial conglomerate (either a commercial or an investment bank) that also provides brokerage services in BIST through its subsidiary. The affiliation between the REIT and the brokerage house can either be direct or indirect.

[4] We account for changes in stock tickers throughout our sample period. See http://www.borsaistanbul.com/datum/payadvekoddegisiklikleri.zip

[5] For instance, the sample minimum for the majority holdings is around 4% for our sample. But the "majority" owner have the total control in the management because that 4% corresponds to 100% of the A-type shares which gives total voting power to the bearer.

To give an example of direct affiliation, we can discuss Is Bankasi (Bank) (ISCTR), one of the biggest commercial banks in Turkey. Is Bank has majority ownership and corresponding control rights on Is Gayrimenkul Yatirim A.S. (ISGYO). Is Bank also has a brokerage house, Is Yatirim Menkul Degerler (IYM), that provides brokerage services to investors in BIST. Therefore, ISGYO and IYM are directly affiliated since they operate under the same financial conglomerate, ISCTR. Erol and Tirtiroglu (2011) argue that as the concentrated owners in REITs, financial institutions actively use their experience as debt financiers to monitor firms and managers. These financial institutions also employ ownership power to install "right-hand" managers to reduce potential incentive conflicts.

We can also have an indirect relationship between a REIT and a brokerage house, again through ownership structures. Similar to direct affiliation, the majority owner of a firm can either be a commercial or an investment bank or their affiliated fund. For example, between 2005-2009, the majority owner of Atakule Gayrimenkul Yatirim Ortakligi A.S.(AGYO) was the pension fund associated with Vakifbank (a government bank in Turkey, VKBNK), named Vakifbank Personeli Ozel Sosyal Guvenlik Hizmetleri Vakfi. As Vakifbank, the parent conglomerate, also has a brokerage subsidiary (Vakif Yatirim Menkul Degerler A.S., VKY), we consider AGYO and VKY to be affiliated[6], albeit indirectly.

In this study, our "restricted sample" contains only the REITs with direct or indirect affiliation to a financial conglomerate, whereas our "full sample" contains all REITs publicly traded in Turkey. Figure 1 shows the changes in the number of stocks in the full and the restricted sample across time.

[6] If the majority owner of a REIT in our sample is part of a government institution, we consider that REIT to be affiliated with all of the brokerage houses that are part of government banks. Namely, Vakif Yatirim Menkul Degerler A.S. (VKY), Halk Yatirim Menkul Degerler A.S. (HLY), and Ziraat Yatirim Menkul Degerler A.S. (ZRY).

Insert Figure 1 here

2.2. Earnings announcements

For each of the stocks in our full sample, we obtain earnings announcement dates and the corresponding financials from the PDP and BIST websites[7]. Each earnings event in our sample contains the announcement date and the corresponding REIT. We complement our event sample with the earnings per share (EPS) levels obtained through the Bloomberg Terminal. Specifically, EPS is the portion of a company's profit allocated to each shareholder. It is calculated based on net income available to common shareholders divided by the basic weighted average shares outstanding. For any given announcement in the event sample, the corresponding EPS level is matched according to the ticker and quarter-year. For example, for an announcement made in May 2005, we matched the EPS levels of the given REIT at the end of 2005-Q1.

An event is labeled as "Good News" ("Bad News") if there is an increase (decrease) in the EPS levels compared to the previous announcement. Suppose the EPS level of a given announcement or prior announcement is unavailable; then, we do not classify this announcement as good or bad news. There are 767 earnings announcements in our full sample, where we classify 343 events as "Bad News" and 348 events as "Good News.". Similarly, we have 369 events in our restricted sample, where 169 events are classified as "Good News" and 162 as "Bad News." Hence, both the full and the restricted sample are balanced regarding news content. Figure 2 provides the descriptive statistics on the size of our event sample across different years.

Insert Figure 2 here

2.3. Intraday order and trade-book

[7] The Capital Markets Board of Turkey, enforces all firms that are traded in Borsa Istanbul to disclose their announcements first on PDP which became operational as of 2009 (See www.kap.org.tr) All earnings announcements and the corresponding company financials before 2009 can be obtained through the archive at BIST website https://borsaistanbul.com/tr/sayfa/476/mali-tablolar-arsiv-2009-ve-oncesi

For each of the REITs that was publicly traded in BIST between 2005 and 2015, we downloaded the intraday order and trade book from BIST Datastore. Each observation in our order dataset includes the date, time, firm ticker, order ID, order type, quantity, and price entries at a second frequency. We only use orders submitted in continuous auction periods to avoid heterogeneous information arrival during opening and closing auctions. Unlike the intraday order that can be obtained for other developed or emerging markets stocks, BIST order-book data includes broker ID, which enables us to distinguish brokerage houses that transmit orders to BIST. Using this information, we are able to explore potential heterogeneities in order flow across different brokerage houses before earnings announcements.

BIST has not shared the broker ID on publicly available limit order book data after introducing the BISTECH trading system in November 2015. BISTECH enabled differences in order submission and trade execution latency among investors in BIST. Therefore, in our sample period, there are no differences among investors in terms of latency, which further helps us isolate the impact of bank affiliation on information leakage[8].

2.3.1. Daily trade imbalance

Observations in our trade dataset consist of the date, time, firm ticker, trade quantity, price, and order IDs on both the buy and the sell side of the trade. We then use the intraday order and trade data to stack the daily buy and sell trade volumes on each REIT in our sample around earnings announcements. Specifically, the total and signed trade volume of each brokerage house is

[8] A recent study by Tiniç, Savaser, and Salih (2022) underlines the information advantage of the trades initiated by the proprietary orders of brokerage houses over the customer trades in BIST. In this study, we cannot identify whether an order is proprietary or not, as the order-book data in Datastore does not include a flag for trader type. Therefore, we cannot assess whether the heterogeneities across brokerage houses around earnings announcements, if they exist, are due to proprietary trading activity or not.

calculated in the event window, starting 40 trading days before the announcement up until and including the announcement date [-40,0].

We define $B_{b,i,d}$ and $S_{b,i,d}$ as the buy and sell trade for broker *b*, on a given trading day *d* around an earnings announcement event *i*. Specifically, we sum the Turkish Lira (TL) denominated volume of trades when broker *b* is on the buy (sell) side across each trading day *t* in the event window of *i*, to calculate $B_{b,i,d}$ ($S_{b,i,d}$). Each event *i* is associated with a single REIT; therefore, the trade flow of a given broker is also on a single stock *s*. However, we prefer to use the notations with events rather than stocks since a REIT in our sample has multiple earning announcement events. Nonetheless, in our econometric models, we use *s* to denote firm-level variables and fixed effects.

The total daily trade flow passing through a broker *b* on a given trading day *d* around an earnings announcement event *i* is then given by the logarithmic transformation of the sum of buy and sell trade volume as follows:

$$TOTFLOW_{b,i,d} = log\left(B_{b,i,d} + S_{b,i,d}\right) \tag{1}$$

We examine the imbalances in the buy and sell trades to proxy for the private information content of a trade flow across each broker. In particular, we define two variables $NETFLOW_{b,i,d}$ and $BUY_{b,i,d}$ that enables us to model the trade direction around the earnings announcements in the following manner (Bittner et al., 2023):

$$NETFLOW_{b,i,d} = \begin{cases} log\left(B_{b,i,d} - S_{b,i,d}\right) & if\left(B_{b,i,d} - S_{b,i,d}\right) > 0 \\ -log\left(B_{b,i,d} - S_{b,i,d}\right) & if\left(B_{b,i,d} - S_{b,i,d}\right) < 0 \end{cases} \tag{2}$$

$$BUY_{b,i,d} = \begin{cases} 1 & if\left(B_{b,i,d} - S_{b,i,d}\right) > 0 \\ 0 & if\left(B_{b,i,d} - S_{b,i,d}\right) < 0 \end{cases} \tag{3}$$

We conjecture that NETFLOW and BUY will be higher when the private information content of the trade flow passing through a brokerage house increases.

Next, we split our event period into two equal parts. Specifically, we label [-40,21] and [-20,0], respectively, as the estimation and pre-announcement periods. In line with this definition, we set $PREANN_{i,d}$ as a dummy variable that takes one if day d is in the pre-announcement period for event *i*, and zero otherwise.

We then delineate a bank/business group affiliation measure to examine the heterogeneities across brokerage houses concerning signed (informed) trade flow. We precisely capture the bank/business group affiliation with brokers and REITs through parent financial conglomerate, using $AFFILIATED_{b,i}$ dummy, which takes the value one if the brokerage house b is in the same business group with the REIT in event *i*, and zero otherwise[9].

Finally, to construct sub-sample analyses across the news content of each earnings announcement, we define $NTYPE_i$ which is a dummy variable that takes one (zero) if the earnings announcement signals "Good News" ("Bad News") to the equity investors of the corresponding REIT.

2.3.2. Firm-level intraday measures

To examine the relationship between the informed trading associated with business group-affiliated brokers and the market quality of REITs, we compute firm-level proxies for volatility and liquidity at 60-minute intervals for all REITs traded in BIST between March 2005 and November 2015.

To obtain our dependent variables using the trade book data, we first calculate the trade-by-trade returns for stock *s,* within time interval t. Let $R_{s,n,t} = log\left(P_{s,n,t}/P_{s,n-1,t}\right)$ be the logarithmic return

[9] There is also time dimension to the bank affiliation since the majority ownership and the associated bank affiliation of a REIT may change across time. In our sample, Atakule Gayrimenkul Yatirim Ortakligi A.S (AGYO) provides an example where in 2009-Q3 the majority ownership of the firm moved from Vakifbank Personeli Ozel Sosyal Guvenlik Hizmetleri Vakfi (which provides indirect affiliation between AGYO and brokerage houses that are subsidiaries of government banks) to an individual (which does not provide any direct or indirect bank affiliation). Our empirical construct allows us to easily control for such changes, but we do not denote AFFILIATED with a time subscript t, since the majority owners stay the same for other 35 REITs throughout our sample period.

on the *n-th* trade for stock *s,* within time interval *t* where $P_{s,n,t}$ is the execution price of the *n-th* trade for stock s within time interval *t.* Our volatility proxy for stock *s* in time interval *t* is then defined as the standard deviation of trade-by-trade returns, $SDRET_{s,t}$, for stock *s* in time interval t. That is;

$$SDRET_{s,t} = \sqrt{\frac{1}{N_{s,t}-1}\sum_{n=1}^{N_{s,t}}\left(R_{s,n,t} - \overline{R_{s,t}}\right)^2} \quad (4)$$

where $N_{s,t}$ is the total number of trades for stock *s* in time interval *t.* $\overline{R_{s,t}}$ is the average trade-by-trade return for stock *s* in time interval *t.*

Let $VOL_{s,n,t}$ be the TL-denominated volume for the *n-th* trade stock *s* in time interval *t.* We take our (il)liquidity proxy as the Amihud measure, following Amihud (2002), which is an inverse liquidity or illiquidity measure calculated as below:

$$ILLIQ_{s,t} = \frac{1}{N_{s,t}}\sum_{n=1}^{N_{s,t}}\frac{|R_{s,n,t}|}{VOL_{s,n,t}} * 1000 \quad (5)$$

For any stock *s* in our sample and each trading interval *t*, we calculate $TV_{s,t}$ which is the logarithmic transformation of the TL-denominated total trading volume for stock *s* in time interval *t*. Tiniç, Sensoy, Demir, and Nguyen (2022) document a significant and positive correlation[10] between trading volume and the measures of broker trading networks, such as network connectivity, weighted clustering coefficients, and broker network reciprocity, which are shown to systematically impact the cross-section of expected returns along with intraday market liquidity and volatility in BIST.

To proxy for the informed trading levels for each stock *s* in time interval *t*, we rely on an imbalance metric similar to those employed by Chordia et al. (2008). Similar to Rzayev and Ibikunle (2019), we name this measure market toxicity $MT_{s,t}$, since the existing order-flow toxicity measures, for

[10] Up to 93% in monthly frequency and 68% in 60-minute frequency.

instance, the volume synchronized probability of informed trading measure of Easley et al. (2012) (VPIN) primarily captures the order imbalances in the market which are substantially positively correlated with $MT_{s,t}$ (Rzayev and Ibikunle, 2019). For any given stock *s,* in time interval *t*, $MT_{s,t}$ is calculated as follows:

$$MT_{s,t} = \frac{|BIT_{s,t} - SIT_{s,t}|}{BIT_{s,t} + SIT_{s,t}} \quad (6)$$

where $BIT_{s,t}$ ($SIT_{s,t}$) is the number of buyer-(seller-) initiated trades for stock *s* in time interval *t*. An important advantage of using simple trade-imbalance measures as a proxy for information asymmetry, rather than using sophisticated measures of market toxicity like VPIN, is that the equation (6) can easily be decomposed into two components: one associated with informed trading levels of group-affiliated brokers and another associated with informed trading levels of unaffiliated brokers. For any given time interval *t* on any given stock *s*, we denote market toxicity associated with *affiliated (unaffiliated)* brokers as $\mathrm{MT}^{A}_{s,t}$ $\left(MT^{U}_{s,t}\right)$ which is calculated as follows:

$$MT^{A}_{s,t} = \frac{|BIT^{A}_{s,t} - SIT^{A}_{s,t}|}{BIT_{s,t} + SIT_{s,t}} \quad (7)$$

$$MT^{U}_{s,t} = \frac{|BIT^{U}_{s,t} - SIT^{U}_{s,t}|}{BIT_{s,t} + SIT_{s,t}} \quad (8)$$

where $BIT^{A}_{s,t}\left(BIT^{U}_{s,t}\right)$ is the number of buy trades initiated by brokers that are (not) in the same business group, or affiliated (unaffiliated) with stock *s* at a given time interval *t*. Similarly, $SIT^{A}_{s,t}\left(SIT^{U}_{s,t}\right)$ is the number of sell trades initiated by brokers that are (not) in the same business group, or affiliated (unaffiliated) with stock *s* at a given time interval *t*[11].

[11] Notice that since a trade is either initiated by affiliated or unaffiliated brokers $\mathrm{BIT} = \mathrm{BIT^A} + \mathrm{BIT^U}$ and $SIT = SIT^{A} + SIT^{U}$. But these equations do not imply that $\mathrm{MT} = \mathrm{MT^A} + \mathrm{MT^U}$ for any given stock *s* in any given time interval *t.*

Table 2 provides the descriptive statistics and pairwise correlations for intraday firm-specific measures that are calculated for the stocks of all REITs traded in BIST between March 2005 – November 2015 at 60-minute intervals. Panel A documents that the average standard deviation across all REITs in all time intervals is around 40 basis points (bps). There can be time intervals with significant variation in trade-by-trade returns, as observed from the sample maximum of SDRET, which is about 11%. The sample mean for ILLIQ across all stocks in all time intervals is around seven bps. Similar to SDRET, we can argue that there can be sudden increases in illiquidity for REITs in some time intervals since the sample maximum for ILLIQ is around 14%. The sample mean for TV is around 11.14, which indicates that the trading volume for an average REIT in an average hourly time interval is around 70.000TL (35.000 U.S. Dollars). Since a REIT in our sample has at most three affiliated brokers, we expect MT and MT^U to be closely related. In line with our expectation, we observe that the distributions of MT and MT^U are quite similar, with sample means around 38% and 37% and sample standard deviations around 28% and 27%, respectively, for these two variables. On the other hand, the sample mean of MT^A is around 2%, indicating that the average trade imbalance for affiliated brokerage houses is substantially smaller compared to MT^U.

Insert Table 2 here

In Table 2 – Panel B, we observe a significant positive correlation between SDRET and ILLIQ (or TV), which may indicate that holding everything else constant, the REITs with lower liquidity have more volatility. Pairwise correlations between informed trading measures over REITs in our sample, whether they are attributed to affiliated brokers, unaffiliated brokers, or aggregate, are significantly *negatively* correlated with SDRET and ILLIQ, in line with the theoretical models that predict a positive relationship between informed trading activity and market quality (Rzayev and Ibikunle, 2019). Similar to the sample distributions, we observe a significant positive correlation

(around 96%) between MT and MT^U, whereas the pairwise correlation between MT^U and MT^A is negative and statistically significant. These observations, albeit in a limited manner, may imply that informed trading by affiliated and unaffiliated brokers can have different impacts on the intraday market quality of REITs in BIST. We test these implications in a panel regression framework, which we present in the next section.

3. Methodology and Results

3.1. Price reaction around earnings announcements

We initiate our analyses by examining the average stock price response around earnings announcements for all REIT stocks traded in Borsa Istanbul (BIST). We employ the seminal event study methodology proposed by Brown and Warner (1985) to assess the stock market response to earnings announcements. Specifically, we set [-40,-21] as our estimation window, where we compute the standard errors associated with cumulative abnormal returns calculated in the pre-announcement window [-20,0], where 0 corresponds to the announcement date. Let $R_{i,d}$ be the percentage return for the REIT stock associated with event *i* on day *d*. The abnormal return is calculated as the difference between the individual stock return and the market return (BIST100) as follows:

$$AR_{i,d} = R_{i,d} - R_{m,d} \quad \text{(Market Adjusted Abnormal Return)} \tag{9}$$

We further calculate the cumulative abnormal returns for each trading day in the pre-announcement window as follows:

$$CAR_{i,d} = \sum_{t=-20}^{t=d} (AR_{i,t} + CAR_{i,t-1}) \tag{10}$$

where the following equations hold by construction $AR_{i,-20} = CAR_{i,-20}$ and $CAR_{i,-21} = 0$ for all *i*. The statistical significance of the cumulative abnormal returns is calculated using the following t-statistic:

$$t = \overline{A_d}/\hat{S}(\overline{A_d}) \tag{11}$$

where

$$\hat{S}(\overline{A_d}) = \sqrt{\sum_{d=-40}^{-21}\left(\overline{A_d} - \bar{\bar{A}}\right)^2}\ /19 \tag{12}$$

and where

$$\bar{\bar{A}} = \sum_{d=-40}^{-21} \overline{A_d}\ /20, \quad \overline{A_d}\ = \sum_{i=1}^{N} A_{i,d}\ /N. \tag{13}$$

where N corresponds to the number of events. We calculate cumulative abnormal returns around earnings announcements where EPS increases (Good News) and decreases (Bad News). If earnings announcements carry significant information to the market, we expect to observe significant and positive (negative) abnormal returns around Good News (Bad News).

In line with our expectations, for the earning announcements in our restricted sample, Figure 3 documents significant positive (negative) abnormal returns for events that carry Good (Bad) News. In particular, the cumulative average abnormal return in the pre-announcement period, CAR(-20,0) for the Good News (Bad News) events is around 1.1% (-1.6%) and statistically significant at a 10% (1%) level. We observe a considerable price reaction in the pre-announcement window. We may also argue that there is substantial post-announcement drift for earnings announcements for Turkish REITs since CAR(-20,10) for Good (Bad) News events is around 1.6% (-2.6%) and significant at a 5% (1%) level. The significance of the cumulative abnormal returns and the persistence of post-announcement drift seem more evident for events that carry Bad News. In line with the conclusions of Hekimoglu and Tanyeri (2011), we observe that the price reaction to earnings announcements (whether they carry good or bad news) is significantly more limited compared to responses observed in developed markets (see for example, Vega, 2006). The narrow magnitude of price reaction may be attributable to information leakage problems, particularly evident in BIST (Simsir and Simsek, 2022). In the next section, we will examine whether there is

an information leakage problem before the earnings announcement in BIST. Furthermore, if such leakage is identified, we will explore the prospect of business group affiliation as a plausible economic mechanism.

Insert Figure 3 here

3.2. Affiliated brokerage houses and trade flow

Next, we examine the affiliated and unaffiliated brokers with respect to total and signed trade flow around earnings announcements. Suppose the affiliated brokers have an informational edge over the others. In that case, we conjecture to observe significant changes in signed trade volume passing through affiliated brokerage houses, and we expect these changes to align with the overall price reaction. We form the following models to investigate whether the total and the signed trade flow substantially differ across affiliated and unaffiliated brokerage houses during the pre-announcement period:

$$TOTFLOW_{b,i,d} = \beta_0 PREANN_{i,d} + \beta_1 AFFILIATED_{b,i} + \beta_2 PREANN_{i,d} * AFFILIATED_{b,i} + \theta_s + \mu_b + \gamma_d + \varepsilon_{b,i,d} \quad (14)$$

$$\mathrm{NETFLOW}_{b,i,d} = \beta_0 \mathrm{PREANN}_{i,d} + \beta_1 \mathrm{AFFILIATED}_{b,i} + \beta_2 PREANN_{i,d} * AFFILIATED_{b,i} + \theta_s + \mu_b + \gamma_d + \varepsilon_{b,i,d} \quad (15)$$

$$\mathrm{BUY}_{\mathrm{b,i,d}} = \beta_0 \mathrm{PREANN}_{\mathrm{i,d}} + \beta_1 \mathrm{AFFILIATED}_{\mathrm{b,i}} + \beta_2 PREANN_{i,d} * AFFILIATED_{b,i} + \theta_s + \mu_b + \gamma_d + \varepsilon_{b,i,d} \quad (16)$$

In equation (14)-(16), $TOTFLOW_{b,i,d}$ represents the total (buy + sell) daily trade flow passing through broker *b* on a given trading day *d* around an earnings announcement event *i*. $NETFLOW_{b,i,d}$ is the net (buy minus sell) daily trade flow passing through broker *b* on a given trading day *d* around an earnings announcement event *i*. $\mathrm{BUY}_{\mathrm{b,i,d}}$ is an indicator variable that takes value one if broker *b* on a given trading day *d* around an earnings announcement event *i* is on the

net buy side, and zero otherwise. $PREANN_{i,d}$ is a dummy variable that takes one if day d is in the pre-announcement period for event i, and zero otherwise. $AFFILIATED_{b,i}$ is another dummy that takes the value one if the brokerage house b is in the same business group with the REIT in event i, and zero otherwise. Finally, θ_s, μ_b, γ_d respectively represents stock-, broker- and date-fixed effects to capture unobserved heterogeneity across firms, brokerage houses, and time.

In all three models, the coefficient of interest, β_2, provides the average changes in (total or signed) trade flow before the earnings announcement of REITs traded in BIST. That is equations (14)-(16) enable us to examine whether (total or signed) trade flow from affiliated brokerage houses significantly changes during the pre-announcement period.

Figure 4 shows the total changes in the net trade flow of affiliated and unaffiliated brokerage houses across all events in our sample. We observe that in the pre-announcement period, the cumulative net trades of the affiliated brokerage houses reach up to 80 million TL (around 40 million U.S. Dollars). Therefore, we can argue that the clients of brokerage houses in the same business group with the underlying REIT firm initiate to take net buy positions on the REIT stock much earlier than the earnings announcements. To the extent that trade imbalances proxy for information asymmetry, Figure 4 may suggest that there is substantial informed trading activity passing through affiliate brokerage houses around earnings announcements. These findings may imply the importance of bank affiliation in disseminating private information about earnings prospects for Turkish REITs.

Insert Figure 4 here

Tables (3) – (5) present the results for equations (14) – (16), respectively. The relationship between a REIT and a brokerage house is measured by whether the brokerage house is in the same business group as the REIT. The results in Table (3) suggest the total trade flow passing through affiliate

brokerage houses, on average, increases by 2.6% in the pre-announcement period; however, this increase is *not* statistically significant after controlling for potential unobserved heterogeneity across brokers, REITs, and time.

The results presented in Table (4), on the other hand, document a statistically significant increase in the net (informed) trade flow passing through affiliated brokers in the pre-announcement period. In particular, the net trade flow passing through the affiliated brokerage houses in the pre-announcement window, on average, increases by 15%, suggesting that the rise in informed trading activity is also *economically* significant. The informed trading activity seems more evident for the earnings announcements carrying Good News for the underlying REIT stock. In particular, for the events where an EPS increase is announced, the net trade flow through affiliated brokerage houses in the pre-announcement window increases by 26%. On the contrary, in column (3) of Table (4), we observe no significant change in the net trade flow when the announcement carries Bad News. The limited information leakage for the events with Bad News may further help us explain our earlier results, where we document *more* evident average price reactions for these events. The differences in the net trade flow reaction in the pre-announcement window by the affiliated brokers between Good and Bad News samples are statistically significant, as can be observed from the triple interaction term presented in columns (4) and (5). Columns (4) and (5) of Table (4) also suggest that these findings are similar in terms of both statistical and economic significance in both the full and the restricted samples.

Insert Table 4 here

Table (5) presents the results for equation (16). Similar to the results presented in Table (4), we observe that affiliated brokerage houses are significantly more likely to submit net buy trades during the pre-announcement period. Specifically, the probability that the affiliated brokerage

houses are on the net-buy side increases by 1% during the pre-announcement period. Given that the mean value for $BUY_{b,i,d}$ in our sample is around 11%, the results, once again, may suggest a significant increase in informed trading activity by affiliate brokerage houses during the pre-announcement period. In line with the results in the previous table, we observe that the informed trading activity is more pronounced for the earnings announcements carrying Good News. Specifically, when there is good news, the probability that the affiliated brokerage houses are on the net-buy side increases by 1.7%. In contrast, in column (3) of Table (5), we observe no significant change in net trade flow when earnings announcements carry Bad News.

Up to this point, our results suggest that: 1) The price reaction starts much earlier than the day of earnings announcements. 2) The abnormal returns on the announcement days are smaller in magnitude for Turkish REITs compared to stocks traded in developed markets, which may indicate information leakages. 3) The significance of the cumulative abnormal returns and the persistence of post-announcement drift seem more evident for events that carry Bad News. 4) The trading behavior of clients associated with brokerage firms before official announcements align with the overall market response around the earnings announcements that carry Good News. 5) For events that carry Good News, the increase in the net-buy (informed) trades is significantly more evident for the affiliated brokerage houses even after controlling for unobserved heterogeneity across brokers, REITs, and time. In sum, these items may provide evidence for the informational edge of brokerage houses that are in the same business groups as REITs over unaffiliated brokerage houses when trading underlying REIT stocks, especially around earnings announcements that carry positive news. The asymmetry in the informational content of affiliated brokerage houses is reminiscent of the results presented by Tinic, Savaser, and Salih (2023), which document a significant additional price impact associated with proprietary buy trades in BIST but not

proprietary sell trades. Prior literature also demonstrates these asymmetric price impacts of institutional investors, and studies argue such asymmetric price effects may arise because stock sales decisions are primarily motivated by liquidity-related reasons rather than information-based decisions (Chan and Lakonishok, 1993; Keim and Madhavan, 1995; Griffiths et al., 2000; Saar 2001)

Insert Table 5 here

3.3. Bank affiliation and secondary market quality of REITs

3.3.1. Bank affiliation and intraday liquidity

Market microstructure theory posits that liquidity providers, operating under the assumption of risk-neutrality, increase transaction costs when trading against investors private information due to adverse selection risk (Glosten and Milgrom, 1985; Kyle, 1985; Easley and O'Hara, 1987). The earlier empirical studies confirm these predictions (for example, Easley et al., 1996), suggesting that informed trades draw liquidity from the market (Glosten, 1994; Seppi, 1997).

Contrary to the predictions of these models, another view in the existing literature indicates that informed investors would prefer periods with extensive liquidity trading activity to trade in order to maximize their profits on their informational edge. Admati and Pfleiderer (1988) emphasize that investors with private information enter the market during periods of high trading volumes to avoid exposing their orders. Consequently, the coexistence of informed and uninformed trading is anticipated. Supporting these expectations, Barclay and Hendershott (2003) and Rzayev and Ibikunle (2019) discern an augmentation in liquidity levels during intervals characterized by heightened information asymmetry. We examine the intraday relationship between information asymmetry and future liquidity levels under the following setting:

$$\mathrm{ILLIQ}_{s,t} = \theta_s + \nu_t + \delta_1 M_{s,t-1} + \delta_2 \mathrm{SDRET}_{s,t-1} + \delta_3 \mathrm{TV}_{s,t-1} + \varepsilon_{s,t} \quad (17)$$

where $ILLIQ_{s,t}$ is the Amihud illiquidity measure. $SDRET_{s,t}$, is the standard deviation of trade-by-trade returns. $TV_{s,t}$ is the logarithmic transformation of the TL-denominated total trading volume for stock *s* in time interval *t*. MT is our information asymmetry (market toxicity) proxy. θ_s is the stock-fixed effects. ν_t is the date-time fixed effects. If informed traders demand liquidity in BIST across REIT stocks, we expect the estimate for δ_1 to be positive, however, if informed trading enhances liquidity, then the coefficient estimate for δ_1 would be negative.

We further update equation (19) to account for the potential heterogeneous impact of informed trading associated with affiliated and unaffiliated brokers by decomposing our market toxicity measure into two: $\mathrm{MT}_{s,t}^{A}$ *and* $\mathrm{MT}_{s,t}^{U}$, which denote market toxicity associated with affiliated and unaffiliated brokers, respectively. The updated model is as follows:

$$ILLIQ_{s,t} = \theta_s + \nu_t + \delta_1 \mathrm{MT}_{s,t}^{A} + \delta_2 \mathrm{MT}_{s,t}^{U} + \delta_3 SDRET_{s,t-1} + \delta_4 TV_{s,t-1} + \varepsilon_{s,t} \quad (18)$$

Table (6) presents the estimates for equations (17) and (18). In particular, columns (1)-(3) of Table (6) provide the results for equation (17) under different model specifications. We observe a statistically significant and negative relationship between market toxicity (informed trading) and future liquidity levels. A one percent increase in market toxicity, on average, *decreases* the future realized liquidity by 0.16% - 0.54%, and the impact is statistically significant even after controlling for overall volatility and trade volume along with unobserved heterogeneity across REITs, date, and time. As the sample mean for ILLIQ is around 0.70%, we argue that the average effect of market toxicity on future liquidity levels is also economically significant.

Insert Table 6 here

Next, we decompose our toxicity measure into two, trying to capture the differential impact of informed trading passing through affiliated and unaffiliated brokers on future liquidity. Columns (4)-(5) of Table (6) present the results of the extended model given in equation (18). Our results

indicate that informed trading attributed to affiliated and unaffiliated brokers has a *different* impact on future liquidity levels. Specifically, we show that the estimates for $\delta_1(\delta_2)$ are negative (positive) and statistically significant at a 1% level. Our results suggest that a one percent increase in informed trading associated with business group affiliated brokers, on average, *increases* future liquidity by 0.34%-0.44%, whereas market toxicity associated with unaffiliated brokers *decreases* future liquidity levels by 0.16%-0.54%. In all model specifications, the estimates for δ_1 and δ_2 remain statistically significant at a 1% level. We, therefore, argue that informed trading activity through business group affiliated brokers would enhance liquidity (Barclay and Hendershott, 2003; Rzayev and Ibikunle, 2019), whereas informed trading activity transmitted through unaffiliated brokers would demand liquidity for REITs traded in BIST (Glosten, 1994; Seppi, 1997).

3.3.2. Bank affiliation and intraday volatility

The fundamental theoretical studies in the market microstructure literature assume that new information is impounded into prices at a constant rate (Kyle, 1985), which results in constant volatility, especially for stocks traded in continuous auction markets. These studies argue that volatility appears only after informed trading and is unaffected by liquidity trading levels. Degryse et al. (2013) further document that the predictions of the original frameworks still hold even in the presence of large, uninformed traders. Tiniç, Savaser, and Salih (2023) show that intraday volatility increases with the net-buy proprietary trades of brokerage houses in BIST. Tiniç, Sensoy, Demir, and Nguyen (2023) show that the future volatility decreases as intraday broker network connectivity in BIST increases (information asymmetry decreases).

Contrary to these fundamental models, recent studies also argue that informed traders regulate the price discovery process and should reduce future volatility levels after controlling for the overall

trading volume (Amarov et al., 2006; Rzayev and Ibikunle, 2019). We examine the intraday relationship between information asymmetry and volatility levels under the following setting:

$$SDRET_{s,t} = \theta_s + \nu_t + \delta_1 MT_{s,t-1} + \delta_2 ILLIQ_{s,t-1} + \delta_3 TV_{s,t-1} + \varepsilon_{s,t} \quad (19)$$

If informed traders in BIST regulate the price discovery process, we expect the coefficient of interest, δ_1, to be negative. Similar to our analyses, we update equation (19) to account for the potential heterogeneous impact of informed trading associated with affiliated and unaffiliated brokers. The updated model is as follows:

$$SDRET_{s,t} = \theta_i + \nu_s + \delta_1 \mathrm{M}T^{A}_{s,t} + \delta_2 \mathrm{M}T^{U}_{s,t} + \delta_3 ILLIQ_{s,t-1} + \delta_4 TV_{s,t-1} + \varepsilon_{s,t} \quad (20)$$

Table (7) provides the estimates for equations (19) and (20). In particular, columns (1)-(3) present the results for equation (19) under different model specifications. We observe a statistically significant and negative relationship between market toxicity (informed trading) and future volatility levels. A one percent increase in market toxicity, on average, *increases* the future realized volatility by 2 to 16 basis points, and the impact is statistically significant even after controlling for overall liquidity and trade volume along with unobserved heterogeneity across REITs and time. Given that the sample mean for SDRET is around 40 bps, the average effect of market toxicity on future volatility is also economically significant. Next, we decompose our toxicity measure into two, trying to capture informed trading passing through affiliated and unaffiliated brokers. Columns (4)-(5) present the results of the extended model given in equation (20).

Interestingly, we observe differential impact for informed trading attributed to affiliated and unaffiliated brokers. Specifically, in column (5), we follow that the estimates for both δ_1, δ_2 are positive and statistically significant. However, the impact of informed trading activity attributed to affiliated brokerage houses switches signs after we control for the unobserved heterogeneity with respect to stocks, date, and time. In particular, we document that the estimate for δ_1 is negative

and statistically significant in the last column of Table 7. Particularly, we conclude that a one percent increase in informed trading activity attributed to affiliated (unaffiliated) brokers, on average, reduces (increases) future volatility by 2 (2.5) basis points. These findings may imply that informed trading activity through business group affiliated brokers would regulate the price discovery process, whereas informed trading activity transmitted through unaffiliated brokers would increase the return volatility of REITs traded in BIST.

Insert Table 7 here

Combining the findings in Table 6 with the results presented in Table 7, we can argue that private information percolated through business group-affiliated brokerage houses can positively impact the market quality of the stocks of group REIT. We show that private information (proxied by market toxicity measures) attributed to trades submitted through affiliated brokerage houses enhances future liquidity and reduces volatility. On the contrary, private information percolated through unaffiliated brokerage houses demand liquidity and increases volatility, reducing overall market quality.

4. Conclusion

In this paper, our objective is to uncover a potential economic pathway related to the problem of information leakage during corporate events, particularly focusing on earnings announcements. More specifically, we suggest that business group affiliations can serve as a mechanism for the deliberate disclosure of significant information before quarterly earnings announcements. Our findings highlight a substantial increase in net buy positions held by brokerage houses operating under the same business group as the underlying firm, particularly before announcements with favorable earnings prospects. We emphasize the active involvement of business group-affiliated

brokers in influencing the dissemination of information, challenging the traditional view of brokers merely executing trades in order-driven markets.

Our results contribute to a universal understanding of how information flows and impacts market quality in financial markets. We illustrate that business group affiliations have noteworthy implications for the quality and process of disseminating private information in secondary markets. These findings underscore the importance of considering broker affiliations with nuance, even in order-driven markets.

Utilizing a comprehensive dataset focusing on real estate investment trusts traded on Borsa Istanbul, we establish a strong foundation for future investigations into the changing role of market intermediaries as information aggregators. Our results have broader relevance for regulatory bodies, investors, and researchers, offering valuable perspectives into the multifaced aspects of how information disseminates from the real world to financial markets around corporate events.

Tables and Figures

Panel A: Descriptive Statistics						
VARIABLE	TOTFLOW	NETFLOW	BUY	PREANN	AFFILIATED	NTYPE
OBSERVATIONS	4,692,450	4,692,450	4,692,450	4,692,450	4,692,450	4,231,200
MEAN	2.16	0.00	0.11	0.51	0.00	0.51
STD.DEV.	4.24	4.16	0.31	0.50	0.07	0.50
MINIMUM	-1.61	-18.26	0.00	0.00	0.00	0.00
MAXIMUM	19.73	17.31	1.00	1.00	1.00	1.00
Panel B: Pairwise Correlations						
TOTFLOW	1					
NETFLOW	-0.0019***	1				
BUY	0.6240***	0.7120***	1			
PREANN	-0.0030***	0.0012**	-0.0005	1		
AFFILIATED	0.1220***	-0.0002	0.0743***	0.0000	1	
NTYPE	0.0062***	-0.0028***	0.0002	0.0000	0.0020***	1

Table 1 – Descriptive statistics and pairwise correlations: This table provides descriptive statistics and pairwise correlations of each variable used in our analyses. TOTFLOW is the logarithmic transformation of the sum of buyer- and seller-initiated trade flows at the broker-date level. NETFLOW is the logarithmic transformation of the absolute difference in buy and sell flows at the broker-date level. BUY is a dummy variable that takes one if NETFLOW is positive. PREANN is a dummy variable that takes one for the period covering 20 days before [-20,0] an earnings announcement (event) and zero otherwise. AFFILIATED is a dummy variable that takes one if a broker is in the same business group as the real estate investment trust. NTYPE is a dummy that takes one if the earnings announcement is good news; that is, the earnings per share (EPS) for a given quarter is greater than the EPS level in the previous quarter. NTYPE takes zero if the earnings announcement is bad news; that is, the EPS for a given quarter is less than the EPS level in the previous quarter. ***,**, and *, respectively, denote statistical significance at a 1%, 5%, and 10% level

.

Panel A: Descriptive Statistics						
VARIABLE	SDRET	ILLIQ	TV	MT	MT^A	MT^U
OBSERVATION	251,153	251,153	251,153	251,153	251,153	251,153
MEAN	0.004	0.698	11.135	0.380	0.027	0.370
STD.DEV.	0.00	2.35	2.22	0.28	0.08	0.27
MINIMUM	0.00	0.00	-0.30	0.00	0.00	0.00
MAXIMUM	0.11	133.67	19.34	1.00	1.00	1.00
Panel B: Pairwise Correlations						
SDRET	1					
ILLIQ	0.689***	1				
TV	-0.3490***	-0.2550***	1			
MT	-0.0713***	-0.0446***	-0.248***	1		
MT^A	-0.0095***	-0.0236***	-0.0074***	0.0508***	1	
MT^U	-0.0644***	-0.0392***	-0.2520***	0.9630***	-0.1020***	1

Table 2 – Descriptive statistics and pairwise correlations firm-specific measures at 60-minute frequency: Panel A presents the descriptive statistics for intraday firm-specific measures that are calculated for the stocks of all real estate investment trusts traded in Borsa Istanbul between March 2005 – November 2015 at 60-minute intervals. SDRET is the standard deviation of trade-by-trade returns for a given real estate investment trust in a given period. ILLIQ is the Amihud illiquidy ratio. TV is the logarithm of the aggregate trading volume. MT is the aggregate market toxicity measure. MT^A is the market toxicity attributed to trades of brokers that are in the same business group for (affiliated with) a given real estate investment trust. MT^U is the market toxicity attributed to trades of brokers that are unaffiliated with a given real estate investment trust. Panel B provides the pairwise correlations between each variable. ***,**,* respectively denote statistical significance at 1%, 5%, and 10% level.

	(1)	(2)	(3)	(4)	(5)
	TOTFLOW	TOTFLOW	TOTFLOW	TOTFLOW	TOTFLOW
PREANN	-0.0269***	-0.0551***	-0.00443		
	(-6.156)	(-8.265)	(-0.618)		
AFFILIATED	1.379***	1.475***	1.331***		
	(48.73)	(31.90)	(31.58)		
PREANN * AFFILIATED	0.0266	-0.0116	-0.0220		
	(0.688)	(-0.188)	(-0.381)		
PREANN * NTYPE				-0.0137***	-0.00344
				(-3.597)	(-0.562)
AFFILIATED * NTYPE				1.455***	1.153***
				(36.07)	(27.01)
PREANN*AFFILIATED*NTYPE				0.0212	-0.0256
				(0.381)	(-0.440)
INTERCEPT	2.163***	2.190***	2.113***	2.143***	2.411***
	(825.6)	(549.8)	(505.0)	(1,240)	(904.0)
Observations	4,692,450	2,146,350	2,084,850	4,231,200	2,035,650
Adjusted R^2	52%	53%	53%	52%	54%
Broker, Stock, and Date FE	YES	YES	YES	YES	YES
News Type	Good & Bad News	Good News	Bad News	Good & Bad News	Good & Bad News
Sample	Full Sample	Full Sample	Full Sample	Full Sample	Restricted Sample

Table 3 – Broker-level regressions for total trade flow: This table provides the results for the following model: $TOTFLOW_{b,i,d} = \beta_0\, PREANN_{i,d} + \beta_1\, AFFILIATED_{b,i} + \beta_2\, AFFILIATED_{b,i} * PREANN_{i,d} + \theta_s + \mu_b + \psi_d + \varepsilon_{b,i,d}$ where NETFLOW is the logarithmic transformation of the absolute difference in buy and sell flows at the broker-date level. AFFILIATED is defined as a dummy variable that takes one if a broker is in the same business group as the real estate investment trust. θ_s corresponds to stock-fixed effects. Similarly, μ_b corresponds to broker-fixed effects. ψ_d denotes the date-fixed effects. The values in parenthesis are t-statistics of the corresponding coefficient. ***,**,* respectively denote statistical significance at 1%, 5%, and 10% levels. NTYPE is a dummy that takes one if the earnings announcement is good news; that is, the earnings per share (EPS) for a given quarter is greater than the EPS level in the previous quarter. NTYPE takes zero if the earnings announcement is bad news; that is, the EPS for a given quarter is less than the EPS level in the previous quarter. Columns (1), (2), and (3) present the results for the full sample, good news, and bad news sample. Column (4) tests the triple interaction between PREANN, AFFILIATED, and NTYPE for the full sample. Finally, the last column presents the results for the restricted sample, where the full sample is constrained to include only real estate investment trusts with affiliated brokerage houses.

	(1)	(2)	(3)	(4)	(5)
	NETFLOW	NETFLOW	NETFLOW	NETFLOW	NETFLOW
PREANN	0.00566	0.0120	-0.00415		
	(0.914)	(1.274)	(-0.406)		
AFFILIATED	-0.147***	-0.215***	-0.0600		
	(-3.654)	(-3.663)	(-1.000)		
PREANN * AFFILIATED	0.151***	0.264***	0.0824		
	(2.761)	(3.305)	(1.004)		
PREANN * NTYPE				-0.0113**	-0.0197**
				(-2.081)	(-2.215)
AFFILIATED * NTYPE				-0.286***	-0.211***
				(-4.978)	(-3.399)
PREANN*AFFILIATED*NTYPE				0.280***	0.284***
				(3.529)	(3.345)
INTERCEPT	-0.00206	-0.0162***	0.0148**	0.00420*	-0.0136***
	(-0.554)	(-2.883)	(2.482)	(1.704)	(-3.506)
Observations	4,692,450	2,146,350	2,084,850	4,231,200	2,035,650
Adjusted R^2	0.1%	0.2%	0.2%	0.1%	0.2%
Broker, Stock, and Date FE	YES	YES	YES	YES	YES
News Type	Good & Bad News	Good News	Bad News	Good & Bad News	Good & Bad News
Sample	Full Sample	Full Sample	Full Sample	Full Sample	Restricted Sample

Table 4 – Broker-level regressions for informed trade flow (NETFLOW): This table provides the results for the following model: $NETFLOW_{b,i,d} = \beta_0\, PREANN_{i,d} + \beta_1\, AFFILIATED_{b,i} + \beta_2\, AFFILIATED_{b,i} * PREANN_{i,d} + \theta_s + \mu_b + \psi_d + \varepsilon_{b,i,d}$ where TOTFLOW is the logarithmic transformation of the sum of buyer- and seller-initiated trade volumes at the broker-date level. AFFILIATED is defined as a dummy variable that takes one if a broker is in the same business group as the real estate investment trust. θ_s corresponds to stock-fixed effects. Similarly, μ_b corresponds to broker-fixed effects. ψ_d denotes the date-fixed effects. The values in parenthesis are t-statistics of the corresponding coefficient. ***,**,* respectively denote statistical significance at 1%, 5%, and 10% levels. NTYPE is a dummy that takes one if the earnings announcement is good news; that is, the earnings per share (EPS) for a given quarter is greater than the EPS level in the previous quarter. NTYPE takes zero if the earnings announcement is bad news; that is, the EPS for a given quarter is less than the EPS level in the previous quarter. Columns (1), (2), and (3) present the results for the full sample, good news, and bad news sample. Column (4) tests the triple interaction between PREANN, AFFILIATED, and NTYPE for the full sample. Finally, the last column presents the results for the restricted sample, where the full sample is constrained to include only real estate investment trusts with affiliated brokerage houses.

	(1)	(2)	(3)	(4)	(5)
	BUY	BUY	BUY	BUY	BUY
PREANN	-0.000305	-0.00108*	-0.000144		
	(-0.751)	(-1.764)	(-0.215)		
AFFILIATED	0.0252***	0.0199***	0.0301***		
	(9.610)	(5.240)	(7.618)		
PREANN * AFFILIATED	0.0109***	0.0170***	0.00430		
	(3.036)	(3.274)	(0.796)		
PREANN * NTYPE				-0.000944***	-0.00119**
				(-2.669)	(-2.104)
AFFILIATED * NTYPE				0.0150***	0.0158***
				(3.996)	(4.000)
PREANN*AFFILIATED*NTYPE				0.0192***	0.0179***
				(3.707)	(3.330)
INTERCEPT	0.109***	0.109***	0.108***	0.109***	0.117***
	(448.6)	(298.7)	(276.1)	(675.4)	(476.1)
Observations	4,692,450	2,146,350	2,084,850	4,231,200	2,035,650
Adjusted R^2	24%	24%	24%	24%	24%
Broker, Stock, and Date FE	YES	YES	YES	YES	YES
News Type	Good & Bad News	Good News	Bad News	Good & Bad News	Good & Bad News
Sample	Full Sample	Full Sample	Full Sample	Full Sample	Restricted Sample

Table 5 – Broker-level regressions for informed trade flow (BUY): This table provides the results for the following model: $BUY_{b,i,d} = \beta_0\, PREANN_{i,d} + \beta_1\, AFFILIATED_{b,i} + \beta_2\, AFFILIATED_{b,i} * PREANN_i + \theta_s + \mu_b + \psi_d + \varepsilon_{b,i,d}$ where BUY is a dummy variable that takes one if NETFLOW is positive. AFFILIATED is defined as a dummy variable that takes one if a broker is in the same business group as the real estate investment trust. θ_s corresponds to stock-fixed effects. Similarly, μ_b corresponds to broker-fixed effects. ψ_d denotes the date-fixed effects. The values in parenthesis are t-statistics of the corresponding coefficient. ***,**,* respectively denote statistical significance at 1%, 5%, and 10% levels. NTYPE is a dummy that takes one if the earnings announcement is good news; that is, the earnings per share (EPS) for a given quarter is greater than the EPS level in the previous quarter. NTYPE takes zero if the earnings announcement is bad news; that is, the EPS for a given quarter is less than the EPS level in the previous quarter. Columns (1), (2), and (3) present the results for the full sample, good news, and bad news sample. Column (4) tests the triple interaction between PREANN, AFFILIATED, and NTYPE for the full sample. Finally, the last column presents the results for the restricted sample, where the full sample is constrained to include only real estate investment trusts with affiliated brokerage houses.

	(1)	(2)	(3)	(4)	(5)
	ILLIQ	ILLIQ	ILLIQ	ILLIQ	ILLIQ
MT^A				-0.339***	-0.443***
				(-5.936)	(-7.709)
MT^U				0.548***	0.159***
				(32.81)	(7.351)
SDRET		229.7***	142.7***	229.4***	142.3***
		(199.6)	(25.72)	(199.4)	(25.74)
TV		-0.0100***	-0.0538***	-0.0102***	-0.0551***
		(-4.690)	(-11.06)	(-4.763)	(-11.28)
MT	0.507***	0.544***	0.160***		
	(29.72)	(33.36)	(7.555)		
Constant	0.508***	-0.351***	0.642***	-0.335***	0.672***
	(63.99)	(-12.32)	(8.477)	(-11.66)	(8.828)
Observations	251,153	251,153	251,152	251,153	251,152
Adj. R^2	0%	16%	24%	16%	24%
Fixed Effects	NO	NO	Stock & Date Time	NO	Stock & Date Time
Standard Errors	OLS	OLS	Robust	OLS	Robust

Table 6 – Intraday panel regressions for liquidity modeling: In this table, we present the results of the following panel regression: $ILLIQ_{s,t} = \theta_s + \nu_t + \delta_1 MT_{s,t-1} + \delta_2 SDRET_{s,t-1} + \delta_3 TV_{s,t-1} + \varepsilon_{s,t}$. ILLIQ is the Amihud illiquidity measure for firm *i* in time interval *t.* SDRET is the standard deviation of trade-by-trade returns for a given real estate investment trust in a given period. ILLIQ is the Amihud illiquidy ratio. TV is the logarithm of the aggregate trading volume. MT is the aggregate market toxicity measure. MT^A is the market toxicity attributed to trades of brokers that are in the same business group for (affiliated with) a given real estate investment trust. MT^U is the market toxicity attributed to trades of brokers that are unaffiliated with a given real estate investment trust. θ_s corresponds to stock fixed effects. ν_t presents the date-time fixed effects. Columns (1) – (4) document the relationship between informed trading and intraday (il)liquidity under different econometric specifications. In Columns (5) – (7), we disaggregate MT into MT^A and MT^U to examine the potential differences in affiliated and unaffiliated informed trading on future liquidity. We calculate all variables in 60-minute time intervals. For each variable, we provide coefficient estimates along with the corresponding t-statistics in parentheses. Robust indicates that the t-statistics are obtained from heteroskedasticity-consistent standard errors (White, 1980). ***,**,* indicate statistical significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
	SDRET	SDRET	SDRET	SDRET	SDRET
MT^A				0.000526***	-0.000202**
				(6.232)	(-2.149)
MT^U				0.00121***	0.000253***
				(49.23)	(9.173)
ILLIQ		0.000686***	0.000353***	0.000686***	0.000353***
		(235.0)	(32.75)	(234.8)	(32.73)
TV		-0.000223***	-0.000252***	-0.000222***	-0.000252***
		(-73.32)	(-50.83)	(-72.99)	(-50.49)
MT	0.00158***	0.00120***	0.000235***		
	(59.78)	(49.86)	(8.753)		
Constant	0.00340***	0.00555***	0.00646***	0.00554***	0.00646***
	(277.0)	(144.7)	(102.1)	(143.2)	(100.7)
Observations	251,153	251,153	251,152	251,153	251,152
Adj. R^2	1%	24%	45%	24%	45%
Fixed Effects	NO	NO	Stock & Date Time	NO	Stock & Date Time
Standard Errors	OLS	OLS	Robust	OLS	Robust

Table 7 – Intraday panel regressions for volatility modeling: In this table, we present the results of the following panel regression: $SDRET_{s,t} = \theta_s + \nu_t + \delta_1 MT_{s,t-1} + \delta_2 ILLIQ_{s,t-1} + \delta_3 TV_{s,t-1} + \varepsilon_{s,t}$. ILLIQ is the Amihud illiquidity measure for firm *i* in time interval *t*. SDRET is the standard deviation of trade-by-trade returns for a given real estate investment trust in a given period. ILLIQ is the Amihud illiquidy ratio. TV is the logarithm of the aggregate trading volume. MT is the aggregate market toxicity measure. MT^A is the market toxicity attributed to trades of brokers that are in the same business group for (affiliated with) a given real estate investment trust. MT^U is the market toxicity attributed to trades of brokers that are unaffiliated with a given real estate investment trust. θ_s corresponds to stock fixed effects. ν_t presents the date-time fixed effects. Columns (1) – (4) document the relationship between informed trading and intraday (il)liquidity under different econometric specifications. In Columns (5) – (7), we disaggregate MT into MT^A and MT^U to examine the potential differences in affiliated and unaffiliated informed trading on future liquidity. We calculate all variables in 60-minute time intervals. For each variable, we provide coefficient estimates along with the corresponding t-statistics in parentheses. Robust indicates that the t-statistics are obtained from heteroskedasticity-consistent standard errors (White, 1980). ***,**,* indicate statistical significance at 1%, 5%, and 10% levels, respectively.

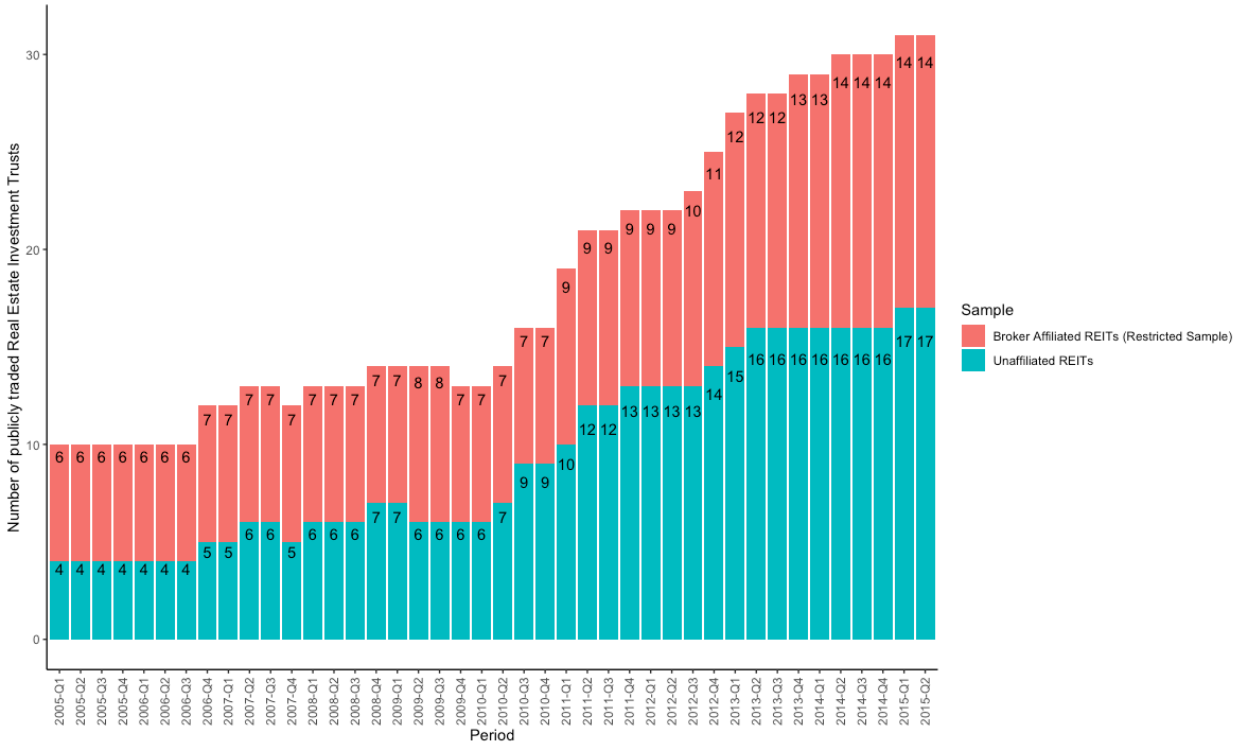

Figure 1 – Sample descriptive: This figure presents the number of different real estate investment trusts (REITs) in our sample at a quarter-year. The red bars show the number of different REITs affiliated with a brokerage house in Borsa Istanbul (BIST). These firms construct the "Restricted Sample." The blue bars show the number of different REITs not affiliated with any brokerage house operating in BIST. Broker-affiliated REITs and Unaffiliated REITs together construct the "Full Sample." For instance, in 2005-Q1, our restricted sample contained six different REITs, whereas our full sample consisted of ten different REITs traded in BIST.

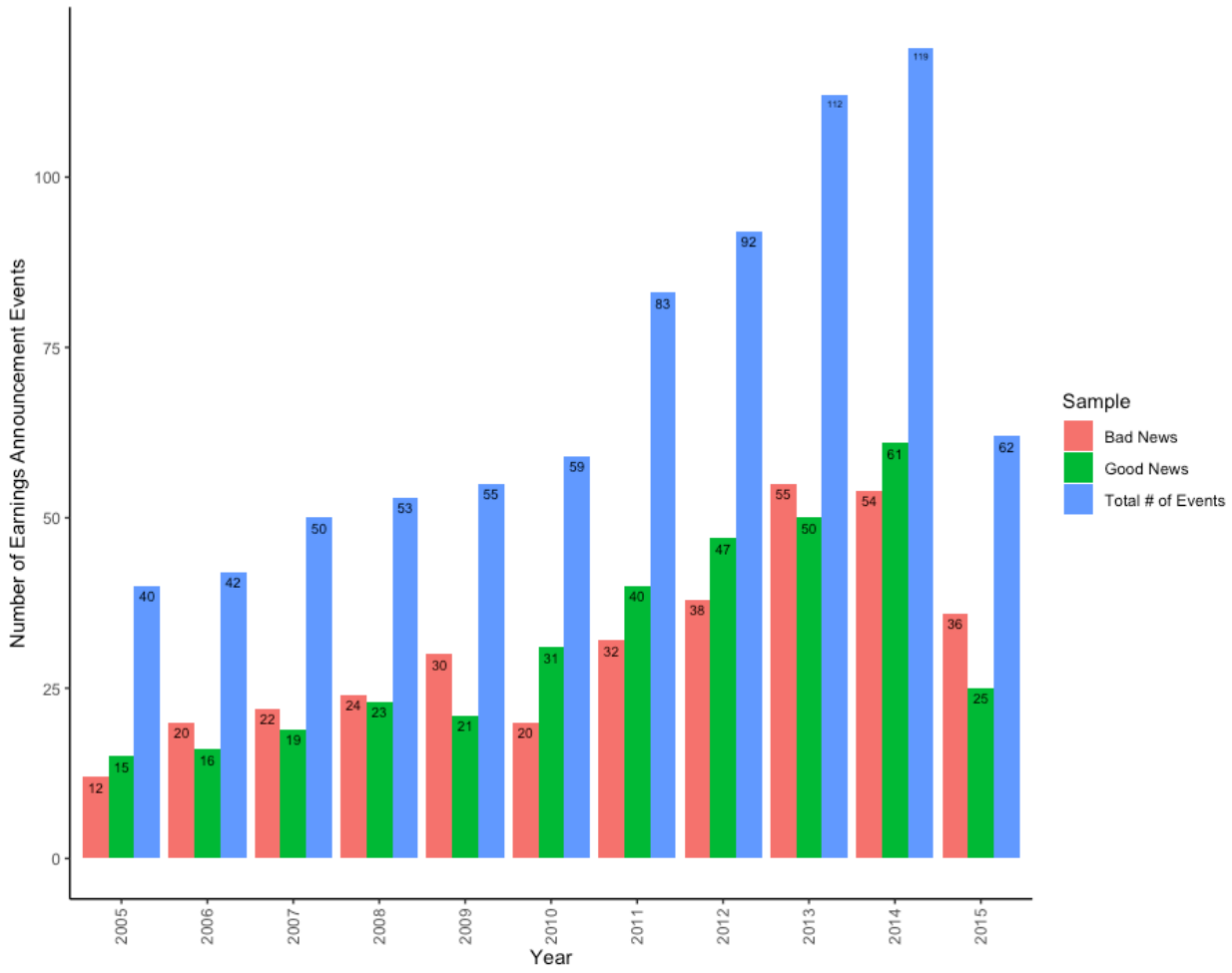

Figure 2 – Events Descriptive: *This figure presents the number of Earnings Announcement events in our sample across each year.* The earnings announcement dates are obtained from the Public Disclosure Platform and Borsa Istanbul website. We obtain the earnings per share (EPS) levels of a given real estate investment trust for a given announcement from Bloomberg Terminal. An earnings announcement event is labeled as "Good News" ("Bad News") if there is an increase (decrease) in the EPS levels compared to the previous quarter. Green (Red) bars represent the number of Good (Bad) events in our sample for a given year. Blue bars represent the total number of events for a given year.

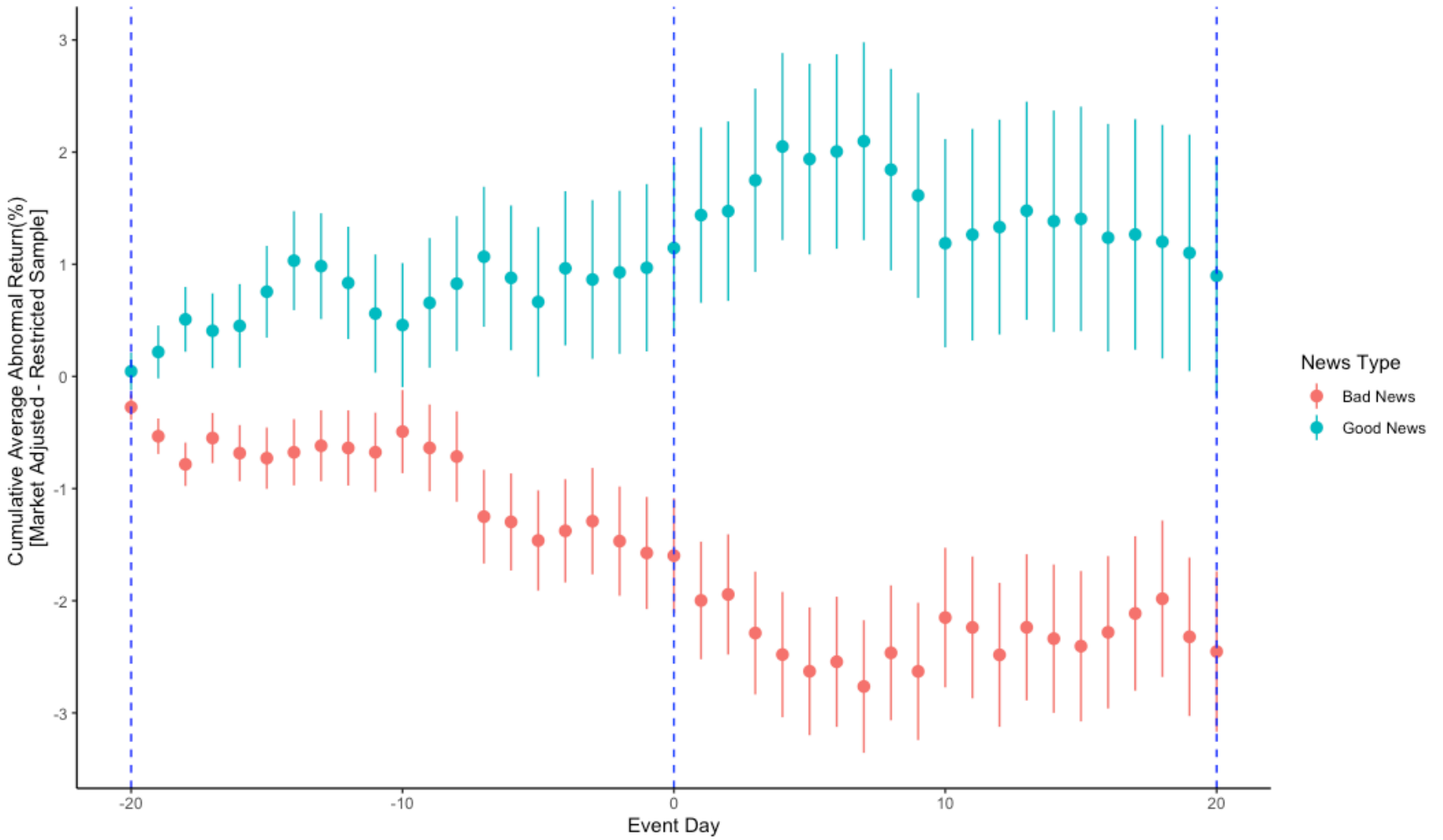

Figure 3 – Cumulative Average Abnormal Returns: This figure provides the daily cumulative average abnormal returns (CARs) and associated standard errors during the window [-20,20] of earnings announcements in our restricted sample. We employ Brown and Warner's (1985) event-study methodology to obtain CARs and corresponding standard errors. Abnormal returns are calculated using the market-adjusted model, where for a given trading day, an abnormal return on a given stock is the difference between the realized return on that stock and the return of the market index (BIST100). An earnings announcement event is labeled as "Good News" ("Bad News") if there is an increase (decrease) in the EPS levels compared to the previous quarter.

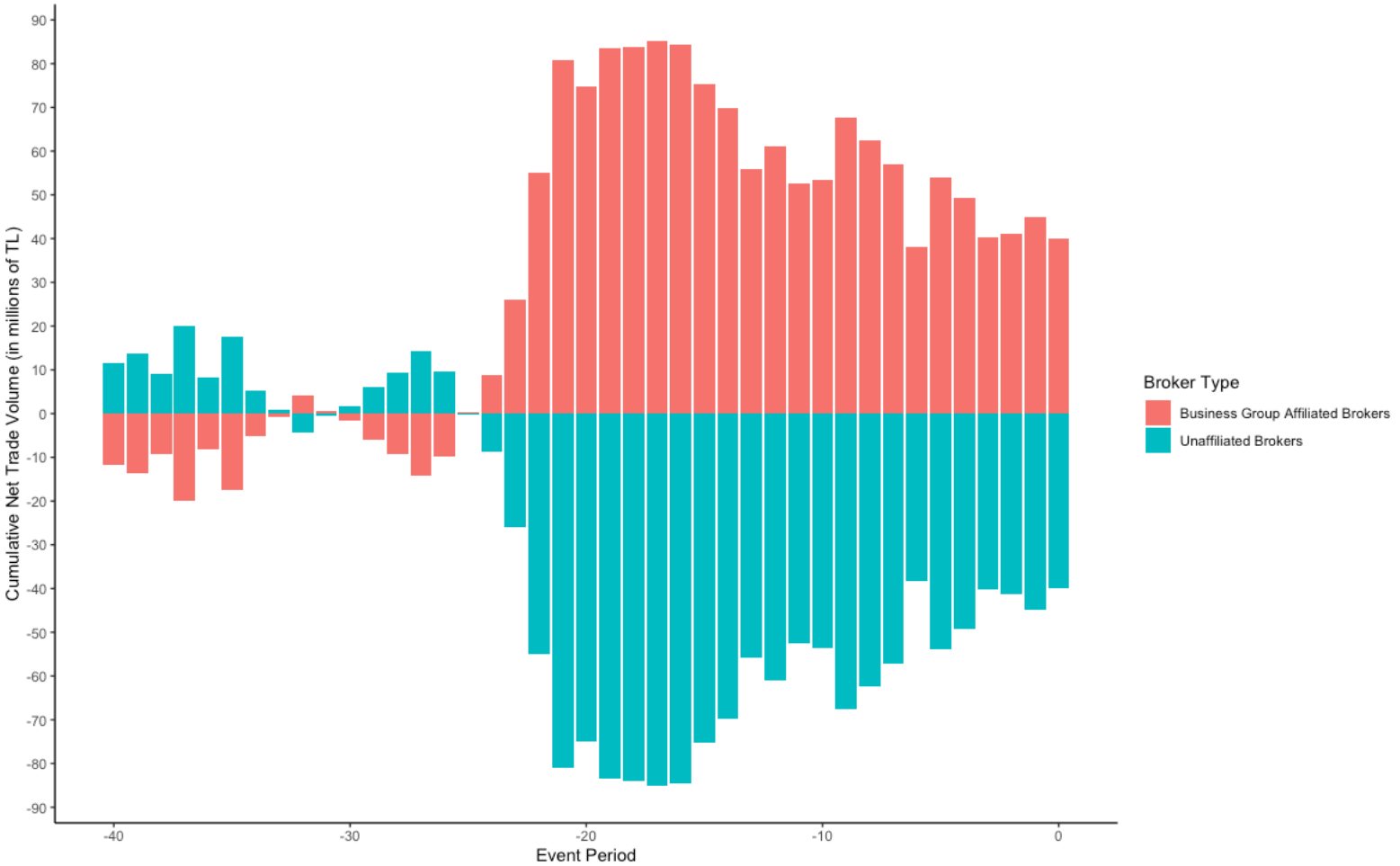

Figure 4 – Daily cumulative net trade volume around earnings announcements: *This figure provides the cumulative net flows transmitted to Borsa Istanbul by affiliated and unaffiliated brokerage houses for the real estate investment trusts in our "Restricted Sample" across the event period [-40,0]. Net flows are calculated as the difference between buyer-initiated trade volume and seller-initiated trade volume. All values are denominated in the local currency, the Turkish Lira.*

References

Admati, A. R., & Pfleiderer, P. (1988). A theory of intraday patterns: Volume and price variability. The review of financial studies, 1(1), 3-40.

Aktas, N., De Bodt, E., & Roll, R. (2004). Market response to European regulation of business combinations. Journal of financial and quantitative analysis, 39(4), 731-757.

Aktas, O. U., & Kryzanowski, L. (2014). Trade classification accuracy for the BIST. Journal of International Financial Markets, Institutions and Money, 33, 259-282

Allen, L., Jagtiani, J., Peristiani, S., & Saunders, A. (2004). The role of bank advisors in mergers and acquisitions. Journal of Money, Credit and Banking, 197-224.

Amihud, Y. (2002). Illiquidity and stock returns: cross-section and time-series effects. Journal of Financial Markets, 5(1):31–56.

Arslan, H. B., & Simsir, S. A. (2016). Measuring takeover premiums in cross-border mergers and acquisitions: Insights from Turkey. Emerging Markets Finance and Trade, 52(1), 188-203.

Avramov, D., Chordia, T., & Goyal, A. (2006). The impact of trades on daily volatility. The Review of Financial Studies, 19(4), 1241-1277.

Barbon, A., Di Maggio, M., Franzoni, F., & Landier, A. (2019). Brokers and order flow leakage: Evidence from fire sales. The Journal of Finance, 74(6), 2707-2749.

Barclay, M. J., & Hendershott, T. (2003). Price discovery and trading after hours. The Review of Financial Studies, 16(4), 1041-1073.

Bhattacharya, U., & Daouk, H. (2002). The world price of insider trading. The Journal of Finance, 57(1), 75-108.

Bhattacharya, U., Daouk, H., Jorgenson, B., & Kehr, C. H. (2000). When an event is not an event: the curious case of an emerging market. Journal of Financial Economics, 55(1), 69-101.

Bhattacharya, U., Lee, J. H., & Pool, V. K. (2013). Conflicting family values in mutual fund families. The Journal of Finance, 68(1), 173-200.

Bittner, C., Fecht, F., Pala, M., & Saidi, F. (2023). Information transmission between banks and the market for corporate control. Available at SSRN 3990924.

Brown, S. J., & Warner, J. B. (1985). Using daily stock returns: The case of event studies. Journal of financial economics, 14(1), 3-31.

Cao, C., Hansch, O., & Wang, X. (2009). The information content of an open limit-order book. Journal of Futures Markets: Futures, Options, and Other Derivative Products, 29(1), 16-41.

Chakravarty, S., & McConnell, J. J. (1999). Does insider trading really move stock prices?. Journal of Financial and Quantitative Analysis, 34(2), 191-209.

Chan, L. K., & Lakonishok, J. (1993). Institutional trades and intraday stock price behavior. Journal of Financial Economics, 33(2), 173-199.

Chordia, T., Roll, R., & Subrahmanyam, A. (2008). Liquidity and market efficiency. Journal of Financial Economics, 87(2), 249-268.

Claessens, S., Djankov, S., & Lang, L. H. (2000). The separation of ownership and control in East Asian corporations. Journal of Financial Economics, 58(1-2), 81-112.

Damodaran, A., & Liu, C. H. (1993). Insider trading as a signal of private information. The Review of Financial Studies, 6(1), 79-119.

Degryse, H., de Jong, F., & van Kervel, V. (2014). Does order splitting signal uninformed order flow. Unpublished working paper. VU University Amsterdam.

Easley, D., & O'hara, M. (1987). Price, trade size, and information in securities markets. Journal of Financial Economics, 19(1), 69-90.

Easley, D., Kiefer, N. M., O'Hara, M., & Paperman, J. B. (1996). Liquidity, information, and infrequently traded stocks. The Journal of Finance, 51(4), 1405-1436.

Erol, I., & Tirtiroglu, D. (2011). Concentrated ownership, no dividend payout requirement and capital structure of REITs: Evidence from Turkey. The Journal of Real Estate Finance and Economics, 43, 174-204.

Faccio, M., & Lang, L. H. (2002). The ultimate ownership of Western European corporations. Journal of financial economics, 65(3), 365-395.

Fishe, R. P., & Robe, M. A. (2004). The impact of illegal insider trading in dealer and specialist markets: evidence from a natural experiment. Journal of Financial Economics, 71(3), 461-488.

Foucault, T., Moinas, S., & Theissen, E. (2007). Does anonymity matter in electronic limit order markets?. The Review of Financial Studies, 20(5), 1707-1747.

Glosten, L. R. (1994). Is the electronic open limit order book inevitable? The Journal of Finance, 49(4):1127–1161.

Glosten, L. R., & Milgrom, P. R. (1985). Bid, ask and transaction prices in a specialist market with heterogeneously informed traders. Journal of financial economics, 14(1), 71-100.

Golez, B., & Marin, J. M. (2015). Price support by bank-affiliated mutual funds. Journal of Financial Economics, 115(3), 614-638.

Grier, P., & Zychowicz, E. J. (1994). Institutional investors, corporate discipline, and the role of debt. Journal of Economics and Business, 46(1), 1-11.

Griffin, J. M., Shu, T., & Topaloglu, S. (2012). Examining the dark side of financial markets: Do institutions trade on information from investment bank connections?. The Review of Financial Studies, 25(7), 2155-2188.

Griffiths, M. D., Smith, B. F., Turnbull, D. A. S., & White, R. W. (2000). The costs and determinants of order aggressiveness. Journal of Financial Economics, 56(1), 65-88.

Güner, Z. N., & Önder, Z. (2022). Bank affiliation and discounts on closed-end funds. International Review of Financial Analysis, 83, 102266.

Heflin, F., & Shaw, K. W. (2000). Blockholder ownership and market liquidity. Journal of Financial and Quantitative Analysis, 35(4), 621-633.

Hekimoğlu, M. H., & Tanyeri, B. (2011). Türk şirket birleşmelerinin satın alınan şirketlerin hisse senedi fiyatları üzerindeki etkileri. İktisat İşletme ve Finans, 26(308), 53-70.

Inci, A. C., & Seyhun, H. N. (2012). How do quotes and prices evolve around isolated informed trades?. Journal of Economics and Finance, 36, 499-519.

Inci, A. C., Lu, B., & Seyhun, H. N. (2010). Intraday behavior of stock prices and trades around insider trading. Financial Management, 39(1), 323-363.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. The American Economic Review, 76(2), 323-329.

Jensen, M., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. Journal of Financial Economics, 3(4), 305-360.

Jiang, H., Habib, A., & Hu, B. (2011). Ownership concentration, voluntary disclosures and information asymmetry in New Zealand. The British Accounting Review, 43(1), 39-53.

Keim, D. B., & Madhavan, A. (1995). Anatomy of the trading process empirical evidence on the behavior of institutional traders. Journal of Financial Economics, 37(3), 371-398.

Khanna, T., & Yafeh, Y. (2007). Business groups in emerging markets: Paragons or parasites?. Journal of Economic Literature, 45(2), 331-372.

Kyle, A. S. (1985). Continuous auctions and insider trading. Econometrica: Journal of the Econometric Society, 1315-1335.

La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (1999). Corporate ownership around the world. The journal of finance, 54(2), 471-517.

Laeven, L., & Levine, R. (2007). Is there a diversification discount in financial conglomerates?. Journal of financial economics, 85(2), 331-367.

Leff, N. H. (1978). Industrial organization and entrepreneurship in the developing countries: The economic groups. Economic development and cultural change, 26(4), 661-675.

Massa, M., & Rehman, Z. (2008). Information flows within financial conglomerates: Evidence from the banks–mutual funds relation. Journal of Financial Economics, 89(2), 288-306.

McNally, W. J., Shkilko, A., & Smith, B. F. (2017). Do brokers of insiders tip other clients?. Management Science, 63(2), 317-332.

Menkveld, A. J., & Saru, I. L. (2023). Who knows? Information Differences Between Trader Types. Working Paper. Vrije Universiteit Amsterdam.

Meulbroek, L. K. (1992). An empirical analysis of illegal insider trading. The Journal of Finance, 47(5), 1661-1699.

Mueller, D. C. (1969). A theory of conglomerate mergers. The Quarterly Journal of Economics, 83(4), 643-659.

Nenova, T. (2003). The value of corporate voting rights and control: A cross-country analysis. Journal of financial economics, 68(3), 325-351.

Orbay, H., & Yurtoglu, B. B. (2006). The impact of corporate governance structures on the corporate investment performance in Turkey. Corporate Governance: An International Review, 14(4), 349-363.

Parlour, C. A. (1998). Price dynamics in limit order markets. The Review of Financial Studies, 11(4), 789-81

Ranaldo, A. (2004). Order aggressiveness in limit order book markets. Journal of Financial Markets, 7(1):53–74.

Rozeff, M. S. (1982). Growth, beta and agency costs as determinants of dividend payout ratios. Journal of Financial Research, 5(3), 249-259.

Rubin, A. (2007). Ownership level, ownership concentration and liquidity. Journal of Financial Markets, 10(3), 219-248.

Rzayev, K., & Ibikunle, G. (2019). A state-space modeling of the information content of trading volume. Journal of Financial Markets, 46, 100507.

Saar, G. (2001). Price impact asymmetry of block trades: An institutional trading explanation. The Review of Financial Studies, 14(4), 1153-1181.

Savaser, T., & Tiniç, M. (2023). Information shocks and the cross section of expected returns. Borsa Istanbul Review, 23(2), 378-401.

Seppi, D. J. (1997). Liquidity provision with limit orders and a strategic specialist. The Review of Financial Studies, 10(1):103–150.

Shleifer, A., & Vishny, R. W. (1997). A survey of corporate governance. The journal of finance, 52(2), 737-783.

Simsir, S. A., & Simsek, K. D. (2022). The market impact of private information before corporate Announcements: Evidence from Turkey. Journal of International Financial Markets, Institutions and Money, 80, 101624.

Stulz, R. (1990). Managerial discretion and optimal financing policies. Journal of Financial Economics, 26(1), 3-27.

Tiniç, M., Savaser, T., & Salih, A. (2022). Proprietary trading and the information advantage of brokers in order-driven markets. Available at SSRN 4152249.

Tiniç, M., Şensoy, A., Demir, M., & Nguyen, D. K. (2023). Broker Network Connectivity and the Cross-Section of Expected Stock Returns. Available at SSRN 4066241.

Vega, C. (2006). Stock price reaction to public and private information. Journal of Financial Economics, 82(1), 103-133.

Yönder, E. (2015). REITS in Turkey: the impact of the deviations from the global systems. Doctoral Thesis. Middle East Technical University.

Yurtoglu, B. B. (2000). Ownership, control and performance of Turkish listed firms. Empirica, 27, 193-222.

Zheng, L., & Yan, X. (2021). Financial industry affiliation and hedge fund performance. Management Science, 67(12), 7844-7865.