Borsa Istanbul Review xxx (xxxx) xxx

Contents lists available at ScienceDirect

Borsa Istanbul Review

journal homepage: www.elsevier.com/journals/borsa-istanbul-review/2214-8450

Trading halts and the advantage of institutional investors: Historical evidence from Borsa Istanbul

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ARTICLE INFO

JEL classification:
G14
G15

Keywords:
Trading halts
Price discovery
Market microstructure
Regulatory effectiveness
Institutional investors

ABSTRACT

The effects and effectiveness of trading halts remain controversial among academics and regulators. This paper provides historical evidence regarding the efficacy of trading halts from a leading emerging market with a unique microstructure, Borsa Istanbul (Istanbul Stock Exchange), by examining the return, volatility, and volume behavior around news-initiated trading halts using trade-by-trade data and 15-min intervals from January 1999–April 2003. It also investigates, for the first time, the trading behavior of different types of investors, such as individuals, mutual funds, and brokerage houses, around trading halts. Findings indicate that most of the new information is absorbed by prices within 15 min following the resumption of trading after a halt. The reaction of investors to bad news is slower and stronger than good news. Despite halts, institutional investors employ the price advantage of new information during the cessation period ahead of individual investors utilizing better timing in trading after the halts. Institutional investors systematically buy and sell at more favorable prices around halts than individual investors. Finally, overall evidence suggests that trading halts are effective in the dissemination of valuable information and play an important role in enhancing the efficiency of the price discovery mechanism.

1. Introduction

Trading halts on single stocks have become common practice in many international stock markets over the last two decades. For example, on average, the New York Stock Exchange (NYSE) suspends the trading of four common stocks every day (Spiegel and Bhattacharya (1998, pp. 216–226). Exchanges usually call news-initiated trading halts to protect both the uninformed traders and/or the specialists from excessive levels of asymmetric information that leads to significant transaction costs (Glosten & Milgrom, 1985; Kyle, 1985). The stated purpose of trading halts is to allow investors an opportunity to receive and react to new information and to facilitate the orderly emergence of a new equilibrium price. However, there is great debate as to whether these goals can be reached in practice. Proponents argue that halts allow investors time to react to material news events to allow market participants to discover the new price level and reduce volatility (Brady, 1988; Brooks et al., 2003; Corwin & Lipson, 2000; Edelen & Gervais, 1997; Fabozzi & Ma, 1988; Greenwald & Stein, 1988, 1991; Greenwald & Stein, 1988, 1991; Hopewell & Schwartz, 1978; Kodres & O'Brien, 1994; Kyle. 1988; Schwartz, 1982; Stein, 1987). Alternatively, opponents argue that halts are an unnecessary barrier to price discovery and do not prevent an increase in volatility following the halts (Brown & Jennings, 1989; Dow & Gorton, 1989; Ferris et al., 1992; Grossman, 1990, pp. 1–3; Grundy & McNichols, 1989; Kabir, 1994; Lee et al., 1994; Subrahmanyam, 1994). This debate regarding the costs and benefits of trading halts on stocks has not only increased the interest of market regulators and investors, but also that of academics.

Within this framework, there is little evidence that the return, volatility, and volume behavior of stocks are significantly affected by trading halts. Most of the evidence in previous studies documented higher volatility and volume around trading halts, both before and after the trading halt, including Kryzanowski (1979) and Kryzanowski and

Peer review under responsibility of Borsa İstanbul Anonim Şirketi.

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https://doi.org/10.1016/j.bir.2023.12.006
Received 20 November 2023; Received in revised form 20 December 2023; Accepted 20 December 2023
Available online 25 December 2023
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Nemiroff (1998) on the Canadian stock market, Kabir (1992, 1994) on the Amsterdam and London stock markets, Brailsford (1995) for the Australian market, Spiegel and Bhattacharya (1998, pp. 216–226) and Wu (1998) for the Hong Kong stock market and Ferris et al. (1992), Lee et al. (1994), Hong and Wang (2000), Corwin and Lipson (2000), Christie et al. (2002), and Brooks et al. (2003) on the NYSE and the NASDAQ. According to these studies, trading halts are associated with a temporary increase in volatility and trade activity in the post-halt period as new information is incorporated into prices within a certain period after reinstatement. Then, these figures drop to pre-halt levels after some time.[2] More recently, one negative impact of suspension of trading is exemplified by Favreau and Garvey (2022). The authors find that based on the analysis of locked and crossed market states in the U.S. equity markets and despite the SEC's prohibition of them, these market states continued to occur and led to higher trading costs for investors. Another adverse impact of trading halts (or circuit breakers in this case) was noted by Cui and Gozluklu (2016) who detected the spillover effects of trading halts on related stocks that suffered from severe increases in volume, short-term volatility, and spread. Although these metrics reverted to the initial normal levels gradually, the impact is not negligible. Unlike the previous example of regulators' (i.e., the SEC prohibition case) attempts to control trading halts, there have also been instances where the exchanges might stray from the true purpose of this mechanism. Marshall et al. (2023) determine that exchanges found to initiate trading halts catered to the needs of listed firms rather than to meet their own objectives, such as minimizing excess volatility and avoiding trades at non-equilibrium prices. Aware of the unavoidable interplay between regulators, the exchanges, and the investing community during trading halts, Frino and Garcia (2018) examine the impact of macroeconomic news released during circuit breaks or trading halts in the futures markets. They find that releasing macroeconomic news during trading halts resulted in abnormally elevated price volatility and bid-ask spreads, as well as lower market depth, bringing about a higher market quality.

Moise (2021) finds that trading halts in the U.S. are primarily illiquidity driven rather than security specific information and when they are triggered, they can lead to liquidity drying up in all the securities and dampen the short-term price discovery mechanism in small and less liquid stocks during Covid-19. In another study, Chen et al. (2023) argue that downward trading halts are susceptible to reducing the price-dividend ratio daily price ranges while at the same time increasing conditional and realized volatility.

The impact of trading halts on the efficiency and effectiveness of operations of the exchanges should also be examined for the emerging markets as they may have different market microstructures than the developed markets. There are few studies examining trading halts in the context of emerging markets. For example, Ekaputra and Dwijayanti (2008) investigated the impact of trading halts on stock return volatility on the Indonesia Stock Exchange (IDX). They find that trading halts were unsuccessful in reducing the intraday stock return volatility in IDX. Rahim et al. (2021) determine that the market, in general, reacts quickly to the announcement of trading halt policy changes on IDX accompanied by a significant abnormal return at the time of announcement. Bacha et al. (2008) find that trading halts bring about positive price reactions, higher volume, and greater volatility in Malaysia. Panda et al. (2017) analyze the circuit breakers in the Indian exchanges and find a difference in return and volatility measures between pre- and post-circuit breaker periods. This effect of circuit breakers lasts up to 10 days and sometimes up to 20 days in this study. In another study on an emerging market, Taechapiroontong et al. (2012) confirm that trading halts contribute positively to the efficiency of the market by stabilizing it and reducing the information asymmetry on the Thailand Stock Exchange.

Overall, the evidence regarding the impact of trading halts on the efficiency and the effectiveness of trading in the earlier studies is mixed. There is no consistent and conclusive evidence concerning the effectiveness and appropriateness of the trading halts, specifically exchange-mandated news-initiated suspensions in different market microstructural settings despite its importance for policymakers focused on market efficiency, regulatory effectiveness, and risk management. Specific market microstructures and the country settings in emerging markets and developed markets seem to affect these inconclusive results. One of the critical factors in this debate is how market microstructure, disclosures, and specific halt mechanisms are related to the effects of trading halts, but existing empirical research is primarily focused on the North American stock markets. There are only a few studies conducted on other markets, especially those that have different market microstructures related to trading halts. In addition, these studies rarely use the intra-day data necessary for a more sensitive analysis. Moreover, there has been no study on emerging markets that have major institutional and regulatory features, compared to the developed North American markets, using intra-day data thus far.

The effects of halts are also important for investors who seek to understand the behavior of stock prices from a portfolio management perspective. More specifically, trading halts are likely to affect different types of investors (individuals vs. institutions) differently in trading due to their specific characteristics and motivation and it is still ambiguous as to which group of investors has the advantage at the expense of another group. Yet, to my knowledge, there is no study that has examined the reactions of different groups of investors to exchange-mandated news-initiated trading halts. The behavior of different groups of investors, as well as stock prices, volume, and volatility around trading halts provides invaluable information for both investors and regulators.

This paper seeks to provide new international evidence regarding the efficacy of trading halts from a leading emerging market with a unique microstructure, Borsa Istanbul (Istanbul Stock Exchange – hereinafter ISE), by examining the return, volatility, and volume behavior around news-initiated trading halts using trade-by-trade data and 15-min intervals from January 1999–April 2003.[3] Historical evidence from ISE brings proper perspective to several questions including whether emerging markets differ in terms of the conditions and responses from developed markets in the pre- and post-halting and others listed below.

What are the effects of exchange-mandated news-initiated trading halts on the return, volatility, and volume behavior of stocks? How do individual and institutional investors respond to the halts, and what are the differences between the trading behaviors of these groups around the halts? What are the consequences and the implications of halts for regulators and investors? How are halts effective in dissemination of information? Are trading halts effective in controlling volatility by easing tension and facilitating price discovery? Should regulators institute them in financial markets? Or are halts simply useless?

The distinctive market microstructure and institutional setting, a highly volatile and active market of the ISE, gives us a unique

[2] For example, Corwin and Lipson (2000) find volatility ranges from three to six times that of non-halt days during the first 30 min after NYSE halts and these diminish over the next 2 h. Brooks et al. (2003) note that the initial reaction takes place over 20 min and prices tend to reverse over the following 2 h. Kryzanowski and Nemiroff (1998) indicate that much of the information disclosed during a trading halt is reflected in the prices within the first half hour, and most is reflected within a few hours.

[3] Upon the registration of the Articles of Association of Borsa İstanbul by the Trade Registry, the legal entities of İstanbul Menkul Kıymetler Borsası and İstanbul Gold Exchange were terminated and the two institutions merged under a single roof \of Borsa İstanbul in 2013.

opportunity to test the effectiveness of trading halts.[4] Since only news-initiated halts are used, this study also measures and compares the speed of adjustment of information following material company announcements that result in halts. Perhaps one of the most important differences of the ISE from other markets in terms of market microstructure is the severe restrictions on order cancellations during the trading hours that increase the role of trading halts in the price discovery process.[5] In addition, examining the ISE offers a unique opportunity for a better explanation of the efficacy of trading halts on a purely computerized order-driven market without the influence of call or batch-type auctions or opening mechanisms following halts market makers or specialists on the trading halt mechanism as is the case in exchanges in the U.S.[6] Previous studies examine only those halts that occur during trading and exclude halts that occur before the trading day starts. Differently, this study includes, categorizes, and compares both types of halts that occur during the trading day (intra-day) and before the trading day starts (pre-opening). Finally, another important difference of this study is the investigation of the trading behavior differences between institutional investors, such as mutual funds and brokerage houses who constantly monitor the market including around trading halts, and individual investors who are far from the corporate announcements disclosed during trading hours. There is no evidence in the literature regarding this issue thus far to enable us to understand which type of investor benefits from the release of information that results in halts and whether there are systematic differences among the trading characteristics of different types of investors around trading halts. Additionally, to my knowledge, this is the first empirical study on this issue examining the trading halts from a different perspective on an emerging stock market, which is likely to add new insights regarding the use of a regulatory measure on smaller stock exchanges such as the ISE.

2. Literature review

Fabozzi and Ma (1988) find that volatility is significantly lower in the reopening period than during the trading halt for NYSE stocks in the over-the-counter market suggesting that the trading halt has been successful. Similarly, Stein (1987), Greenwald and Stein (1988, 1991), and Kodres and O'Brien (1994) argue that trading halts can reduce possible excessive price fluctuations and facilitate price discovery by reducing transactional risk thereby encouraging traders to participate in the market. Kodres and O'Brien (1994) note that traders may not be able to adjust their trading interests instantaneously to new information due to technological limitations or the costs of continuous monitoring. Traders might be more willing to supply liquidity during normal conditions when they are given an opportunity to cancel orders during extreme market changes. Kyle (1988), Greenwald and Stein (1988, 1991) and Brady (1988) argue that temporary closure allows liquidity providers, particularly buyers, time to reenter the market to absorb a further decline and for market participants to mentally catch up on the market. Corwin and Lipson (2000) and Brooks et al. (2003) find that traders actively reposition their limit orders during NYSE halts. From a different perspective, Edelen and Gervais (1997) model individual trading halts and argue that halts are beneficial to exchanges as they facilitate the monitoring of specialists' actions to curb potentially abusive pricing behavior.

Additionally, trading halts can be beneficial if they are used to transmit information during times of unusually high transaction price uncertainty. Hopewell and Schwartz (1978) find that there are rapid and permanent adjustments in the price levels over suspensions on the NYSE. Schwartz (1982) and Greenwald and Stein (1988, 1991) support this. Empirical results on the smaller stock exchanges seem more promising than those of the largest exchanges as shown by Kryzanowski (1979) for the Canadian, Kabir (1992) for Amsterdam, De Ridder (1990) for Stockholm, and Wu (1998) for the Hong Kong stock markets. Christie et al. (2002) find the opening methodology used after halts matters to accelerate the information dissemination during the halt on the NASDAQ. They also note that the period following a halt is also characterized by a large number of unusually small trades consistent with Chan et al. (1995) who suggest that investors are reluctant to commit to large trades during a period of high price uncertainty following halts during the opening on the NASDAQ.

In contrast, several models suggest that trading halts may reduce the informative side of prices and not prevent excessive volatility. One argument against trading halts is that they impede price formation as trading aggregates information that is distributed among market participants. Howe and Schlarbaum (1986) find that there is a substantial negative return over the halt and stock prices continue to decline in the following weeks with the negative news after the SEC-initiated halt consistent with Ferris et al. (1992). The number of SEC-initiated halts was only one tenth of the NYSE halts and the average length is 12.2 weeks. Kabir (1994) confirms the doubts regarding the efficiency of this mechanism in disseminating price-sensitive information by showing abnormal returns in the month following the month of trading reinstatement for the London Stock Exchange. Others, such as Grossman (1990, pp. 1–3), Subrahmanyam (1994), Brown and Jennings (1989), Grundy and McNichols (1989), and Dow and Gorton (1989), suggest that a temporary market closure at best postpones market activity until trading can re-generate information and, at worst, exacerbates the problem by inducing traders to exit the market before it closes. Similarly, Lee et al. (1994) conclude that halts are unsuccessful in fulfilling their mandate of reducing "excess volatility" and that disruption of "learning by trading" is the only feasible explanation for their findings. Christie et al. (2002) find that even with information transmission, the uncertainty associated with NASDAQ halts is not resolved by the time the halt is lifted. Additionally, market openings and closings are associated with high levels of temporary volatility and the trading activity (Amihud & Mendelson, 1987; Gerety & Mulherin, 1992; Hong & Wang, 2000; Stoll & Whaley, 1990). For example, Corwin and Lipson (2000) find volume is over 600% higher than on non-halt days and remains abnormally high for at least 2 h after the halt. There are also significant changes on spreads, depth, and liquidity (Goldstein & Kavajecz, 2000). Alternatively, if the entire information is not incorporated into the prices by the time trade is resumed, the asymmetric information hypothesis predicts return persistence. Spiegel and Bhattacharya (1998, pp. 216–226) find that order-imbalance suspensions have significant return reversals, whereas the news-pending suspensions have significant return persistence. Brooks et al. (2003) examine the market reaction to unanticipated events in the NYSE and find that the response time is longer than previous studies have reported. Initial reaction takes place over 20 min and prices tend to reverse over the following 2 h. Volume remains higher for more than 90 min. Spreads remain wider over an hour. By comparing daytime vs. overnight events, the authors also find that daytime events take 15 min to catch up to those following overnight events suggesting that the halt might be beneficial. When the news comes to the market during the trading day, the market reacts more slowly on price, volume, and bid-ask spreads than previous research would indicate. There is also a 3-min delay in response to daytime events.

[4] Annualized standard deviation of returns (58.5%) in ISE is the fourth highest among world exchanges (IFC, 1997). Turnover ratio of stocks in ISE is 271.0% and is the third highest among world exchanges, significantly higher than those of the NASDAQ (148%) and the London Stock Exchange (36.3%) (WFE Annual Report, 2002).

[5] Order cancellation was severely restricted and very limited during the trading hours in ISE in the past. However, this rule has been changed in recent years, so it is not the situation currently.

[6] This rule has partially changed following the writing of this paper when Borsa İstanbul has introduced a single price auction method for the stocks halted before the trading day starts. Trading is commenced following a single-price call auction after a stock is halted before the opening of the day.

In more recent studies, Kim et al. (2008) examine the relative performance of trading halts and price limits using data from the Spanish Stock Exchange where both mechanisms have coexisted in an order-driven market with automatic dissemination of real-time trading information. According to their evidence, trading activity increases, but volatility remains the same after trading halts, so information is efficiently reflected in the stock prices once trading resumes after trading halts. Unlike U.S. markets, the SIBE, managed by the Sociedad de Bolsas, does not include market makers. Orders submitted from electronic terminals are routed to the centralized limit order book. All orders are managed according to a strict price-time priority. The opening price is determined by an opening auction followed by continuous trading. Trading is reopened with a call auction like that used at openings in the morning. Frino et al. (2011) examine market behavior around trading halts associated with information releases on the Australian Stock Exchange that also operates an open electronic limit order book. They find trading halts increase both volume and price volatility. Trading halts also increase bid-ask spreads and reduce market depth at the best quotes in the immediate post-halt period. The results of this study imply that trading halts impair rather than improve market quality in markets that operate open electronic limit order books. Hai-Chuan et al. (2014) find that the dynamics of absolute return, trading volume, and bid-ask spread around the intraday halts display a sharp peak and a power law relaxation by using high frequency data from the Shanghai Stock Exchange. Their findings also imply that positive events are more effective than negative events for intraday halts and one-day halts, but negative events are more effective than positive events for inter-day halts. In another study using not news-initiated, but a sample of order imbalance delayed openings on the NYSE, Bidisha et al. (2011) examine the costs and benefits of continued trading on alternative venues when the main market calls a halt. They find that trades routed to off-NYSE venues during NYSE halts are associated with significant price discovery and lead to an improved post-halt trading environment. However, these informational benefits come at a substantial cost as both execution costs and volatility are extremely high on off-NYSE venues during NYSE halts. Jiang et al. (2009) examine the impact of trading halts of NYSE-listed stocks on informationally related securities that continue to trade during the period of the halt and find a significant liquidity impact on informationally related securities with spreads and the price impact of trades having substantial increases. However, they also find that quoted depths, the number of trades, and trade volume significantly increase. Their results also indicate that there is a common liquidity response of informationally related securities to firm-specific trading halts.

Overall, the evidence regarding the impact of trading halts on the efficiency and the effectiveness of trading in the limited number of earlier studies, which focus on North American stock markets and developed markets with common or similar market microstructures, is mixed and, as such, inconclusive. Specific market microstructure, disclosures, specific halt mechanisms, and country settings in emerging and developed markets seem to be effective in these inconclusive results. There are only a few studies conducted on other markets, especially those with different market microstructures related to trading halts. Moreover, these studies primarily examine both volatility-initiated and news-initiated trading halts occurring during trading hours using daily data. The unique contribution of this study is to provide evidence concerning the effects of trading halts using only exchange-mandated news-initiated trading halts including those before the trading day starts and intra-day data in a leading emerging market with a unique microstructure (i.e., lack of call auction after a trading halt, ban on order cancellation during the trading hours except call auctions, lack of a market maker, fully computerized continuous auction order-driven markets, etc.). The distinctive market microstructure and institutional setting (one of the highest volatility and liquidity/turnover ratio markets in the world with a dominance of day-traders in the trading activity) gives me a unique opportunity to test the effectiveness of trading halts and to measure the speed of the adjustment of information following material company announcements that result in halts. The trade data with investor identification also provides me with a unique opportunity to examine the behavioral differences of different groups of investors, such as institutional investors (i.e., mutual funds and brokerage houses) and individual investors when reacting to exchange-mandated news-initiated trading halts. To my knowledge, there is no study that has examined the reactions of different groups of investors to exchange-mandated news-initiated trading halts thus far.

3. Empirical research

3.1. Institutional specifications of the ISE

Institutional specifications and the trading halt policy of the ISE is introduced in detail in the Online Appendix sections A and B.

3.2. Data and methodology

In this study, data consist of only news-initiated halts including both news pending and news-dissemination halts that have been initiated by exchange officials when an information release is expected to have a significant impact on prices. Data on each halt are obtained from the ISE's official files. They include the halt and resume time, the trade-by-trade price and volume data of the halted stocks, and the number of trades for the 21-day period from 10 days prior to the halt through 10 days after the halt. All prices are adjusted to incorporate actions including splits, dividends, right issues, and capital increases. Data also cover the identities of buyers and sellers of trades on halted stocks. All data are publicly available except for the identities of each side of the trade including for whom the trade is executed and whether it is individual investors, brokerage houses' own portfolios, or mutual funds. During trading, brokers must define the identity of their clients while entering their orders into the computerized trading system. For example, if the order is given by a mutual fund, the letter "F" is attached to the order to indicate that the order belongs to a mutual fund. Similarly, "P" indicates a brokerage house's own portfolio, and "M" the non-institutional or individual investor.

Appendix Table A1 (available online) represents the summarized statistics for the news-initiated trading halts on the ISE. Trading halts that are not resolved prior to close, halts that occur more than once for the same stock in a day, and halts that do not have complete data are excluded from the initial sample. Only the stocks that halted and resumed on the same trading day are considered here. Thus, a total of 33 observations were eliminated yielding a sample of 323 trading halts (Panel A). Using the ISE's halt files, 323 trading halts (events) belonging to 182 stocks were identified from January 1999–April 2003.

Halts are also classified as positive (good news), negative (bad news), and zero (neutral) abnormal return based on the returns right after the reopening of trading in the first 5 min similar to the tick test of Lee and Ready (1991).[7] If the initial return is positive, it is classified as good news and so on. There are 145 halts in which their initial return is positive, 116 of 323 are negative, and 62 of them are zero (Appendix Table A1, Panel B, available online). To distinguish the effects of trading halts that occurred before the opening of the sessions, halts are also categorized by their time due to different patterns of stock returns and volume at openings and closings (Amihud & Mendelson, 1987, 1991; Andersen & Bollerslev, 1997; French & Roll, 1986; Gerety & Mulherin, 1992; Harris, 1986; Jain & Joh, 1988; Stoll & Whaley, 1990). Thus, three different halt groups are formed: 1) halts before the first session (Pre-1 halts), 2) during trading (Intra-halts), and 3) before the second

[7] A random examination of news that causes halts has also confirmed the appropriateness of the method used in classification. Assessments of favorableness of the information released during the halt are parallel to the classification method based on the tick test of Lee and Ready (1991).

trading session, but after the first session (Pre-2 halts) since there are two separate trading sessions per day on the ISE. Intra-halts (198) capture the large portion of the sample. Panel B reports that the probability of a release of positive news during trading is greater than that of negative news. Companies tend to announce negative news during non-trading hours. They apparently release more positive information during trading hours (intra-day) than negative information. In the full sample, the mean and median duration in news-initiated halts are 35 min and 18 min, respectively (Panel C). These times are significantly shorter than those on other exchanges.[8] The average duration in Pre-1 halts is approximately three times that of the average duration of Intra-halts. The average and median duration of Intra-halts is 22 min and 14 min, respectively. The main reason behind the differences in average duration is that most of the Pre-1 halts occurred because of the appearance of (officially) undisclosed (private or insider) information in newspapers or the media before the trading day started. In this situation, companies are required by ISE to confirm or to correct the information in the newspaper, whether it is true or false, to protect the investors who would probably trade based on this information when the trading starts. Exchange officials ask the company to confirm or correct this news before the opening. Otherwise, the exchange halts the trading of its stock until the company officially confirms or corrects the information that appeared in the media. Thus, it usually takes longer than regular disclosure of the information during trading. The longer the period that the stock is halted, the more uncertainty and informational asymmetry expected in this period that could cause higher volatility and price change at reopening.

In Appendix Table 1, Panels D and E (available online) show the halts based on the time-of-day, day-of-the-week, and month-of-the -year. Consistent with Spiegel and Bhattacharya (1998, pp. 216–226), a Monday effect exists for news-related suspensions since most suspensions occur on Mondays. 27.9% of halts occur just before the opening and in the first half-hour of trading. It also implies information leakage from the company since officially undisclosed (private) information might have been published in the newspapers before the opening. Alternatively, there are more halts in the first quarter of the calendar year than in the other months of the year and fewer halts in the summer holiday months. Thus, seasonality in halts across the months implies that companies tend to make important decisions, such as investments, dividends, and other issues related to corporate operations, at the beginning of the year. Moreover, most of the stocks that frequently have been subject to the halt are of small or medium-sized companies. In the sample period, on average, 35.2% of the halted stocks are included in the ISE-100 Index. Only 13.9% of them are included in the ISE-30 Index that covers the largest 30 companies. Some of them are distressed firms or firms that have legal problems.

Similar to previous studies, event study methodology was used to examine the liquidity and volatility before and after the trading halt (Corwin & Lipson, 2000; Kryzanowski & Nemiroff, 1998; Lee et al., 1994). In this study, the market response to the information shocks that result in trading halts is examined by using return, volume, and volatility behavior of the halted stocks. Thus, the same methodology used in earlier studies on the data from January 5, 1999–April 9, 2003, was applied. This study focuses on the behavior of return, volatility, and trading activity across 15-min intervals around halts while also considering the existence of two different sessions in a day.

Throughout the study, return, volatility, and trading activity in event periods (from t-40 to t+40, ± two days) are compared to the same characteristics of the halted stocks during a non-event period (from t-200 to t-41 and from t+41 to t+200), where (t) represents the first 15-min interval following the resumption of trading after the halt (i.e., called a "halt interval"). Data for each halt covers the entire period (from t-200 to t+200) that contains 200 15-min intervals (10 trading days) before and after the event date. Time intervals on both event (halt) and non-event (non-halt) periods are defined based on the halt time and reopening time of the stocks. The halt interval (t) is the period between the beginning of the halt and the end of the first interval following the resumption of trading after the halt. Fifteen-minute pre-halt periods are measured backward from the halt time to the opening, and 15-min post-halt periods are measured forward from the resumption time of the halt to closing. Extending the event period up to 10 h before and after the halt provides an opportunity to observe the behavior of halted stocks up to two trading days before and after the halt. Trading volume and the number of trades in each interval are used as a representation of trading activity. Similar to Lee et al. (1994) and Corwin and Lipson (2000), to control the stock-specific time-of-day effects, abnormal measures for each 15-min interval in the halt period are computed by comparing the values in the event period interval with the values of exactly the same matching interval (time-of-day) of halted stock in the non-event period.[9] For example, to measure the abnormal return on halted stock i on interval t, (AR_{it}) is calculated as follows:

$$AR_{it} = R_{it} - R_{itn}$$

R_{it} is the return on stock i in interval t of the halt period measured by the percentage change in stock price on interval t of halt period relative to the price on interval t-1 of halt period. R_{itn} is the return on stock i in interval t of the non-halt period measured by the average of the percentage change in the stock price on same matching interval t of the non-halt period relative to the price on interval t-1 of the non-halt period.

Then, average abnormal returns of each interval in an event period are computed by averaging the ARs of each stock in each of the same intervals.

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} ARit$$

where N is the number of halts. Abnormal measures of trading volume and the number of trades are also computed in the same way. Abnormal average returns around suspensions are measured and compared by using different event windows ranging from one interval to 40 intervals: [-40, −1], [-20, −1] [-12, −1], [-8, −1], [-4, −1], −4, −3, −2, −1, 0, 1, 2, 3, [1, 4], [1, 8], [1, 12], [1, 20], and [1, 40]. All volatility, average returns, and trading activity measures of stocks are tested using t-tests and nonparametric Wilcoxon sign rank tests.

4. Empirical findings

4.1. The volatility spillover hypothesis

The effectiveness of halts on return volatility, price discovery, and the corresponding changes in trading volume during periods before and after halts are examined as the major goal of halts is to prevent excessive volatility due to a sudden information release during trading. Since the halts are directly related with the release of information, the ability of

[8] There were nearly 400 halts on the NYSE in 1995 and 1996. Most of them were news-related halts. The mean duration for news halts is 86 min on the NYSE (Corwin & Lipson, 2000). The median duration is around 150 min on the Canadian markets (Kryzanowski & Nemiroff, 1998). The majority of the halts occur at the opening. The median is one day on the Euronext Exchange (Engelen, 2002). Hopewell and Schwartz (1978) find that news suspensions lasted 261 min on the NYSE between 1974 and 1975. Delayed openings tend to last longer than intraday suspensions (437 min vs. 149 min). The longer the trading halt, the larger the price adjustment. A similar result was described by Schwartz (1976). Regulator-initiated suspensions tend to last longer as in the Hong Kong market (Wu, 1998). Median suspension days are three and one for the mandatory group and voluntary group, respectively.

[9] The same computation is also generated by using market returns and very small and negligible differences between these two methods were found.

the market to absorb this new and important information before, during, and after the halt is investigated here. If the halt is effective, volatility in the post-halt period should return to its pre-halt period level in a short period of time. The effect of spillover to subsequent trading days or intervals is described in the volatility spillover hypothesis. If the halted stock shows greater volatility during post-halt intervals than pre-halt intervals, and does not return to its pre-halt average quickly, then this finding supports the hypothesis that trading halts are not successful in controlling volatility due to volatility spillovers. To test the volatility spillover hypothesis, an 81-interval event period was used: from session t–40 to t+40, before and after the halt interval, t_0. For halted stocks, session $t = 0$ represents the halt, whereas t-1 and t+1 are one interval prior to and following the halt. Similar to Kim and Rhee (1997) and Corwin and Lipson (2000), interval returns squared was used as a volatility measure, $V_{t,i} = (r_{t,i})$,[2] where $r_{t,i}$ represents close-to-close return for each stock on interval t relative to the previous interval, t–1. This measure is calculated for each halted stock. Then, the averages for each session in the 81-session event period were found.

The findings in Appendix Table A2 (available online) indicate that there is no increase in volatility before the halt. In the full sample, on average, volatility jumps significantly to 23.95% on halt interval t from 2.23% on t-1, then declines sharply to 3.50% in the next 15-min interval t+1 (Fig. 1). Although post-halt volatility seems to be slightly larger than pre-halt volatility, volatility is down to its normal pre-halt level within an hour. A large decline in the volatility of halted stocks on t+1 could be seen as evidence in favor of the effectiveness of halts. It shows that trading halts do not cause volatility to spread to longer horizons. High volatility is greatly influenced by information at the reopening. Another reason behind the slightly higher volatility in the post-halt period would be the change in the fundamental value of the stock because of the announcement, unmeasured information effects, and a reflection of the remaining part of the information as it is disclosed to a larger number of investors or the market's closure itself (Corwin & Lipson, 2000). Alternatively, trading reveals an investor's private information which moves the price. Thus, returns over the trading period tend to be more volatile than returns over nontrading periods. Findings imply that halts at least do not spread the volatility out longer than if there were no halts. Volatility may have been higher over a longer period following the announcement if the halts did not exist. Evidence indicates that a trading halt accelerates the absorption of new information and helps prices reflect material information faster than otherwise would be possible.

Panels A, B, and C in Appendix Table A2 (available online) report that findings for the other sub-groups, such as positive and negative news-initiated, Pre-1, Pre-2 and Intra-halted stocks, are also in line with the findings for the full sample. Similar to the full sample results, Fig. 2 displays that volatility declines sharply following a halt interval both for positive and negative news halts. Post-halt volatility of negative news-initiated halts is not only slightly higher than the volatility of the pre-halt period, but also higher than that of the positive news-initiated halts. For example, the average volatility in the post-halt period (+1, +4) for positive and negative return halts are 2.63% and 4.36%, respectively.

Similarly, post-volatility of the Pre-1 halts are higher than the post-volatility of the Pre-2 and Intra-halts due to the combined effects of the material information and the opening (market closure effect) itself. This is consistent with my expectations as earlier studies show that return, volatility, and volume follow a U-shape pattern over the trading. The first interval following the halt of Pre-1 stocks becomes the first trading interval of a trading day. Therefore, relatively higher volatility would be expected for Pre-1 halts in the first few intervals following the resumption of trading after a halt. Another reason behind the slightly higher volatility and absolute returns of the Pre-1 stocks could be the media coverage of news that caused the halt. Most of the pre-opening halts occur due to the publication of private (insider) information in newspapers. Consistent with Kim and Verrecchia (1991), media coverage of non-public information before the trading day facilitates the dissemination of information, draws the attention of investors more strongly than it does during trading, and could change the dispersion of investor beliefs. Thus, all result in higher returns, volume, and volatility at opening. Interestingly, stocks that are halted before the opening of the first session (Pre-1) due to a negative information release (Pre-1-neg) face significantly larger volatility than the volatility of stocks halted due to positive announcements (Pre-1-poz). Despite the large decrease in volatility on t+1 relative to the halt interval in Pre-1-neg stocks (from 40.81% to 2.26%), volatility remains higher than its pre-halt level until the end of the event period. This indicates that the effects of negative announcements that caused a delayed opening are greater and last longer than the effects of positive announcements. Moreover, findings for the sub-periods 1999–2000 and 2001–2003 also confirm my findings and all results are statistically significant. I also examined positive news-initiated halted stocks by categorizing them into two groups: stocks included in Index-30 and non-Index-30 stocks. The findings indicate that the volatility of non-index stocks is not only significantly higher both before and after a halt than the Index-30 stocks, but also last longer in the post-halt period than that of index stocks. The reaction of investors to the news of non-index stocks during the halt interval is significantly stronger than those of Index-30 stocks (31.4 vs. 16.4).[10]

4.2. Delayed price discovery hypothesis

If halts are related to the dissemination of material information, the return in the first interval following a halt should be relatively large to show how quickly new information is absorbed by the market. It would then be expected that a quick market adjustment in prices would leave the abnormal returns small and insignificant in the post-halt period. Otherwise, it means there is a delay in price discovery implying that there should be large positive (negative) returns for stocks that are halted due to positive news (negative news) in the post-halt period. To examine the immediate and subsequent price movements following the halt, return series around the halt interval are examined and compared.

Appendix Table A3 (available online) presents the average abnormal returns (AARs) at each interval in different event windows during the halt period. The first column reports various event windows from one interval to 40 intervals. This table clearly demonstrates that there is only a large fluctuation in the prices of halted stocks right at the reopening following the halt. There is no significant change in prices after the halt interval. In absolute terms, the AAR on the halt interval (t) is 3.55%. For positive news-initiated halts, the AAR during the halt is large and significant at 4.46% and then begins to decline. Thus, all new information is absorbed by the market within the first 15 min after the reopening of trading. There is no significant continuation in the increase in prices and no correction or reversals in the post-halt period. It seems that the prices of halted stocks reach their new equilibrium during the halt interval after the new information. Fig. 3 illustrates clearly that the cumulative average return (CAR) of positive news halts at the end of the event period remains almost at the same level as during the halt interval. In addition, the first 1-min and 5-min returns following the reopening are examined. However, they are not given here due to space limitations. We find that most of the change (78%) in prices within the first 15 min is generated within the first minute following the reopening after the halt.[11] At the end of the first minute, the AAR is 2.76%, which was

[10] This is not given here due to space limitations but can be obtained from the author on request.

[11] This ratio might have increased in value by time because of the increasing share of High Frequency Trading occurring in Borsa İstanbul. High Frequency Traders, who constantly monitor the markets and react to the news, trades, and changes in the order book through their algorithms running on super-fast computers, are expected to have even more advantages in trading following trading halts than conventional institutional investors. This would be a new research question related to trading halts to be analyzed in the future.

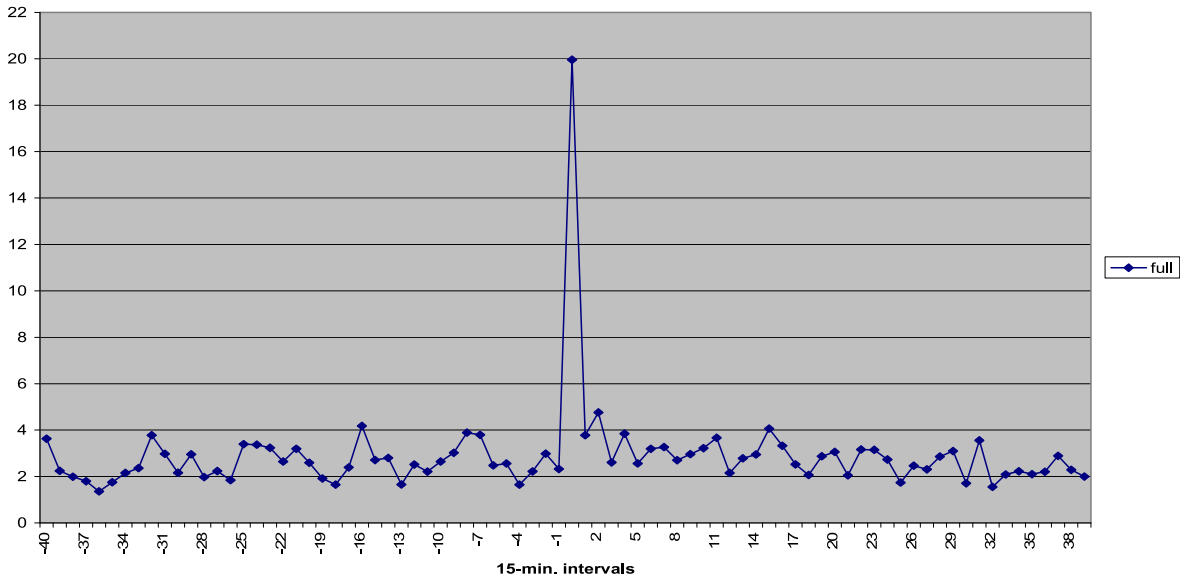


Fig. 1. Volatility around trading halts (full sample).

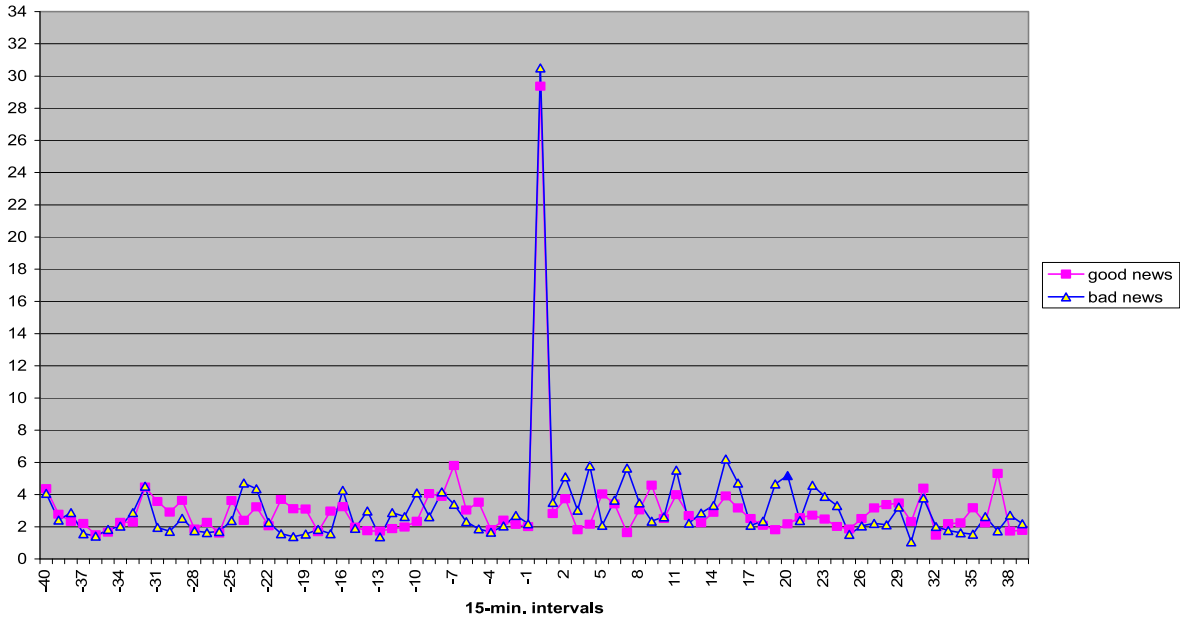


Fig. 2. Volatility around Trading Halts: Good News vs Bad News.

3.55% at the end of the first 15 min. This is similar for positive and negative news. Gradual abnormal returns in the pre-halt period (from *t*-40 to *t*-1) of approximately 2% imply that there could be information leakage and some insider trading prior to the announcement-initiated halt. These findings might also suggest that halts are a response to pre-halt information asymmetry. However, test results are not strong enough to confirm insider trading statistically.

The behavior of AARs for negative news-initiated halts displays some differences than those of positive news-initiated halts. After a large decline (−4.13%) during the halt interval, prices remain at almost the same level for an hour. Then, prices keep declining until the end of the next 6 h resulting in CARs reaching −6.26%. Thus, an announcement of negative news causes a total drop in prices by 7.76% following the halt. However, most of the information is reflected in the prices within the first 15 min after trading resumes. It seems that the impact of negative news is stronger and lasts longer than that of positive news. This is consistent with Hong et al. (2000) who find that bad news travels slowly and generates an under-reaction in the returns that might also be related to the restrictions and difficulties with short-sales. Alternatively, the prices of negative news-initiated stocks increase by 1.50% prior to the halt. This pre-halt abnormal return behavior is very similar to those described by Kryzanowski and Nemiroff (1998). Continuation of negative returns of bad news-initiated halts in the post-halt period could be attributed partially to the reaction of investors to abnormal positive returns in the pre-halt period due to news that is inconsistent with investors' expectations. Larger negative returns over a longer time in the post-halt period could also demonstrate additional reactions of investors to positive returns in the pre-halt period just before the announcement of negative news.

4.3. *The effects of time of halts*

To detect the impact of time of halts on the return behavior of halted stocks, the AARs of halted stocks are examined by dividing them into

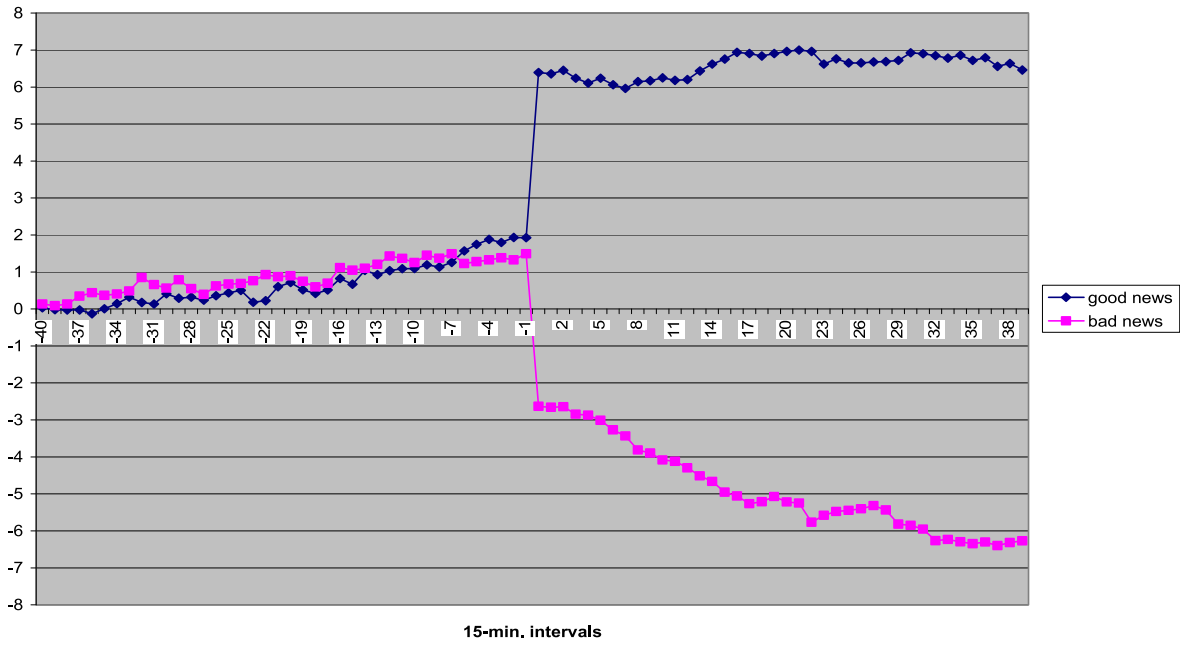


Fig. 3. Cumulative abnormal returns around trading halts (%).

three different groups based on their halt time: Pre-1, Pre-2, and Intra. In addition, these groups are also divided based on the favorableness of the news that results, such as positive and negative. Findings are displayed in Appendix Table A3, Panels A, B, and C (available online). AARs in different groups move similarly to those of the full sample. Almost all information is reflected in the prices for all stock groups within the first interval after trading starts following the halt. There are no significant differences among groups indicating that the time of the halts does not have a considerable effect on the return behavior of halted stocks. Halting the stocks before the opening or during trading does not change the reaction of the market participants to the new information. Fig. 4 illustrates that in either situation, prices almost reach their natural equilibrium very quickly following the announcement through the halt. It could be interpreted that the halt is a useful mechanism to prevent the delay in responding to daytime events relative to overnight events as observed on the NYSE by Brooks et al. (2003). Thus, halts seem to be the main reason behind the fact that there is no significant difference between the speed of adjustment of information for intra-day halts and the pre-open halts on the ISE, where continuous trading is the only mechanism used both at the opening and during the day unlike the NYSE.

Alternatively, prices of stocks that are subject to negative news-initiated halts absorb negative information over a longer period than their positive counterparts by facing larger absolute (negative) returns. This effect especially exists for the stocks that are halted prior to the opening of the trading day (Pre-1) due to a negative information release. These stocks decline −5.14% during the halt interval and keep declining until t+33 when it reaches −11.40%. Obviously, the price adjustment of bad news is slower than that of good news, especially if bad news arrives prior to the opening. My findings are consistent with the previous evidence that indicates the market mechanism works effectively to absorb new material information and reflect in the prices as quickly as possible in a short period of time (e.g., within 15 min).

4.4. *Trading interference hypothesis*

In this section, the trading activity of halted stocks is investigated. An expected increase in volume and the number of trades following the resumption of trading immediately after the halt is due to the positive relationship between the trading activity and volatility found in previous studies (French & Roll, 1986; Harris, 1986; Jones et al., 1994; Schwert, 1989; Stoll & Whaley, 1990). It is also expected that investors would increase their trading activity for liquidity and portfolio rebalancing purposes after receiving new information. Further increases in volume after a halt interval could be seen as evidence of trading interference by the halts. Therefore, if the halt is effective in controlling volatility, trading activity in terms of volume and the number of trades should not increase excessively in the post-halt period. To examine the trading activity of stocks that are halted in my sample, each of the 81 intervals in the event period are analyzed. Abnormal trading activity is measured similarly to abnormal returns as used by Kryzanowski and Nemiroff (1998) and Corwin and Lipson (2000). Additional computations based on percentage changes in these measures, not reported here due to space limitations, show similar results.

Appendix Table A4 (available online) represents the interval-to-interval abnormal trading activity around halts. Consistent with a large abnormal return and volatility during the halt interval, and with earlier studies, there is a significant increase in trading volume during halt intervals for all stock groups except for negative halts. However, abnormal volume is positive only on interval t. Following the halt interval, the abnormal number of shares traded in the post-halt period declines until the end of the event period and remains lower than that of the pre-halt and non-halt periods. Volume even drops on halt interval (−24231) for negative news-initiated halted stocks, while it increases for positive news-initiated halts (+76165). Stocks that are halted before the opening have larger abnormal volume during the halt interval and subsequent fewer intervals than other sub-groups due to information release and a delayed opening. However, only a few of them are statistically significant, displaying no significant differences in the volume of halted stocks between the pre- and post-halt periods. This represents the investors' unwillingness to supply liquidity around the halt due to the uncertainty based on new information.

Similar to volume, there is no significant movement in the abnormal number of trades in the pre-halt period, except in one interval prior to halt (t-1) as shown in Appendix Table A5 (available online). Interestingly, the increase in the number of trades begins just one interval before the halt and, after a significant jump from 6.3 to 53.7 during the halt interval, starts to decrease following this interval until the end of the event period. Obviously, investors who hold these stocks would make revisions on their positions depending upon the favorableness of the announcement. Similarly, many new investors, who have no position on

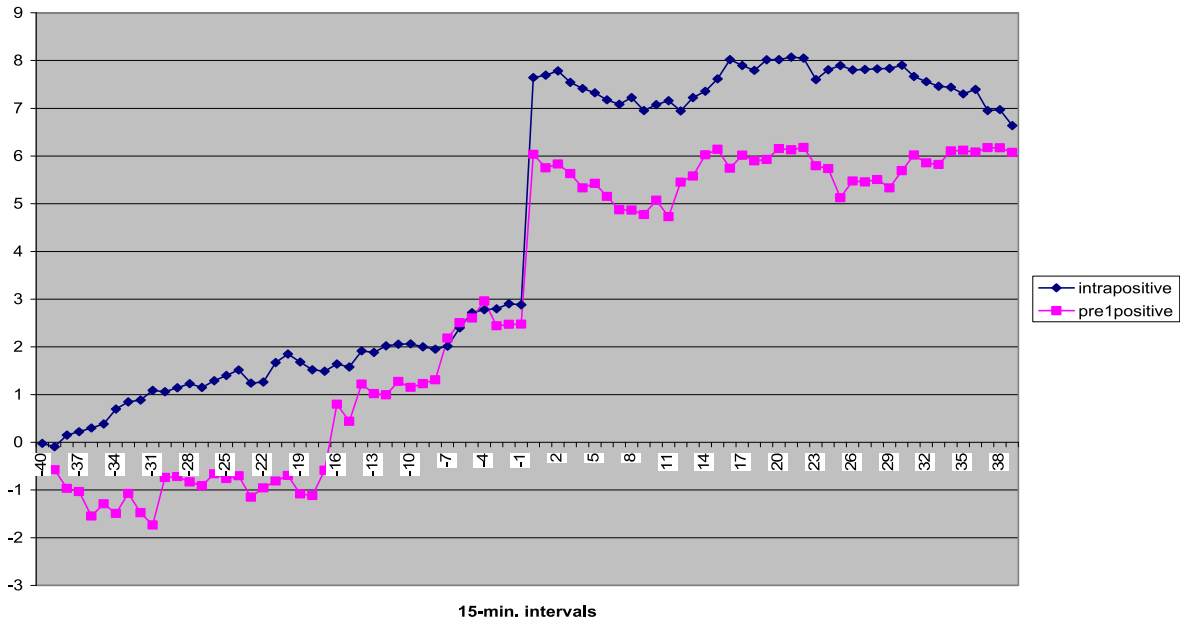


Fig. 4. CARs around Trading Halts: Intaday Halts vs Pre-opening Halts (Good News).

these stocks, also start trading due to the disclosure of new information. Therefore, an increase in trading activity would be expected in the post-halt period as a product of the price discovery process. However, as soon as the new information is disseminated to a large number of investors and reflected in the prices, post-halt trading activity should return to its average of the non-halt period. Thus, the question here is how quickly it returns to its pre-halt or non-halt levels. Even though findings indicate that the number of trades in the post-halt period is slightly higher than its average during the non-halt and pre-halt periods, most of the trading activity is generated within the first interval at the reopening after the halt. There is almost no significant trading activity after the first 60 min following the resumption of trading. This pattern is also similar in the sub-periods examined. Alternatively, an increase in the number of trades when the volume drops implies that the trade size becomes smaller after the halt. This is consistent with Chan et al. (1995), who suggest that investors are reluctant to commit to large trades during a period of high price uncertainty following halts.

Finally, the return, volume, and volatility of halted stocks in the post-halt period are compared with those of the pre-halt period through paired *t*-tests and signed rank tests. The paired test results displayed in Appendix Table A6 (available online) confirm my previous findings. Price adjustment is primarily (almost completely) generated within 15 min (an hour). This lasts longer (i.e., up to 2 h) for bad news. Overall, return, volume, and volatility tend to return to their non-halt period averages in a short period of time after trading is resumed following the halt. Thus, halts seem to facilitate the orderly emergence of a new equilibrium price by allowing investors a chance to reach, evaluate, and eventually react to the new important information.

4.5. Duration of halts

Another argument regarding the effects of halts is the length of the halt. Lee et al. (1994) states that halt mechanisms cannot be improved by increasing the length of the halt period by demonstrating the inverse relation between duration and price adjustment. Consistently, Spiegel and Bhattacharya (1998) suggest that the NYSE has improved its ability to absorb more extreme news in time with shorter suspensions after the regulation that shortened the halt time. In fact, what is the effect of the duration of halts on price discovery? Is the duration of halts effective on the dissemination of information? The longer the halt the faster the formation of a new equilibrium price? Or, do longer halts generate excessive volatility by preventing trading and increasing uncertainty? What is the optimum average length of halts: an hour as in the NYSE or much shorter as in the ISE? In fact, the average (median) duration of news-initiated halts on the ISE is 35 min (22 min) and is significantly shorter than the average duration of the same type of halts in other international exchanges as shown previously. To enlighten these issues, the sensitivity of the return, volatility, and volume behavior of halted stocks to the duration of halts has been examined. To measure the differences among the stocks that are halted for different durations, stocks are categorized into four different groups based on their halt duration.[12] These groups are: stocks that are halted up to 15 min, from 15 to 30 min, from 30 to 60 min, and more than 60 min.

Appendix Table A7 (available online) reports that there are no significant differences in the return, volatility and volume behavior of stocks depending upon the duration of their halts. Both pre-halt and post-halt movements in these measures are consistent with my previous findings for the full sample. One difference for the stocks that are halted up to 15 min is the drop in the volume on the halt interval and a slightly higher spillover in return and volatility in the two immediate intervals after the halt intervals (t+1 and t+2) than those of the groups for 15–30 and 30–60 min. Minor differences might be interpreted that a 15-min-long halt is too short to let the information be disseminated and evaluated by the investors. It seems that volatility and the volume of stocks that halted for 30–60 min tend to return to their non-halt level slightly faster than those of stocks halted for up to 30 min. But it does not necessarily show that the longer the halt period, the faster the absorption of new information into the prices since the findings for the stocks that are halted more than 60 min are not consistent with this. This is also consistent with Lee et al. (1994) and Spiegel and Bhattacharya (1998, pp. 216–226). Even though the duration of halts in the emerging ISE is shorter than other developed stock markets, the market seems to respond to the new information faster or at least as fast as it does in more developed, and presumably efficient, stock markets in the U.S. and Canada. Therefore, one suggestion that can be drawn by regulators is that the duration of the halts should be neither longer nor shorter than it needs to be. It seems that an average of 30 min is sufficient to let information be received and evaluated by many investors.

[12] Duration is calculated from the beginning of the sessions for the stocks halted before the opening of the first and second sessions (Pre-1 and Pre-2).

Alternatively, in addition to the duration of the halts, there might be additional factors affecting the speed of the reflection of new information. What are the other factors that determine the speed of adjustment in stocks prices after announcements? There are several differences between the microstructures in the ISE and U.S. markets. Some of the factors that might effective the speed of adjustment on the ISE as fast as it is in the U.S. markets are, unlike the NYSE, the price discovery mechanism based on continuous trading via fully computerized trading, the non-existence of monopolist intermediaries, such as specialists, investor characteristics, and small size of the market. More specifically, inefficiencies in call auctions and batch mechanisms employed at the opening by the NYSE relative to the continuous trading process of the ISE could affect the speed of adjustment following halts. Continuous trading would help investors reach equilibrium prices by learning through trading. Furthermore, one would also expect quicker adjustment in prices after halts in the NYSE via specialists whose main obligation is to provide stability and facilitate equilibrium in the market. The specialist's opening price should be close to the market clearing price; however, this does not always happen in practice (Lee et al., 1994). This causes doubt concerning the specialists' role in the price discovery process at the opening following trading halts. Therefore, halts on a continuous trading market without any intermediaries, such as specialists, seem to be an important tool to increase the speed of adjustment in prices.[13] In sum, differences in the speed of adjustment after halts in two markets could be attributed to the differences in the market microstructure, such as price discovery mechanisms. Taken together, the main finding of this study, the quick reaction of prices to new information on a short period of halt, leads us to raise another question.

4.6. Who takes advantage of new information that results in a halt?

Which investor group generates this quick reaction, and who benefits from the release of information even though halts seek to disseminate this new information to a large number of investors? Is it institutional investors and day traders who continuously follow news over the trading or is it individual investors? Furthermore, a large portion of the daily trades is executed by day traders on the ISE whose only job is to follow the news and to trade frequently to make profits, usually from a relatively high spread due to large minimum tick sizes by taking intra-day positions. Their role in the formation of stock prices is very important on the ISE. Similarly, institutional investors monitor the news and market continuously and have a greater advantage to reach news than most of individual investors. Therefore, both day traders and especially institutional investors might facilitate the formation of prices by stepping ahead of the other type of investors. To understand whether some specific types of investors, such as institutional investors, take advantage of new information as they constantly watch the market ahead of individual investors, trading patterns of different types of investors should be analyzed.

Although it is not directly possible to identify the trades of day traders in many markets worldwide, a regulation of the ISE allows us to make a distinction among different types of investors. According to this regulation, brokerage houses must define the type of investor as Individual (M), Mutual Fund (F), or Portfolio (P) on orders while they are submitting to the electronic trading system. "Individual" represents orders given on behalf of individual investors, while "Mutual Funds" are for mutual funds. "Portfolio" represents the brokerage house's own portfolios. Thus, my data set gives us an opportunity to observe whether certain types of investors take advantage of new information during and immediately after the halt. If so, there should be systematic differences in the buying and selling prices among different types of investors, but also an increase in the share of certain investors in trading activity in the post-halt period. To examine this hypothesis, a volume-weighted average of buying and selling prices of each type of investors for each halted stock within the four intervals before and after halt are computed. In addition, the total number of shares traded by each type of investor around the halts is calculated. Table 1 demonstrates and compares the volume-weighted average prices of buys and sells for each type of investor.

By examining trades (buying and selling prices) executed on behalf of individuals, mutual funds, and brokerage house portfolios, I find that the volume-weighted average buying prices of individuals on halted stocks during halt intervals are 0.554%, and 0.274% more expensive than the buying price of mutual funds and portfolios on the same stocks, respectively (Panel A). The volume-weighted average selling prices of individuals on halted stocks over the same interval are 0.52% and 0.51% lower than the selling price of funds and portfolios, respectively. It seems that individuals buy at higher prices and sell at lower prices than mutual funds and especially brokerage houses' own portfolios. And, this is valid for two-thirds of the stocks examined. These differences are also relevant for good news-initiated and bad news-initiated halts. In good news-initiated halts, individuals buy 0.595% and 0.127% higher and sell 0.50% and 0.82% lower than mutual funds and portfolios, respectively, on the same stocks in the first interval following the resumption of trading. In bad news-initiated halts, individuals buy 0.46% and 0.13% higher and sell 0.51% and 0.04% lower than mutual funds and portfolios on the same stocks in the first interval following the resumption of trading after the halt.

To determine whether these differences are due to an information release or occur systematically even in the pre-halt period, the same analysis for the pre-halt period is applied. My findings indicate that these differences are significantly lower or in favor of individual investors in the pre-halt period confirming that mutual funds and brokerage houses take the price advantage of the information release ahead of the individual investors by having better timing in buying and selling right after the trading halts. By extending the period up to 1 h following the resumption of trading, similar results are obtained. Then, to confirm the robustness of these findings, price differences are also computed on an equally-weighted basis (Panel D). Equally-weighted price differences also confirm that institutional investors exploit the priority of individual clients by responding to new information before uninformed individuals.[14] However, trading halts seek to disseminate information particularly to individual investors who are not constantly monitoring the market during the day. Mutual funds and portfolios of brokerage houses, which are constantly monitoring the market by the nature of their business, systematically buy and sell at more favorable prices than non-institutional or individual investors around the halts. Another observation is the change in trading activity of funds and portfolios immediately after a halt relative to the pre-halt period. Table 1, Panel B reports that the number of stocks on which mutual funds and portfolios traded on intervals following the halt has almost doubled. However, their trading share in total trades has not changed much (Panel C) since most of the halted stocks are small and medium size stocks.[15] Finally, trading activity of different types of investors is investigated based on stocks they trade, such as ISE-30 stocks and non-index stocks. Consistent with my expectations, Panels E and Panel F report that institutional investors buy lower and sell higher than individual investors on stocks that are included on the Index-30 than those on non-index stocks since they heavily hold index stocks.

[13] This rule has partially changed following the writing of this paper when Borsa İstanbul has introduced a single-price auction method after trading halts. Trading is commenced following a single-price call auction after a stock is halted if the stock is halted before the trading day starts (pre-).

[14] The regulation at ISE enforces brokerage houses should put the orders of their customers into the trading system first before their own orders.

[15] There were no small cap or medium cap mutual funds in Turkey in the past. Though most of the mutual funds primarily hold blue chips and the stocks of the ISE-30 Index that consist of the largest stocks, there are currently mutual funds investing in small cap and medium cap stocks.

Table 1
Trading Behavior of Different Types of Investors around Trading Halts
Panel A shows the volume-weighted average price differences in buying and selling around halts by different types of investors. M, F, and P represent individual investors, mutual funds, and brokerage houses' own portfolios, respectively. Panel B shows the number of (same) stocks that these types of investors trade at the same intervals in halt-period. Panel C provides the total number of shares traded by M, F, and P at the same intervals in halt-period. *, **, *** denotes at the one, five and ten percent levels of significance.

Panel A:	Volume-Weighted Average Price Differences			
	Buy		Sell	
Period	M - F	M - P	M - F	M - P
post-4 intervals	0,001541**	0,005858*	−0,003789***	−0,002279***
pre-4 intervals	0,001901	0,001351	0,00082***	−0,001372***
post-1 interval	0,00554*	0,00274***	−0,00523**	−0,00508*
- good news	0,00595*	0,00127**	−0,0050*	−0,00815*
- bad news	0,00458*	−0,00126	−0,00513**	−0,00039
pre-1 interval	0,00176**	0,001074**	−0,002718**	−0,003446**

Panel B:	Number of stocks traded			
	Buy		Sell	
Period	M/P	M/F	M/P	M/F
post-4 intervals	83	64	77	77
pre-4 intervals	55	53	66	52
post-1 interval	57	34	56	56
pre-1 interval	27	20	30	24

Panel C:	Volume (Total number of shares traded)		
	F	M	P
post-4 intervals	262,662,000	28,952,960,000	798,728,000
pre-4 intervals	149,235,000	13,259,712,000	460,587,000
post-1 interval	101,862,000	13,550,045,000	279,525,000
pre-1 interval	63,507,000	4,017,542,000	104,933,000

Panel D:	Equal-Weighted Average Price Differences			
	Buy		Sell	
Period	M - F	M - P	M - F	M - P
post-4 intervals	0.00210*	0.00050	−0.00247***	−0.00300***
pre-4 intervals	0.00052	−0.00099	0.00084***	−0.00217***
post-1 interval	0.00406*	0.00181**	−0.00166	−0.00241**
- good news	0.00365*	0.00428*	−0.00145	−0.00157***
- bad news	0.00166**	0.00199**	−0.00324***	−0.00343***
pre-1 interval	0.00144	0.00395*	−0.00045	−0.00150*

Panel E:	Volume-Weighted Average Price Differences in Index-30 Stocks			
	Buy		Sell	
Period	M - F	M - P	M - F	M - P
post-4 interval	0,001511*	0,005429**	−0,003849*	−0,002223*
pre-4 interval	0,001911	0,000561	0,002084	−0,004892**
post-1 interval	0,00652*	0,00017	−0,00360**	−0,00364*
pre-1 interval	0,00176*	0,002074	−0,002718**	−0,003446*

Panel F:	Volume-Weighted Average Price Differences in Non-Index-30 Stocks			
	Buy		Sell	
Period	M - F	M - P	M - F	M - P
post-4 interval	0,00171*	0,00647*	−0,00358**	−0,00227*
pre-4 interval	0,00183**	0,00251	−0,00300**	0,00199**
post-1 interval	0,00179*	0,00364**	−0,00701*	−0,00608*
pre-1 interval	0,00166	−0,00032	−0,00248**	−0,00282***

Overall, our findings show that trading halts are effective in dissemination of valuable information and play an important role in enhancing the efficiency of the price discovery mechanism. Most of the new information is absorbed by prices within 15 min (primarily within the first minute) following the resume of trading after a halt. Reaction of investors to bad news is slower and stronger than good news, and consistent with Hong et al. (2000) who document that bad news travels slowly and so generates an under-reaction in the returns which might also be related with the restrictions and difficulties on short-sales in Borsa İstanbul. I think that the restrictions and challenges of short-selling in Borsa Istanbul are much more severe than other markets such as Australia, Spain, and U.S. Halts seem to be the main reason behind the fact that there is no significant difference between the speed of adjustment of information for intra-day halts and the pre-open halts on the ISE, where continuous trading is the only mechanism used both at the opening and during the day, unlike the NYSE.

These results are consistent with Xu, Wei, and Liu (2014), who show that halts are effective in the Shanghai Stock Exchange and Kim, Yague, and Yang (2008) in the Spanish Stock Exchange, which has no market maker in electronic continuous market similar to Borsa İstanbul but except conducting call auctions following the halts, and in contrary to Frino, Lecce, and Segara (2011), who show that trading halts impair rather than improve market quality in markets that operate open electronic limit order book with call-auction in Australian market, and Lee et al. (1994), Corwin and Lipson (2000) and Christie et al. (2002) who show that halts are unsuccessful in fulfilling their mandate of reducing "excess volatility" an increase in trading activity for U.S. markets with market-maker/specialist and call-auction.

Despite halts, institutional investors would take the price advantage of new information during the halt period ahead of the individual investors by doing better timing in trading after halts. Institutional investors systematically buy and sell at more favorable prices (buy at lower prices and sell at higher prices) around halts than individual investors. Institutional investors also buy cheaper and sell more expensively than individual investors on stocks that are included on the Index-30 than those on non-index stocks since they heavily hold index stocks. There is also no evidence on this specifically in the literature.

Findings also indicate that volatility of non-index stocks is not only significantly higher both before and after a halt than Index-30 stocks, but also last longer in the post-halt period than that of index stocks. Reaction of investors to the news of non-index stocks during the halt interval is significantly stronger than those of Index-30 stocks (31.4 vs. 16.4). We think that there is no study in the literature that made this distinction between the index stocks and non-index stocks.

Consistent with Chan et al. (1995), who suggest that investors are reluctant to commit to large trades during the period of high price uncertainty following halts, empirical findings show an increase in the number of trades when volume drops implies that the trade size becomes smaller after the halt. There is almost no significant trading activity after the first 60 min following the resume of trading.

I show that there are no significant differences in return, volatility and volume behavior of stocks depending on the duration of their halts. However, despite the average duration of halts in emerging ISE is shorter than other developed stock markets, the market seems to respond to the new information faster or at least as fast as it does in more developed (presumably efficient) stock markets in US and Canada. This is not consistent with Lee et al. (1994), and Spiegel and Bhattacharya (1998, pp. 216–226). Lee et al. (1994) show evidence that causes doubt on the specialists' role in the price discovery process at the opening following the trading halts. Consistently, halts on Borsa İstanbul, which applies continuous trading market without specialists and call auction seem to be an important tool to increase the speed of adjustment in prices. In sum, differences in the speed of adjustment after halts on two markets might be attributed to the differences in the market microstructure such as price discovery mechanisms.

5. Summary and conclusion

Based on the inconsistent and inconclusive evidence regarding the effectiveness and appropriateness of trading halts in stock markets in spite of its importance for policymakers and investors found by a limited number of previous studies, primarily on the U.S. market, I examined the efficacy of trading halts to disseminate information by examining the return, volatility, and volume behavior around trading halts in a leading

emerging market, the ISE, which has a significantly different market microstructure than the U.S. market. To address this issue, a sample of news-initiated trading halts on the ISE is investigated to examine the effects of trading halts on return, volatility, and volume behavior of halted stocks using trade-by-trade data within 15-min intervals for approximately a five-year period. This study also investigates, for the first time, the trading behavior of different types of investors, such as individuals, mutual funds, and brokerage houses, around trading halts and whether institutional investors, who continuously monitor the market, and are able to step into the market ahead of individual investors to take the advantage of their position, by using a unique dataset that defines the identities of traders.

My findings indicate that return, volume, and volatility tend to return to their non-halt period averages in a short period of time after trading is resumed. Information is absorbed largely by the prices within 15 min (almost completely in an hour) following the resumption of trading after the halt. Seventy-eight percent of the change in prices within the first 15 min is generated within the first 1 min following the reopening after the halt. However, this ratio might have increased in time because of the increasing market share of HFTs, which could be a future research opportunity for those who seek to examine the effect of HFTs on the effectiveness of the trading halts, as well as their competitive advantage in trading against both individual and other institutional investors. In general, the results are robust to the time-of-the-halt and the duration of the halt's effects. Alternatively, consistent with previous studies, the reaction of investors to negative announcements is not only stronger than that of positive news, but also lasts longer. This is relevant, especially for negative announcements that cause a halt before the start of the day due to media coverage and a delayed opening (i.e., the market closure effect). Restrictions on short sales and positive abnormal returns in the pre-halt period could be additional factors that affect this. Although the duration of halts on the ISE is shorter than on developed stock markets, the market seems to respond to the new information quicker or at least as quickly as it does in more developed U.S. markets due to its different market microstructure, such as fully computerized trading, price discovery mechanisms based on continuous trading, a lack of opening session and single-price call auctions after the halts, the non-existence of monopolist specialists, restrictions on order cancellation during trading, and investor characteristics. However, the duration of halts shows no significant effect on the trading patterns of halted stocks around the halts. My findings imply that 30 min is long enough to let information be received and evaluated by a large number of investors.

One of the most striking findings of this study is the differences in the trading behaviors of individuals, mutual funds, and brokerage houses around trading halts. Mutual funds and brokerage houses take the price advantage of the information release ahead of the individual investors by executing better timing in trading after the halt as they constantly monitor the market. Institutional investors systematically buy and sell at more favorable prices than individual investors around halts using this advantage. Although halts facilitate the dissemination of valuable information during the halt period to a large number of investors and give them a chance to react to the new announcement, halts cannot completely prevent institutional investors from exploiting their advantage due to their professional activity at the expense of individual investors. Despite their exploitation, halts increase the speed and magnitude of the adjustment in prices.

Finally, overall evidence suggests that trading halts seem to facilitate the orderly emergence of a new equilibrium price by allowing investors a chance to reach, to evaluate, and, eventually, to react to new important information. Thus, news-initiated trading halts have an important role in enhancing the efficiency of the price discovery mechanism. The results of this study also concern the policymakers and regulators. First, from a positive perspective, halting trading can help to stabilize the market during periods of extreme volatility or uncertainty. This pause allows investors to reevaluate their positions and prevents panic selling or buying. In addition, it offers regulators the opportunity to investigate unusual market movement or ensure compliance with trading regulations. It can help in preventing market manipulation and ensuring fair trading practices. Moreover, halts can protect investors from sudden, severe price movements that might occur due to unexpected news or events. It gives investors time to digest information and make more informed decisions. Finally, while halts can disrupt the flow of trading, they can also contribute to market efficiency by preventing potentially incorrect or misleading information from affecting prices. Meanwhile, the proper execution of halts carries a lot of responsibility on behalf of regulators. Proper execution of halts is closely associated with the design of the halt process from the halting decision to the re-opening of trading after the halt including the rapid dissemination of new information to the maximum number of investors and financial intermediaries. As a part of the design of the halt process, the auction methodology that is used at the opening of the halted stock to the trading following the halt and other market microstructural settings and the length and timing of halts seem to have some effect on the effectiveness of the trading halts. The policies and procedures for initiating and lifting halts need to be well-defined and communicated to market participants. This transparency ensures market confidence. Prolonged or frequent halts can have economic repercussions affecting liquidity and investor confidence. It could impact the overall economy if market volatility persists. These implications underline the importance of a balanced approach to trading halts. While they serve as a safety mechanism, as well as an information dissemination and signaling mechanism for the market in general, overuse or misuse can also have negative consequences. Regulators and policymakers need to carefully calibrate the use of trading halts to maintain market stability while ensuring liquidity and investor confidence. Finally, the aforementioned trading rules and market microstructure in the Istanbul Stock Exchange have significantly changed over time and can be seen as a limitation of this study. However, these changes in the market microstructure of an emerging market to substantially converge to that of developed markets offers new opportunities for researchers to examine the effects of trading halts that will also help regulators and exchanges to understand the effectiveness of their policies on trading halts.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.bir.2023.12.006.

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