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SOCIAL RESPONSIBILITY OF A STOCK EXCHANGE: CORPORATE GOVERNANCE AT BORSA ISTANBUL

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ABSTRACT

Accentuated intraday volatility and uncertainty leads to mispricing, inefficiency, and the potential unfair treatment of some market participants. As an important financial institution, the stock exchange is required to find mechanisms to reduce volatility for good corporate governance and for social responsibility. In this paper, one such mechanism, closing call auction, is explored in the actively traded industrials sector of the emerging Borsa Istanbul. Evidence of the successful implementation of the mechanism is provided. Volatility decreases and efficiency of the prices increases after the implementation of the closing call auction. The exchange executives' positive engagement in good corporate governance is documented and is suggested to other stock exchanges as a social responsibility instrument.

Keywords: accentuated volatility, corporate governance, corporate social responsibility, emerging markets, market efficiency

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INTRODUCTION

The social responsibility theory involves enacting policies that endorses a balance between profit maximization of a business for its stakeholders and benefiting the society as a whole. Social responsibility becomes more meaningful when a company voluntarily establishes its internal policies, as opposed to regulation through the government. Therefore, businesses are feeling more and more encouraged to act in a manner that benefits all the participants of the economy, in addition to maximizing shareholder value. Corporate social responsibility aims to diminish practices that harm the society, and to implement policies that benefit everybody (Campbell, 2007).

One of the most important financial institutions in a society is the stock exchange, where shares of publicly traded corporations are exchanged between market participants. The stock exchange administrators have the goal of making sure that all the participants are treated fairly and equally in terms of access to the markets and in terms of the execution of the trades. This primary goal is consistent with the corporate social responsibility theory. The exchange administrators monitor the market to make sure that illegal informed trading does not take place, irrational trading behavior does not dominate the market, and unreasonable volatility does not exist. In other words, as mentioned in Ching and Tardelli (2015), the administrators want to make the exchange

efficient, where the prices are stable, and they correctly reflect the values of the securities.

Stock market exchanges in developed countries have long-established rules and regulations. For example, the New York Stock Exchange has a circuit breaker mechanism to reduce overall volatility and to encourage traders to act rationally, especially in a panic environment. Another mechanism is an auction system before the market opens in the morning. By taking into account the order imbalances, the accumulated buy and sell orders are matched to determine the optimal execution price to reduce volatility when the stock market opens in the morning. Volatility is highly undesirable because it brings in inefficiency, mispricing, uncertainty, and unequal treatment of market participants since inexperienced traders are taken advantage of. The call auction mechanism is an example of the corporate social responsibility of exchange administrators because by increasing efficiency and equal treatment of market participants, the society as a whole benefits (Francioni and Schwartz, 2017).

The main motivation of the study is to examine how Borsa Istanbul, as one of the most important financial institutions in Turkey, approaches corporate governance and social responsibility. Whether the Borsa Istanbul regulators implemented any mechanisms to reduce intraday volatility and therefore achieved social equity is investigated. The analyses concentrate on the industrials sector of Borsa Istanbul. Currently the largest and the most important sector of the Turkish economy is the industrials sector, with companies that are actively traded stocks at the stock exchange without any liquidity frictions. The second motivation for the study is to shed light on whether such mechanisms have been useful and successful. Exchange managers at Borsa Istanbul introduced a closing call auction mechanism to reduce volatility near the closure of the market each day. The paper provides evidence of the effectiveness of the closing call auction mechanism for the industrials sector stocks. The third and final motivation of the investigation is to suggest recommendations to regulators in other emerging- and frontier-country equity

markets since Borsa Istanbul is a good representative for such markets.

The rest of the paper is organized as follows. Section 2 is the literature review on the relevant corporate governance studies and intraday volatility research. Section 3 provides information about Borsa Istanbul and about the industrials sectors. The corporate governance practices implemented by the Borsa Istanbul administrators are described. Section 4 is about the data and the methodology. Section 5 presents the discussion of the results. Conclusion follows.

LITERATURE REVIEW

Corporate Governance and Social Responsibility

Social responsibility and corporate governance both focus on the ethical practices in a business. Social responsibility is more of a policy or an obligation to the community with the goal of performing beneficial activities for all. This means that a corporation should take into account the social, environmental, economic, and human rights perspectives in business dealings and operations. On the other hand, good corporate governance is central to any successful business. It is necessary for an organization to maintain good legal and ethical standing for the shareholders, regulators, and the wider community, in addition to the traditional goals of profitability and growth.

Corporate social responsibility has been in debate since the 1950s, and Carroll (1999) provides a comprehensive survey of previous work. While earlier studies discuss the pros (Campbell, 2007) and cons (Friedman, 2008) of social responsibility and the culture, the overall evidence over the last two decades in El Ghouli et al. (2011) and in others has shown the necessity of social responsibility for a corporation's performance. Studies about corporate governance in emerging countries such as India (Sarkar and Sarkar, 2000), also point out the importance of good corporate governance for success. Investment portfolios and strategies are now commonly designed by taking into account corporate governance and social responsibility factors as discussed in Kempf and Osthoff (2007).

Social responsibility and corporate governance of a stock exchange is of essential importance because the exchange is one of the most fundamental financial institutions in an economy. The rules and mechanisms adopted by stock exchanges for good corporate governance have been examined in Abrahamand and Kannappan (2018) and Ching and Tardelli (2015), among others. These studies have mostly focused on the corporate structure of the administration of the exchange and have compared corporate governance mechanisms between different exchanges. In this paper, the main focus will be on the success of the mechanisms implemented by the exchange administrators to alleviate inefficiencies, mispricings, and potential unfair treatment of market participants.

Intraday Volatility and Stock Exchange Corporate Responsibility

Volatility (or uncertainty) is an undesirable medium for stock trading because the security prices deviate away from their correct values. These mispriced securities create an inefficient market where confidence of traders for fair treatment diminishes. Studies by Ozenbas et al. (2011), Madhavan et al. (1997), and others have documented a U-shaped volatility pattern in developed country stock exchanges. This shape has indicated high volatility and uncertainty in the morning when the market opens, a low and stable volatility during the middle of the trading day, and heightened volatility before the close of the market.

When emerging and frontier country stock markets are examined, research suggests different volatility patterns. For example, Choe and Shin (1993) and Tian and Guo (2007) present L-shaped volatility structures for the morning and for the afternoon trading sessions at the Korean stock exchange and at the Shanghai stock exchange, respectively.

The typical U-shaped intraday volatility pattern seen across many stock market exchanges is also known as the volatility smile. Heightened volatility in the morning is due to the difficulty of market traders in fully digesting the accumulated information overnight. This leads to inconsistent and conflicting trades within the first few minutes, generating

accentuated volatility. Heightened volatility before the close of the market can be (1) due to the frantic trading activity of market professionals trying to execute the remaining open orders for the day and/or (2) portfolio rebalancing activities in order to keep the characteristics of these portfolios within the bounds for which they were originally created.

Whatever the reason, accentuated volatility hurts market participants. In highly volatile environments of uncertainty, stocks are not correctly priced, markets are inefficient, and traders are neither fairly nor equally treated. Consequently, the exchange regulators adapt tools and mechanisms to bring social fairness and equality back to the market.

The Volatility Characteristics at Borsa Istanbul

The volatility features of the Turkish stock exchange have been investigated in previous studies, mainly with low frequency daily, weekly, and monthly data. Alper and Yilmaz (2004) and Erdem et al. (2005) present an empirical analysis of the real stock return volatility contagion from emerging markets and financial centers to the Turkish market since 1992, based on monthly data from January 1991 to January 2004. Bildirici and Ersin (2009) discuss artificial neural networks to evaluate the high volatility of daily returns for the 1987-2008 period in the Istanbul stock exchange.

While the above studies use daily or lower frequency samples, this study employs intraday frequency data with tick-by-tick price movements to get a more relevant picture about volatility during the day. Furthermore, the study centers on the largest and most important industrials sector of the economy. Focusing on the liquid industrials sector, which has more than half of the companies (all actively traded) at Borsa Istanbul provides better insight into the intraday volatility characteristics without unnecessary additional frictions. From these two aspects, this is the first study on the intraday volatility of the industrials sector. The next section provides detailed information about the industrials sector and about the corporate social responsibility mechanisms at Borsa Istanbul.

BORSA ISTANBUL

The creation of the Istanbul Stock Exchange (later renamed as Borsa Istanbul) in the early 1980s was followed by the inauguration of the Turkish equity markets in 1986. Since its inception, the exchange has had two trading sessions during the day with a midday break. This is different from the developed country equity markets, where trading is continuous throughout the day. Over the years, the trading hours have changed at Borsa Istanbul but the two sessions in the morning and in the afternoon have remained. Borsa Istanbul Corporation is one of the most vital financial institutions in the Turkish economy.

Corporate Governance, Social Responsibility, Market Efficiency

As the primary exchange for the regular trading of all financial securities, Borsa Istanbul has established the corporate governance structure and social responsibility principals to make sure that the exchange medium is fair and equal for all market participants. The exchange regulators have implemented numerous mechanisms and policies over the years:

1. With numerous types of orders (limit, market, market to limit, imbalance, conditional, mid-point, odd lot, short-sell, VWAP trades) available for markets participants, the exchange provides convenience and flexibility.
2. Price bands, maximum order value limits, volatility-based measures system, circuit breakers, and market making with continuous auction single prices help with the correct functioning of trading within the financial market.
3. The exchange has numerous authorized independent market advisors.
4. To make sure that there is a reliable and transparent system, unusual price movements, transactions, and trading volumes are monitored and reported through electronic surveillance systems.

Opening Call Auction and Mid-Day Call Auction

In February 2007, Borsa Istanbul implemented an opening call auction system just before the market opens for the morning session and the afternoon session. The reason has been to collect the accumulated buy and sell orders, and using the order imbalance, to establish an optimal execution price to reduce the uncertainty and the accentuated volatility that have been consistently observed when the market opens in the morning and in the afternoon sessions (Inci, 2012). The reduction in volatility would help establish fair and accurate prices. The opening call auction has been considered as a useful corporate governance mechanism in providing a socially responsible trading environment to market participants.

Closing Time Call Auction System

On March 2, 2012, Borsa Istanbul introduced a closing auction system. The main reason for this introduction was the high volatility in the stock price movements right before the close of the market for the trading day, and the desire on the part of the administrators to reduce this volatility for fairness and efficiency. The closing auction is a short session with a single price after the exchange formally closes. All unmatched and unexecuted orders of the main trading session and new unmatched orders are compiled during the initial phase of the closing auction. The unique price at which the highest trading volume may be achieved is calculated and all open trades are executed at this price. The usefulness of this policy in the reduction of volatility and the provision of efficiency and fairness to all market participants in the context of the liquid industrials sector is explored next.

Industrials Sector

The industrials sector makes up more than half of the entire Istanbul stock exchange. The largest sub-sectors in the industrials sector are machinery, chemicals, and construction sub-sectors. Each of these sub-sectors constitutes about 30 companies. These companies and sub-sectors are the driving forces of manufacturing and of the export side of the Turkish economy. The other sub-sectors for industrials are textile,

food, metals, mining, and pulp & paper & printing sub-sectors. They contribute significantly to the gross domestic production of the economy.

The primary sources of exports of the Turkish economy originating from the industrials sector are construction, automotive, chemicals, textile, and food products. The industrials sector has been stable enough to insulate the Turkish economy from volatile market conditions and from global shocks. The sector has grown consistently every year in the 2010s and remains as one of the strongest and healthiest sections of the stock exchange (Akgun and Sahin, 2017).

DATA AND METHODOLOGY

The Borsa Istanbul industrials sector consists of 153 firms [Sector Index: XUSIN]. The sub-sectors are Food [21 firms, sub-sector index: XGIDA], Textile [13 firms, sub-sector index: XTEKS], Pulp, Paper, and Printing [14 firms, sub-sector index: XKAGT], Chemicals, Petrol, Plastics [27 firms, sub-sector index: XKMYA], Construction [27 firms, sub-sector index: XTAST], Metals [18 firms, sub-sector index: XMANA], Mining [4 firms, sub-sector index: XMADN]; and Machinery, [29 firms, sub-sector index: XMESY]. The intraday sample in this paper extends from July 2010 through February 2019 and avoids the financial crisis period of 2007-2008. Intraday volatility patterns are examined with this dataset.

The presence of accentuated volatility is explored for the morning session with a focus on the three 5-minute periods when the market opens and the three 5-minute periods when the market closes for the lunch break. Similarly, for the afternoon session, the three 5-minute periods when the market reopens and the three 5-minute periods when the market closes for the day are used in the empirical analyses. The middle 5-minutes of the two sessions are also considered. The differences in the volatilities of these intraday time segments are presented with point estimates, statistical tests, and graphical plots.

Trading hours at Borsa Istanbul have evolved over the years. When creating the datasets for the investigation of intraday volatility in the

industrials sector, these different opening and closing hours are consistently and jointly considered. For example, when the last 5-minute segment of the trading day is explored, that would correspond to 5:55pm-6pm for 14 November 2017 until now, from 5:25pm to 5:30pm during the June 2013 to November 2016 period, and so on. The same approach is followed for all the other 5-minute time segment classifications of the trading day over the sample period.

RESULTS AND DISCUSSION

The summary statistics of the intraday volatility characteristics for the industrials sector are presented in Table 1. Different volatility measurements using the 5-minute time segments are reported. For both the morning and afternoon sessions, volatilities for the three consecutive opening 5-minute segments, the middle of the session, and the last three consecutive 5-minute segments before the market closes are listed. A quick inspection of the entire 2010-2019 sample reveals that the highest volatility is during the 5-minute segment when the stock market opens in the morning. The second highest volatility is when the market reopens in the afternoon. The third highest volatility is around when the market closes, but this last observation is not supported by all the volatility measures. The potential increase in volatility before the close of the market is possibly harnessed by the closing call auction mechanism that was implemented in March 2012 by the Borsa Istanbul administrators.

The sample period is from July 2010 through February 2019. Each variable in the table represents a different standard deviation measurement: abs is of absolute values of the final and beginning price differences for the period; log is of the log returns in basis points; ret is of the returns expressed in basis points; mad is of the absolute value of end of period and beginning of period price difference normalized by the final price in basis points; maxmin is of the difference between maximum and minimum values of the trading period; and normmaxmin is of the difference between maximum and minimum values of the trading period divided by the average of the final and

beginning prices of the trading period in basis points.

Table 1. Intraday Volatilities of the Industrials Sector (5-min intervals)

5-Minute Intervals	N	abs	log	ret	mad	maxmin	normmaxmin
1st 5 min.	2156	149.83	24.42	24.43	17.20	171.14	18.20
2nd 5 min	2156	113.19	17.43	17.41	12.58	124.40	12.51
3rd 5 min.	2156	101.50	15.81	15.81	11.18	110.78	11.06
Mid-morning 5 min.	2158	53.12	8.85	8.84	6.26	59.33	6.40
3rd to last 5 min. bef. break	2153	40.36	6.96	6.95	4.86	45.18	5.09
2nd to last 5 min. bef. break	2153	37.57	6.77	6.77	4.75	43.16	5.07
Last 5 min. bef. break	2152	37.40	7.14	7.14	5.01	39.59	5.34
1st 5 min. after break	2139	103.54	16.06	16.02	12.66	108.83	12.80
2nd 5 min after break	2139	80.42	12.23	12.22	8.82	86.21	8.80
3rd 5 min. after break	2139	59.95	10.82	10.82	7.55	65.39	7.54
Mid-afternoon 5 min.	2141	72.36	10.05	10.06	7.48	81.35	7.95
3rd to last 5 min. bef. close	2141	68.48	11.20	11.19	8.02	70.05	7.93
2nd to last 5 min. bef. close	2047	68.80	11.55	11.53	8.43	70.77	8.48
Last 5 min. before close	2141	61.95	13.01	13.02	9.64	65.42	10.27

Figure 1 depicts the 5-minute intraday volatilities. We can clearly observe the L-shaped 'smirk' pattern in the volatility during the morning session. The afternoon pattern is not entirely clear. Some volatility measures imply a U-shaped 'smile', while the others indicate an L-shaped 'smirk', similar to that of the morning session. The lack of a consistent pattern for the afternoon session is possibly because of the closing call auction system of March 2012 implemented to reduce volatility and achieve socially responsible fair and efficient pricing which is addressed further in Section 5.1.

Next, volatility ratios are computed to better understand the differences between the opening (closing) volatility values and the mid-session volatilities. This approach makes it

possible to statistically observe the relative effect of the volatility dynamics throughout the trading day. If the ratio of the opening or closing volatility relative to the mid-session volatility is statistically significant (i.e. if the volatility ratio is statistically higher than one), this would provide concrete evidence of accentuated intraday volatility patterns in the industrials sector. To investigate this issue, the opening (and end of day closing) period-to-mid-afternoon volatility ratios for each of the risk measures are computed. Similarly, the opening (and end of day closing) period-to-mid-morning volatility ratios are also computed. These volatility ratios are presented in Table 2.

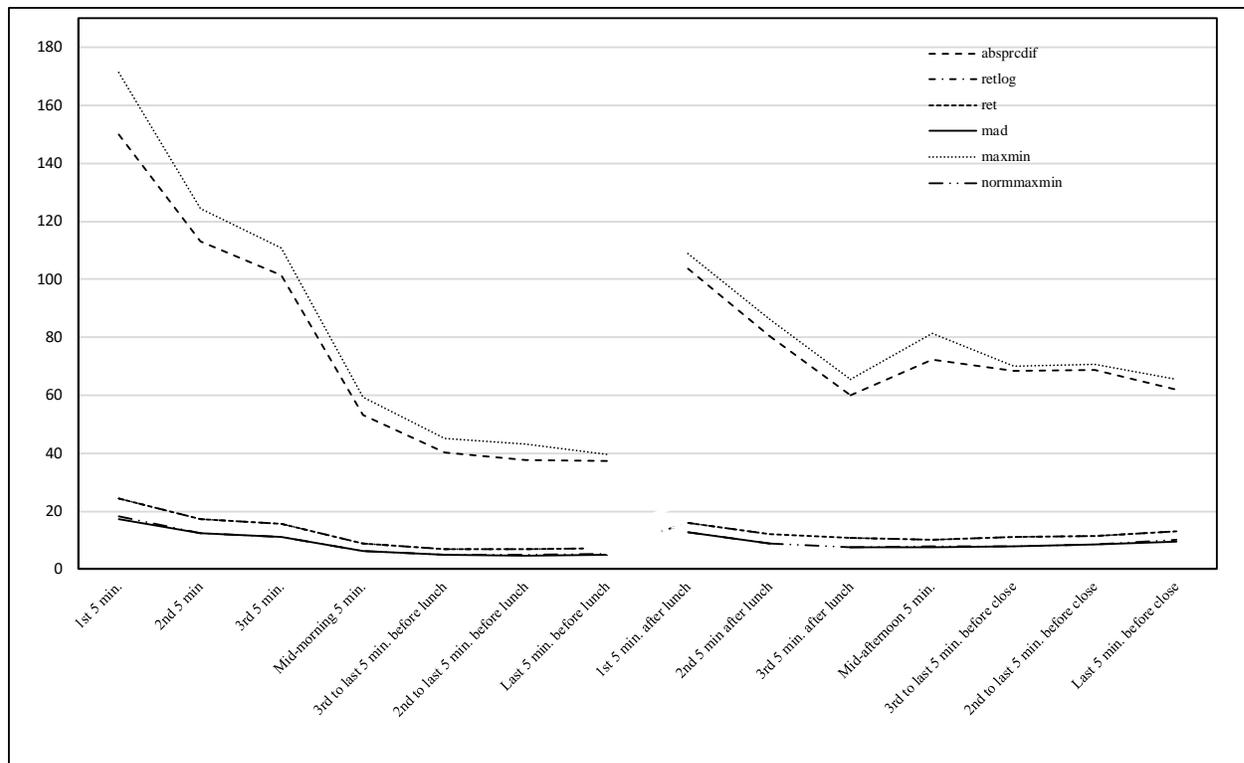


Figure 1. Intraday Volatility at the Borsa Istanbul Industrials Sector

Panel A of Table 2 employs the closing volatilities in the numerator and Panel B employs the opening volatilities in the numerator. Most volatility ratios in the table are greater than one, reflecting the accentuation of volatility when the market opens in the morning and before the market closes for the day. These ratios are further confirmation of accentuated volatility in the industrials sector during the morning open and prior to the market close. Of the results presented in the Panel A (where the closing volatility is in the numerator), some of the ratios are not statistically different from 1. This is probably because of the closing auction mechanism, mitigating the closing volatility in the numerator of the ratios. The impact of the closing auction is examined next.

Evolution of the Closing Time Volatility

Borsa Istanbul executives implemented the closing call auction system on March 2, 2012. The purpose was to reduce the accentuated volatility around the closing time of the market for the day. The high volatility caused

mispricings, inefficiencies, and the potential mistreatment of some market participants. As an act of good corporate governance and social responsibility, the auction system was introduced. Unexecuted trades after the close of the market would be collected together and buy and sell orders would be matched in order to generate an optimal execution price with the largest trading volume. The presence of such an auction system provided an out for late traders and would therefore reduce accentuated volatility at the end of the day, and thus help provide stability, efficiency, accurate prices, and fairness to the market overall.

To investigate this, the 2010-2019 sample period is split into two sub-samples as the early sub-sample, and the recent sub-sample with the closing auction system. For robustness, the sample was also split into three sub-samples as the early sub-sample before the closing auction system, the middle sub-sample around which the closing call auction was introduced, and the recent sub-sample where the closing auction system was fully established.

Volatility ratios use the closing period volatility in the numerator and either mid-morning or mid-afternoon volatility in the denominator. 5-minute period returns are used for volatility measurements. The standard deviation measures are the same as those in Table 1. ***, **, and * represent the statistical

difference of the numerator with respect to the denominator (mid-morning or mid-afternoon volatility) at 1%, 5%, or 10% level. Panel A reports the closing volatility to mid-session volatility ratios and Panel B reports the opening volatility to mid-session volatility ratios. The sample period is from July 2010 through February 2019.

Table 2. Opening and Closing Volatility to Mid-morning and Mid-afternoon Ratios

5-minute period returns		
Panel A. Closing Volatility	Mid-Morning	Mid-Afternoon
abs	1.17*	0.86
log	1.47***	1.29***
ret	1.47***	1.30***
mad	1.54***	1.29***
maxmin	1.10	0.80
normmaxmin	1.60***	1.29***
Panel B. Opening Volatility	Mid-Morning	Mid-Afternoon
abs	2.82***	2.07***
log	2.76***	2.43***
ret	2.76***	2.43***
mad	2.75***	2.30***
maxmin	2.88***	2.10***
normmaxmin	2.84***	2.29***

This table examines the evolution of the closing time volatility over time. In Panel A, Early Sub-Sample is from July 2010 to November 2014, Recent Sub-Sample is from November 2014 to February 2019. In Panel B,

Early Sub-Sample is from July 2010 to June 2013, Middle Sub-Sample is from June 2013 to April 2016, Recent Sub-Sample is from April 2016 to February 2019. The volatility measures are the same as those in Table 1.

Table 3. Effectiveness of Corporate Governance Social Responsibility

Panel A.	N	log	ret	mad	normmaxmin
Early Sub-Sample	1071	15.72	15.74	11.60	12.03
Recent Sub-Sample	1070	8.88	8.89	6.04	5.87

Panel B.	N	log	ret	mad	normmaxmi n
Early Sub-Sample	720	16.68	16.72	12.80	12.96
Middle Sub-Sample	704	10.89	10.89	7.15	7.83
Recent Sub-Sample	717	8.84	8.84	6.17	6.27

Table 3 presents the closing time volatility values for these different sub-samples. As we can see from either panel, after the introduction of the closing call auction system, the volatility measures around the market closing time do indeed decline, implying that the market does become more stable, fair, and efficient with correct stock prices. All of the volatility measures in both panels decline by almost half. Therefore, the success of the closing call auction is evidence that corporate governance is successfully applied, and social responsibility is properly exercised by Borsa Istanbul.

CONCLUSION

A fundamental corporate social responsibility of a stock exchange is fairness. Every participant in the exchange, individual investor or professional investment company, small investor or a wealthy investor, foreign or domestic, should be treated fairly and equally. This is an important way for an exchange to contribute positively to the welfare of individual participants and to the welfare of the society as a whole.

The volatility patterns for the industrials sector are explored in the study. Accentuated volatility and substantial inefficiency around the closing time of the Turkish stock exchange are documented. These anomalies lead to mispricings and the potential unfair treatment of some market participants. Good corporate governance and social responsibility policies of the Borsa Istanbul Corporation required exchange regulators to find remedies for these types of anomalies.

A particular corporate governance policy of the Borsa Istanbul stock exchange is explored: the introduction of the closing call auction mechanism in March 2012. The aim was to reduce closing time volatility, and therefore mitigate inefficiency and enhance the fair

treatment of market participants. The analyses provide evidence of the effectiveness of the policy in the context of the industrials sector of Borsa Istanbul.

The early sub-samples without the proper establishment of the closing call auction system have comparatively high volatility measures around the closing time. However, after the introduction of the closing call auction system, volatility measures become consistently lower in the recent sub-samples. This is evidence of the success of the social responsibility attempt by Borsa Istanbul Corporation. Corporate governance policy of reducing volatility with the closing auction system helps achieve correct prices, efficiency, transparency, fairness and equality for the market participants. These results and conclusions of the closing call auction experience at Borsa Istanbul is an example for other emerging country stock exchanges. If accentuated volatility becomes pervasive, then the closing call auction can be considered as a tool to fight with uncertainty.

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