



Pan(dem)ic reactions in Turkish stock market: evidence from share repurchases

Burak Pirgaip¹ 

Received: 26 June 2020 / Revised: 2 March 2021 / Accepted: 17 March 2021 /
Published online: 5 May 2021
© Eurasia Business and Economics Society 2021

Abstract

Share repurchases have been widely used in global markets for years for various purposes such as to pay out cash, to stabilize stock prices, and so on. However, their use has recently been challenged due to the economic and financial uncertainty imposed by the COVID-19 outbreak. Not only governments have put bans or restrictions on the repurchasing transactions but also some major companies themselves have suspended their buyback programs to preserve cash. On the other hand, repurchase activity has manifested itself in Turkish capital markets somewhat unexpectedly under uncertain market conditions. This study is one of the first attempts to explore the impact of share repurchase transactions on stock returns in an emerging market severely hit by COVID-19. Our analyses reveal that market reaction to repurchase activity in the aftermath of the pandemic declaration of March 11, 2020 was significantly positive. Moreover, short-term stock performance of repurchasing firms was far greater than that of their non-repurchasing peers. These results have important policy implications in terms of corporate payout decisions which have recently been challenged by the new coronavirus.

Keywords Share repurchases · COVID-19 · Pandemic · Event study · Market reaction

JEL Classification G14 · G35 · G18

1 Introduction

Stock markets that have already been showing a sharp declining trend for some time under the uncertainty of the COVID-19 outbreak, literally collapsed almost everywhere with the declaration of pandemic alert by the World Health Organization

✉ Burak Pirgaip
burakpirgaip@hacettepe.edu.tr

¹ Department of Business Administration, Hacettepe University, 06800 Beytepe Çankaya/Ankara, Turkey

(WHO) on March 11, 2020. On that day, the “fire” spread very fast from one stock exchange to another. S&P500 suffered its quickest descent into bear market. Nikkei225 and FTSE100 plunged as much as 10%. In France and Germany, indexes cratered more than 12% and in Italy the figure was 16.9%. The “fear” also manifested itself in the surge of the CBOE Volatility Index, i.e. VIX, which hit historically highest levels.¹ The situation was even worse in many emerging markets. For example, MSCI Emerging Markets index lost 10.5%, while individually, South Africa and Brazil stocks closed down nearly 10% and 15%, respectively and circuit breakers were triggered in many markets including South Korea, Thailand and Philippines.

The pandemic shock waves immediately spilled over into Borsa Istanbul, the Turkish Stock Exchange, as well. Turkey’s benchmark stock index closed the day with a 7.26% decline. In the aftermath of the pandemic designation, the stock market tried to achieve recovery to some extent by means of governmental actions, but the attempts were not worthy of note. The damage was so severe that the market experienced a further 8.07% decline on March 16, 2020 and reached its trough eventually on March 23, 2020 after consecutive days of falling prices. In these circumstances, some of the companies interestingly started to announce to buy back their shares as a preventive measure against plummeting prices. This was interesting for two reasons. One, although signaling or undervaluation is the most well-known motive attributed to share repurchases,² one might justifiably argue that the main motivation in these times of unprecedented turmoil, would rather be holding more cash (Pirgaip & Dinçergök, 2019). Indeed, repurchase actions in the vast majority of countries were canceled by the firms³ or restricted by the regulatory bodies.⁴ Given this, it was somewhat contrary to the expectations in the market where investors were frustrated with the uncertainty regarding the COVID-19. Two, Turkish government, as part of an omnibus bill, emphasized the importance of the preservation of companies’ equities and imposed severe limitations on the amount of cash dividends.⁵ Another

¹ According to DeCambre (2020), the move for the VIX induced by the global pandemic almost tripled its move at the same point in 2008, when the global financial crisis broke out.

² See Bhattacharya (1979), Vermaelen (1981), Vermaelen (1984), Lakonishok and Vermaelen (1990), Comment and Jarrell (1991), and Persons (1997).

³ Goldman Sachs, JPMorgan Chase, Morgan Stanley, Citigroup, Bank of America are some of the major repurchasers in the U.S. market which suspended their buyback programs. According to Goldman Sachs, share repurchases will decline by 50% to \$371 billion during 2020 (Kilgore, 2020). In the non-financial sector, General Motors and Ford Motor Company are the leading ones that announced the deferral of share repurchase programs (Sheth, 2020).

⁴ In the U.S., for instance, companies that receive federal aid were not able to repurchase shares (Fox, 2020).

⁵ The regulation (Law No. 7244, Date: 17.04.2020) required that the amount of cash dividends that can be distributed until 30.09.2020 shall not exceed 25% of the net profit generated in 2019; profits of the previous year(s) or free reserve funds cannot be subject to any distribution; and the board of directors shall not be authorized by the general assembly for the distribution of advance dividends (Şenocak and

common aspect of share repurchases is that they are substitutes⁶ to cash dividends (Grullon & Michaely, 1992; Jiang et al., 2013; Skinner, 2008). Yet, the government did not intervene in share repurchase decisions of firms. Conversely, Capital Markets Board⁷ removed regulatory constraints on the share repurchase transactions for publicly listed companies on March 23, 2020 (CMB, 2020). This was contradictory in that a company, which would not be entitled to distribute a restricted level of cash, would be able to buy its shares back at the same amount.

For these reasons, the recent share repurchase activity in Turkey is worth to be further investigated in order to explore the market reaction towards repurchase events under COVID-19 conditions. In this context, we employ an event study methodology to analyze the investor behavior. Empirical results suggest that repurchase transactions had significantly positive effects on stock prices. This finding is robust when repurchasing firms are compared with their non-repurchasing peers.

The originality of the paper is twofold. First, our paper fills a gap in the contemporaneous work on firms and the COVID-19 crisis and contributes to the literature on how repurchases are used in distressed times. As we shall see in our literature review, to date, there has not been much research on the role of share repurchases in curbing the market downturn under uncertain conditions brought by COVID-19. But, we are of the view that the signaling power of share repurchases should not be ignored since they may serve as a credible tool for managers in conveying to investors that the true value of their firm is higher than its current market value (Hackethal & Zdantchouk, 2006), particularly in turbulent times (Stonham, 2002) such as the global financial crisis of 2008–2009 (Chen et al., 2018). In this regard, it is worth exploring why firms may have preferred to buy their shares back instead of holding cash for precautionary purposes. Second, most of the event studies carried out by researchers in the COVID-19 era has considered the stock market reaction around the date of events associated with various pandemic announcements. However, it was nearly impossible to set one clear point of time as the event date, which would probably obscure the source of price movements since there were multiple declarations regarding COVID-19 alongside with news on other notable developments such as the price war in the oil market, the trade war between the U.S. and China, and the U.S. presidential elections (Ashraf, 2020; Ramelli & Wagner, 2020). Our goal, rather, is to unveil the stock market reaction to a single and a specific corporate event, i.e. share repurchases, which took place as a response to the negative shocks posed by COVID-19 in the stock market.

The structure of the paper is as follows. Section 2 outlines recent literature on the impact of COVID-19 on stock markets. Section 3 describes the data and methodology employed in the study. Section 4 presents the empirical results and Sect. 5 concludes.

Footnote 5 (continued)

Ak, 2020). Note that, this limitation was extended for a further three months with a Presidential Decree (Decree No. 2948, Date: 18.09.2020) until 31.12.2020 and was eventually repealed as of 1.1.2021.

⁶ Note that, there is also one strand of literature arguing that share repurchases complement cash dividends (Dittmar, 2000; Jagannathan and Stephens, 2003).

⁷ Capital Markets Board of Turkey is the public authority responsible for regulating the Turkish securities markets with functions analogous to those of the SEC.

2 Literature review

There is a growing body of literature focusing on the impact of COVID-19 on stock markets. Zhang et al. (2020) point out the great uncertainty caused by the pandemic which has led to increased volatility and unpredictability in global markets. Ashraf (2020) scrutinizes the stock market response to the COVID-19 confirmed cases and deaths and finds that the market response to the growth in confirmed cases was significantly negative while response to the growth in deaths were weak. Okorie and Lin (2021) investigate the fractal contagion effect of the COVID-19 pandemic on the stock market returns and volatilities by using Detrended Moving Cross-Correlation Analysis and Detrended Cross-Correlation Analysis techniques. Over a sample of top 32 COVID-19 affected economies, the authors provide evidence for a short-lived fractal contagion effect revealing the comovements among various stock markets. Ramelli and Wagner (2020) signify the fever in the stock markets as the virus spread to Europe and the U.S. Similarly, Ali et al. (2020) report that, as the virus moved from epidemic to pandemic as well as from China to Europe and the U.S., panic in the stock markets increased. However, Zaremba et al. (2020) demonstrate that it is the government interventions that increase the volatility in the stock markets.

Apart from these abovementioned studies, another strand of literature has also evolved to address how markets in both developed and developing economies reacted to several announcements regarding the pandemic from an event study perspective. Liu et al. (2020a,b) find that stock markets of 77 countries (of these countries 31 are developed, 33 are developing, and 13 are undeveloped) over the world have responded negatively to the WHO announcement on March 11, 2020. The authors also test the impact of emergency announcement made by WHO on January 30, 2020, and conclude that this impact is 10 times lower than that of the pandemic announcement of March 11, 2020 revealing itself in cumulative abnormal returns. Rahman et al. (2021) concur with these findings by emphasizing that the declaration of COVID-19 as a pandemic (March 11, 2020) had a greater negative impact on the stock returns when compared to the declaration of COVID-19 as an emergency (January 30, 2020). Yong and Laing (2020) and Schell et al. (2020) employ the event study method based on WHO announcement of January 30, 2020 and assert that the overall market reaction of this announcement is significantly negative on a global scope. Chen and Yeh (2021) show that both the benchmark market portfolio and 49 industry portfolios in the U.S. experience negative abnormal returns following the announcement of the WHO on March 11, 2020.

Despite the fact that the impact of the WHO pandemic announcement on stock returns is relatively dominant, researchers use other event dates as well. Singh et al. (2020), using an extensive sample of G-20 countries, indicate that stock markets experienced significantly negative abnormal returns, ranging from -0.7 to -42.69% , following January 20, 2020, which is the date that news of the virus first appeared in the media, while, they started to show a gradual recovery in the later stages (i.e. after 43 days) of the event window. Liu et al. (2020a,b) also

select January 20, 2020 as the event date and reveal that the outbreak had a significant negative effect on stock market returns across 21 affected countries under examination including U.S., U.K., Italy, Germany, Japan, Korea and Singapore. Heyden and Heyden (2020) test for the short-term reaction in the U.S., U.K. and 15 European stock markets with respect to different event dates (i.e. first case, first death, and initial announcement of fiscal and monetary policies). Mazur et al. (2021) analyze S&P1500 stocks and document that a great majority of the stocks generate large negative returns and extreme volatility during March 2020, specifically on single-day extreme events, namely Black Monday (March 9, 2020), Black Thursday (March 12, 2020), and Black Monday II (March 16, 2020).

As recent literature suggests, the findings of negative abnormal returns are quite consistent although the exact event dates investigated are different. Nevertheless, the market reaction to share repurchase activity following the pandemic shock has remained almost untouched. Instead, there are traces of literature concerning dividend policy decisions of firms under uncertainty. For instance, Pettenuzzo et al. (2020) examine how the pandemic affected firms' decisions to suspend dividends. One of the key findings in their work is that the market reaction to the huge number of dividend payment suspensions was strongly negative, whereas investors perceived dividend reductions as a positive sign of financial strength. The authors also argue that dividend suspensions have profound impact on the expected future dividend growth. Cejnek et al. (2020) shed light on the issue from the standpoint of the firms' future cost of capital and articulate that investors required additional compensation for negative co-skewness in addition to the pure beta risk. In another study, Fahlenbrach et al. (2020) find no evidence that firms with higher payouts are affected more adversely by the COVID-19 crisis implying that payouts do not have to reduce financial flexibility. More recently, Mazur et al. (2021), introduce a counter argument by specifying that dividend-payer firms significantly underperform their non-dividend payer counterparts following the March 2020 stock market crash. On the other hand, the authors state that managers are reluctant to adjust their dividend and repurchase levels not only to the realized earnings but also to the future earnings potential.

3 Data and methodology

Share repurchase data may reflect the findings of the recent literature in the sense that firms might have made use of the flexible nature of repurchases in their struggle with the pandemic to send positive signals to the market. In that respect, Fig. 1 portrays the pattern in repurchase transactions in Borsa Istanbul around the pandemic alert.

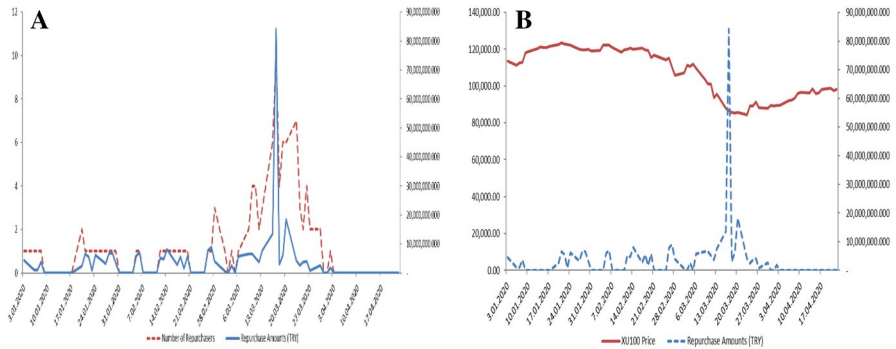


Fig. 1 Repurchase transactions in Borsa Istanbul around the pandemic alert. **a** Displays the graph of number of repurchasing firms (dotted line) as well as the total amount of share repurchases (solid line) in the period of 03.01.2020–22.04.2020. **b** Graphically shows the total amount of share repurchases (dotted line) along with the course of XU100 (solid line) in the same period

As Part A of Fig. 1 shows, while the repurchase activity has been only incidental before the pandemic alert, it skyrocketed within a very short period of time⁸ as a sudden reaction to the panic situation in the market. Number of firms that repurchase stock had a fivefold increase and the Turkish Lira (TRY) amount of repurchase transactions surged by a thousand percent in a few days. This happening coincides with the decreasing trend, which was around -1.88% on daily basis, in the stock exchange as depicted in the Part B of Fig. 1. More specifically, the trading days when high number/volume of repurchases was observed were also the ones when XU100, i.e. the benchmark index, was in a free-fall. For instance, share repurchases overflowed exactly on March 17, 2020, following the day the market dropped by 8.07% .

Figure 1 also implies that the repurchasing activity died out in about 15 trading days as the market started to stabilize. In this 15-trading day-period following the pandemic declaration, 19 companies (ironically to respond to COVID-19), announced and repurchased their own stocks (see Appendix 1). Table 1 provides brief information about these companies and their repurchasing activities.

As Table 1 suggests, financial companies outweigh non-financial ones in conducting repurchasing activities in the period of COVID-19 pandemic alert. Banks have the largest share of the total repurchased amount, while manufacturing firms and venture capital investment trusts are the most frequent repurchasers.

We analyze the short-term stock market response to share repurchase transactions of the sample of 19 companies by employing standard event study methodology. Our sample includes firms that started to buy their shares back as of March 11, 2020, while excluding regular and occasional repurchaser firms that have existed before this date (see Appendix 2). The event study method requires the calculation

⁸ One possible explanation for this latency may be that strict measures including closing schools and universities, halting events and public activities etc. were taken as of March 16, 2020, which was exactly the date the market experienced a staggering loss of 8.07% .

Table 1 Repurchasing companies (after March 11, 2020)

Sector Industry	Non-Financial			Financial					Total
	Mfg.	Rest. & hotels	Tech.	Hld.	VCITs	Banks	REITs	SITs	
# of firms	5	1	3	1	2	2	2	3	19
% of rep. amt	7	1	–	19	4	58	9	2	100%
# of rep. days	11	9	3	9	11	3	2	4	52

Mfg. manufacturing, *Rest. & Hotels* restaurants and hotels, *Tech.* technology, *Hld.* holdings, *VCITs* venture capital investment trusts, *REITs* real estate investment trusts, *SITs* securities investment trusts

of abnormal returns defined as the deviation from the expected return as formulated in Eq. (1) below:

$$AR_{it} = R_{it} - ER_{it}, \quad (1)$$

where AR_{it} is the abnormal, R_{it} is the actual and ER_{it} is the expected return of the firm i in time t . ER_{it} is calculated by means of the following commonly used market model:

$$R_{it} = a + \beta x R_{mt}. \quad (2)$$

A proper determination of estimation and event windows is of utmost importance in event studies, since there is a trade-off between a shorter and longer window of estimation mainly due to confounding events. Nonetheless, previous research is polyphonic in this regard, particularly in the case of emerging markets. A detailed review of literature for event studies in Turkish market⁹ reveals that an estimation window of 100 trading days $[-110, +11]$ and an event window of 21 trading days $[-10, +10]$ would be plausible.¹⁰ Note that, although these windows are long enough to capture the signaling effects and short enough to exclude confounding events, we generate abnormal returns for several event windows with different lengths as well. Moreover, since frequently repurchasing firms would bias the analysis, it is assumed that consecutive repurchases are deemed as a single transaction and the transaction in the first business day in the event window is included in the calculations (Zhang, 2005).

As suggested by Eq. (2), we regress the actual share returns (R_{it}) on the market portfolio returns (R_{mt}) for the estimation period. We obtain the parameter estimates (α and β) from these regressions and compute the expected returns (ER_{it}) for each day in the event period in line with Eq. (1). XU100 index is used as the market proxy since it represents the whole market in terms of market capitalization. Rate of returns are calculated upon the logarithmic differences of the closing price at a

⁹ Please see Basdas and Oran (2014) and the references therein.

¹⁰ From a legal point of view, this also coincides with the specific regulations of Capital Markets Board, which require a 6-month period as a proxy for sound and efficient price formation in Turkish capital markets.

Table 2 Descriptive statistics

	Mean	Med.	St. Dev.	Min.	Max.	Skew.	Kurt,
Panel A: Pandemic alert							
Mean stock returns							
Before	-0.021	-0.027	0.043	-0.082	0.044	0.232	1.975
After	0.000	0.000	0.049	-0.123	0.084	-0.627	3.474
Mean XU100 returns							
Before	-0.011	-0.010	0.030	-0.060	0.040	-0.026	2.118
After	-0.003	-0.001	0.031	-0.081	0.060	-0.822	4.235
Panel B: Repurchase activity							
Mean stock returns							
Before	-0.037	-0.038	0.023	-0.075	-0.001	-0.011	2.474
After	0.017	0.015	0.016	-0.011	0.039	-0.119	2.008
Mean XU100 returns							
Before	-0.019	-0.018	0.013	-0.046	-0.003	-0.587	2.556
After	0.001	0.004	0.013	-0.023	0.015	-0.796	2.339

This table provides information regarding the descriptive features of the data. In Panel A, statistics regarding mean stock and XU returns are reported as before and after the pandemic declaration of March 11, 2020. In Panel B, same statistics are presented this time as before and after respective repurchase activities

single day and that of the previous day. Cumulative abnormal returns (CAR) are computed as follows:

$$CAR_{it} = \sum_{t=1}^n AR_{it}. \quad (3)$$

Finally, we derive average abnormal returns (AAR) and cumulative abnormal returns (CAAR) by taking the mean of the summed AR_{it} and CAR_{it} of the sample firms in the event period and employ parametric and non-parametric tests for the significance of both returns. Data used in the event study regarding stock prices and share repurchase transactions are retrieved from Borsa Istanbul and Public Disclosure Platform,¹¹ respectively.

4 Results

4.1 Descriptive statistics

We summarize the descriptive statistics for stock returns in two dimensions. First, we group the mean stock returns as “before-and-after” the pandemic alert. Second,

¹¹ All public disclosure materials should be published in the Public Disclosure Platform (PDP), a 7/24 electronic system through which electronically-signed notifications of companies are disclosed. The PDP website is accessible at <https://www.kap.org.tr/en/>.

we report them as “before-and-after” the respective repurchase transactions of the companies. Since some companies have started to repurchase soon after, even on the same day of, the pandemic declaration, the period after pandemic alert and the period after repurchase transactions unavoidably overlap. Yet, such grouping is useful to have an insight on the impact of repurchases in time. These summary statistics are presented in Table 2.

It is apparent from Table 2 that mean stock returns increased on average both after the pandemic alert and repurchase transactions, but the increase after the latter (from -3.7 to 1.7%) appears to be more dramatic. A slight decrease in the volatility in returns (from 2.3 to 1.6%) is observed following repurchase transactions, which is the opposite (an increase from 4.3 to 4.9%) in the case of pandemic alert. This is also confirmed by the narrowing range of returns after firms have started to repurchase. Skewness and kurtosis figures after repurchases are lower as well. These preliminary results may be read as the initial impact of repurchases on stock returns was not positive enough to reverse the pressurized market conditions, while it revealed its significance over time as more companies took part in the activity and ultimately helped the market recover.

4.2 Event study metrics

To draw more precise inferences, we report the results of the event study in Table 3. Both parametric (Columns 2–5) and non-parametric (Column 6) test results indicate that repurchase transactions had significantly positive effects on stock returns. Average abnormal returns on the event day (Day 0) and in some post-event days (Day 2, Day 3, Day 6 and Day 8) provide strong evidence that market reacted positively to repurchase events (Column 3). Such positive reactions were so reflected in stock prices that the soaring levels of cumulative abnormal returns reverted back almost to their earlier values (Column 4). Typically, significant abnormal returns in the pre-event period would be considered as signs of information leakage in the market; however, it would be more reasonable to relate the entire negativity in stock returns with the unfavorable market conditions due to pandemic.

As laid out at the bottom of Table 3, the turnaround in the stock returns can be identified easily. Starting from the repurchase event, AAR figures that are negative in the pre-event period switch to positive first and then gain gradual significance throughout the post-event period in a persistent manner. The graphical representation of CAAR surrounding the repurchase event is shown in Fig. 2. The CAAR graph implies that stock market has welcomed share repurchases probably because investors had the perception that repurchasing firms were healthy enough to invest in. Put alternatively, firm managers have been successful in using repurchases as a signaling instrument for the purpose of price stabilization.

It is worth to note that the increase in stock returns might have resulted from factors other than repurchase transactions. An overall recovery, perhaps led by those factors such as government subsidies, liquidity enhancements, precautionary actions, news etc., in XU100 is already observed as can be seen from Part B of Fig. 1. Therefore, the contribution of share repurchases in this context is arguable.

Table 3 Abnormal returns surrounding the repurchase date

Day	AAR (%)	<i>t</i> (AAR)	CAAR (%)	<i>t</i> (CAAR)	Wilcoxon test (<i>z</i>)
-10	-2.179	-2.587***	-2.179	-2.587***	-2.213**
-9	-0.989	-0.933	-3.168	-2.129**	-1.127
-8	-3.310	-4.979***	-6.478	-4.098***	-3.260***
-7	-4.231	-4.159***	-10.710	-5.554***	-3.260***
-6	0.159	0.177	-10.551	-4.752***	0.563
-5	-1.915	-2.468**	-12.466	-4.529***	-2.294**
-4	-2.428	-3.216***	-14.894	-4.978***	-2.736***
-3	-0.555	-0.881	-15.449	-4.902***	-0.845
-2	-2.552	-3.076***	-18.002	-5.015***	-2.535**
-1	0.467	0.668	-17.535	-4.567***	1.248
0	2.194	1.835*	-15.341	-3.488***	1.690*
1	0.856	0.978	-14.485	-3.600***	1.811*
2	2.236	2.724***	-12.249	-3.235***	2.374**
3	2.481	4.215***	-9.768	-2.640***	3.582***
4	0.383	0.339	-9.385	-2.788***	-0.121
5	0.354	0.338	-9.031	-2.680***	0.121
6	2.472	2.500**	-6.559	-1.870*	2.374**
7	-0.081	-0.094	-6.640	-1.785*	-0.483
8	1.277	1.800*	-5.363	-1.413	1.489
9	0.135	0.218	-5.228	-1.352	-0.483
10	1.360	1.613	-3.868	-1.003	1.368
Window	CAAR (%)	<i>t</i> (CAAR)/ <i>z</i>	Window	CAAR (%)	<i>t</i> (CAAR)/ <i>z</i>
[-5, -1]	-6.984	-3.079***/-2.616***	[0, +1]	3.050	1.977**/1.851*
[-2, 0]	0.108	0.057/0.563	[0, +5]	8.503	2.707***/2.334**
[-1, 0]	2.661	1.618/1.690*	[+1, +5]	6.310	2.176**/2.093**
[-1, +1]	3.517	1.887*/1.730*	[+1, +10]	11.473	2.989***/2.736***

This table displays the effects of share repurchases. Day 0 is the repurchase (event) date. AAR(%) and CAAR (%) abnormal return and cumulative abnormal return on average. *t* (AAR) and *t* (CAAR) represent the *t* statistics. Non-parametric Wilcoxon signed-rank test statistics show whether the *z* statistic of AAR is significantly different from zero. ***, ** and * denote the significance level at 1%, 5% and 10%, respectively. Sample includes 19 repurchasing firms

One solution would be to regress abnormal returns on macroeconomic as well as firm-specific factors; however, the small sample size would hinder the reliability of parameter estimates. More prominently, we build our analysis on a very short period of time and use daily stock return data to address the short-term impact of COVID-19 in capital markets. In that sense, a regression model may not be suitable because most of the data pertaining to other factors would have at least monthly, if not quarterly, frequency.

Thus, in addition to our analysis regarding the impact of share repurchases in the market, we compare the market reaction to COVID-19 in the case of repurchasing firms with that of non-repurchasing firms. To this end, we match repurchasers with

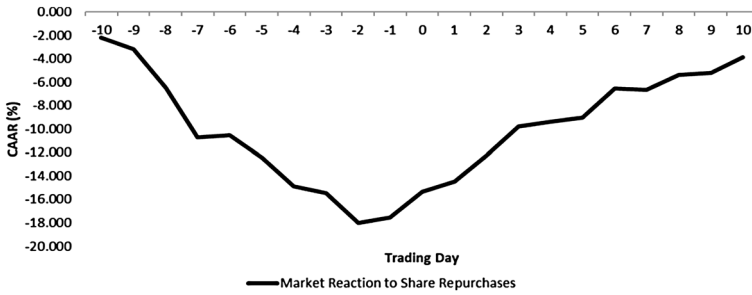


Fig. 2 CAAR around the repurchase event. This figure shows the evolution of CAAR, as an indicator of market reaction, around the repurchase event

non-repurchaser peers¹² on the basis of size (total assets and market capitalization) and relative valuation (market-to-book and price-to-earnings) criteria. This approach is common in the previous literature.¹³ One-to-one matching process ends up with 19 repurchasers and 19 non-repurchasers. At the next step, we use event study methodology to observe the market reaction to pandemic alert of March 11, 2020 for both types of firms. The only difference in the methodology is that we expand the event window as 31 trading days $[-10, +20]$ in order to correspond with the fade-away of the repurchasing activity in the market. By doing so, the impact of repurchases would be observable to its end. Results are given in Table 4.

Table 4 elucidates that the initial market reaction to the pandemic declaration was negative for both types of firms. However, as firms initiated their repurchase activities, repurchasing firm returns have shown a more profound increase than that observed in non-repurchaser stocks. It is evident that while the negative values of repurchaser firms' CAAR substantially dropped in the post-event period, the decline in the negative CAAR that are pertinent to non-repurchasers was not sufficient for a significant price recovery. In raw terms, the range of CAARs of the non-repurchaser firms $(-19.734, -32.253)$ is narrower than that of the repurchaser ones $(-8.736, -24.179)$, implying that the market reaction is far stronger for repurchasing firms following the event date (March 11, 2020). Likewise, various event windows given in the lower part of Table 4 confirm these findings in statistical terms. More concretely, it was possible to generate significantly positive returns with the stocks of repurchasing firms in the post-declaration period as opposed to non-repurchasing firms. Figure 3 provides a striking view of what has happened to stock returns both before and after the pandemic alert.

As Fig. 3 manifests, even though repurchasing and non-repurchasing firm stocks moved closely together in the pre-event period, they started to diverge from each other as of the event day and the difference between the two got bigger in the

¹² Since they are peers, they are already industry-matched. Peer companies data are obtained from Bloomberg.

¹³ See Jagannathan and Stephens (2003), Lie (2005), and Andriosopoulos and Hoque (2013).

Table 4 Abnormal returns surrounding the pandemic alert

Repurchasing firms							Non-repurchasing firms						
Day	AAR (%)	t (AAR)	CAAR (%)	t (CAAR)	Wilcoxon test (z)	Day	AAR (%)	t (AAR)	CAAR (%)	t (CAAR)	Wilcoxon test (z)		
-10	-1.275	-2.440**	-1.275	-2.440**	-2.093**	-10	-1.953	-3.649***	-1.953	-3.649***	-3.114***		
-9	-2.479	-4.675***	-3.754	-4.557***	-3.380***	-9	-0.905	-1.373	-2.858	-5.131***	-1.982**		
-8	-1.377	-2.013**	-5.131	-4.197***	-1.932*	-8	-1.917	-3.264***	-4.775	-5.822***	-2.765***		
-7	2.779	4.252***	-2.352	-2.086**	3.179***	-7	3.527	3.919***	-1.247	-1.348	3.201***		
-6	-0.008	-0.018	-2.359	-2.109**	0.000	-6	-0.514	-0.672	-1.761	-1.640	-0.501		
-5	-2.010	-4.247***	-4.369	-3.411***	-3.099***	-5	-2.616	-3.356***	-4.377	-3.433***	-2.678***		
-4	-0.827	-1.410	-5.197	-3.549***	-2.455**	-4	-0.632	-1.381	-5.009	-4.885***	-1.764*		
-3	-1.449	-3.163***	-6.646	-4.397***	-2.777***	-3	-0.103	-0.083	-5.112	-3.443***	-1.982**		
-2	-2.621	-3.309***	-9.267	-4.789***	-2.656***	-2	-3.239	-2.899***	-8.351	-6.438***	-2.504**		
-1	-1.397	-1.168	-10.664	-3.817***	-1.248	-1	-4.352	-5.129***	-12.703	-7.491***	-3.462***		
0	-3.799	-5.078***	-14.4632	-4.790***	-3.380***	0	-6.320	-4.332***	-19.023	-8.225***	-2.896***		
1	-4.902	-3.858***	-19.365	-5.167***	-2.978***	1	-6.606	-7.146***	-25.629	-8.783***	-3.593***		
2	2.069	3.602***	-17.297	-4.556***	2.857***	2	1.028	0.822	-24.602	-7.788***	1.241		
3	-0.375	-0.547	-17.672	-4.198***	-0.322	3	-0.594	-0.579	-25.196	-8.069***	-1.067		
4	-3.432	-2.965***	-21.104	-4.184***	-2.495**	4	-4.457	-3.451***	-29.652	-8.420***	-2.591***		
5	-1.463	-2.164**	-22.567	-4.185***	-1.932*	5	-1.472	-1.377	-31.124	-8.027***	-1.677*		
6	-1.612	-2.187**	-24.179	-4.222***	-2.213**	6	-1.128	-0.876	-32.253	-7.188***	-0.893		
7	1.237	2.205**	-22.942	-4.274***	2.334**	7	2.485	3.751***	-29.767	-6.935***	3.245***		
8	0.916	0.666	-22.026	-4.287***	0.201	8	-1.227	-0.853	-30.994	-6.786***	-0.936		
9	1.747	3.380***	-20.280	-4.187***	2.777***	9	0.992	1.179	-30.003	-6.709***	1.720*		
10	2.800	3.372***	-17.480	-3.928***	2.817***	10	3.076	3.161***	-26.926	-6.647***	2.504**		
11	3.038	3.824***	-14.441	-3.646***	2.897***	11	1.507	1.219	-25.419	-6.396***	1.328		
12	1.274	1.405	-13.167	-3.731***	0.926	12	2.278	1.817*	-23.141	-5.527***	1.851*		
13	-0.237	-0.230	-13.403	-3.724***	0.161	13	0.158	0.121	-22.984	-5.156***	0.065		

Table 4 (continued)

Repurchasing firms				Non-repurchasing firms							
Day	AAR (%)	t (AAR)	CAAR (%)	t (CAAR)	Wilcoxon test (z)	Day	AAR (%)	t (AAR)	CAAR (%)	t (CAAR)	Wilcoxon test (z)
14	3.615	5.150***	-9.788	-2.784***	3.662***	14	2.645	2.158**	-20.338	-4.074***	2.243**
15	0.379	0.501	-9.409	-2.699***	0.040	15	0.604	0.449	-19.734	-3.647***	-0.501
16	-0.752	-0.870	-10.161	-2.680***	-1.207	16	-2.067	-2.075**	-21.802	-3.772***	-2.286**
17	-0.437	-0.649	-10.598	-2.594***	-1.408	17	-1.802	-2.033**	-23.603	-3.782***	-1.938*
18	1.690	3.055***	-8.908	-2.303**	2.616***	18	0.960	1.070	-22.644	-3.609***	1.894*
19	0.127	0.211	-8.780	-2.203**	-0.443	19	-0.068	-0.071	-22.711	-3.605***	-0.24
20	0.044	0.088	-8.736	-2.097**	-0.282	20	-0.662	-0.766	-23.373	-3.669***	-0.958
Window	CAAR (%)	t (CAAR)/z	Window	CAAR (%)	t (CAAR)/z	Window	CAAR (%)	t (CAAR)/z	Window	CAAR (%)	t (CAAR)/z
[-1, 0]	-5.196	-3.658***/-2.897***	[+1, +20]	5.727	1.425/1.006	[-1, 0]	-10.673	-5.997***/-3.419***	[+1, +20]	-4.350	-0.731/-0.240
[0, +1]	-8.701	-5.090***/-3.461***	[+2, +10]	3.624	1.851*/1.610	[0, +1]	-12.926	-6.192***/-3.419***	[+2, +10]	-1.297	-0.536/-0.936
[+1, +5]	-8.104	-2.459**/-2.133**	[+10, +20]	11.544	2.919***/2.696***	[+1, +5]	-12.101	-4.665***/-3.288***	[+10, +20]	6.629	1.070/2.156**
[+1, +10]	-3.016	-1.171/-0.644	[+2, +20]	10.629	2.507**/2.133**	[+1, +10]	-7.903	-3.012***/-2.461**	[+2, +20]	2.256	0.376/1.285

This table displays the effects of pandemic declaration. Day 0 is the declaration (event) date (March 11, 2020). AAR (%) and CAAR (%) abnormal return and cumulative abnormal return on average. t (AAR) and t (CAAR) represent the t statistics. Non-parametric Wilcoxon signed-rank test statistics show whether the z statistic of AAR is significantly different from zero. ***, ** and * denote the significance level at 1%, 5% and 10%, respectively. Sample includes 19 repurchasing firms and 19 non-repurchasing firms

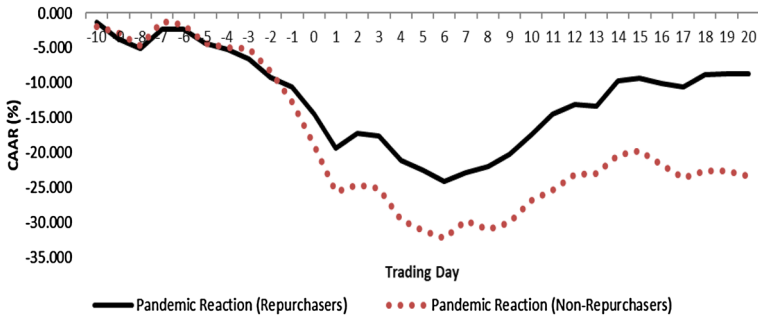


Fig. 3 CAAR around the pandemic alert event

Table 5 Tests of differences in means

H ₀	Pre-event period		Post-event period	
	CAAR _R = CAAR _{NR}	CAAR _R > CAAR _{NR}	CAAR _R = CAAR _{NR}	CAAR _R > CAAR _{NR}
p-value	0.847	0.577	0.000	0.000

This table presents tests of differences in mean CAAR of repurchaser (CAAR_R) and non-repurchaser (CAAR_{NR}) firms' stocks

post-event period when repurchase transactions became frequent. Table 5 reveals the statistical significance of this difference.

According to Table 5, CAAR of repurchasing firms are significantly higher than the ones of non-repurchasing firms in the post-event period, while the null hypothesis of pre-event CAAR are equal cannot be rejected. Eventually, we conclude that repurchase transactions were effective in stifling panic in the aftermath of COVID-19 pandemic alert in the market, especially when compared with the firms did not repurchase their stocks.

4.3 Robustness check

To provide more robust findings to confirm the event study results, we examine how abnormal returns evolve following the pandemic declaration of March 11, 2020 by employing a difference-in-differences analysis using all firm-day observations of the repurchasing (treated) and matched non-repurchasing (control) firms in the period of 11.03.2020–08.04.2020, namely in [0, + 1], [0, + 5], [0, + 10], and [0, + 20]. Following Flammer (2021), we specify the following regression model:

$$y_{it} = \alpha_i + \alpha_s \times \alpha_t + \beta \times Repurchase_{it} + \varepsilon_{it}, \tag{4}$$

where firms are indexed by *i*, days are indexed by *t*, and industries are indexed by *s*. *y* denotes for the cumulative abnormal returns, α_i are firm fixed effects, $\alpha_s \times \alpha_t$ are industry by day fixed effects, *Repurchase* is a dummy variable (“treatment dummy”)

Table 6 Abnormal returns with the share repurchase activity

	CAR [0, + 1]	CAR [0, + 5]	CAR [0, + 10]	CAR [0, + 20]
Repurchase	0.024 (0.018)	0.056*** (0.016)	0.058** (0.017)	0.058** (0.017)
Firm fixed effects	Yes	Yes	Yes	Yes
Industry-day fixed effects	Yes	Yes	Yes	Yes
Observations	76	228	418	798
R-squared	0.33	0.25	0.24	0.33

This table presents the estimates of the difference-in-differences model in Eq. (4). *Repurchase* is a dummy variable equal to one if the firm is a repurchasing firm. The sample includes all firm-day observations of the repurchasing (treated) and matched non-repurchasing (control) firms in various days in the 11.03.2020–08.04.2020 period. Standard errors (reported in parentheses) are clustered at the industry level. ** and *** denote significance at the 5% and 1% level, respectively

that equals one if firm i is a share repurchase (announced and repurchased) and zero otherwise, and ε is the error term. We cluster standard errors at the industry level. In this model, we measure the change in y following the repurchase activity of repurchasing (treated) firms accounting for contemporaneous changes in y at otherwise corresponding non-repurchasing (control) firms by means of β . The results are provided in Table 6.

Table 6 suggests that cumulative abnormal returns are significantly improved with the repurchasing activity initiated by firms following the pandemic declaration of March 11, 2020. These results are congruent with the ones obtained in the event study analyses in the sense that cumulative abnormal returns gradually turn into positive a few days after the declaration as firms repurchase more intensively. On the average, the increase in cumulative abnormal returns ranges between 2.4 and 5.8% upon repurchase transactions.

5 Conclusion

The new coronavirus has caused a great threat not only to the health of the human being but also to the wealth of the investment community. Stock markets worldwide tumbled and the fear spilled over very quickly resulting in historic declines in return levels. In such a panic, a few companies in Turkish stock market started to repurchase their own stocks with an intention to stabilize their prices. In line with the analysis results, these transactions appear to be successful in supporting prices inasmuch that they had a significant contribution in the recovery of the market.

These results offer at least three policy implications. First, policymakers should consider the potential impacts of restricting corporate payouts. Undoubtedly, it is vital to take precautionary actions to preserve cash; however, this does not necessarily mean to neglect the importance of the firms' future cost of capital. Having acknowledged the sticky nature of cash dividends (Ha et al., 2017), it would be reasonable to benefit from the flexibility of share repurchases in reducing the cost of capital (Green & Hollifield, 2003). If repurchase activity is also banned or restricted just as in the case of

dividend payouts, the cost of flexibility may increase (Bonaimé et al., 2016) which in turn would lead to an increase in cost of capital. Second, one of the most effective policies for decision-makers in dealing with the uncertainty in the market is to mind the signaling power of payout policies. Stock markets value better-than-expected dividend practices (Pettenuzzo et al., 2020). Hence, it would be more prudent to continue to pay dividends or to repurchase stocks to some extent rather than suspending their execution as a whole. Certainly not all companies would have the capability to sustain their payout policies, but the ones which have adequate resources and are financially flexible would at least use the informational power of payouts as a signaling instrument to retain and attract investors even in depressing markets. Lastly, share repurchases are attractive to investors provided that they do not jeopardize company's financial situation. The wide use of repurchases in global markets¹⁴ should be closely monitored by regulatory bodies in case they may be used to inflate stock prices artificially rather than allocating cash in order to maintain the business operations (Bhattacharya & Jacobsen, 2016). This is of particular importance in designing stimulus packages which include financial support for companies to survive and recover through the pandemic.

This study is not without limitations. One is pertinent to the small sample size. Only a few repurchasing firms may not represent the impact of share repurchases in the stock market. But, note that, these companies bought their stocks quite frequently. Thus, the number/amount of repurchases may override the number of repurchasers in our case. Our results are also subject to the usual limitations of event studies. That we focus on how markets reacted to repurchases has the shortcoming to neglect other potential factors that might have played a role on the overreaction and underreaction of the market. For future research, we leave further analyses focusing on the relationship between the repurchasing activity and the financial situation of firms in order to understand better how share repurchases contribute to firm value.

6 Availability of data and material

Available upon on request.

Appendix 1

See Table 7.

¹⁴ For instance, S&P500 repurchases for 2019 totalled \$728.7 billion (Crabb, 2020).

Table 7 Repurchasing/non-repurchasing firms and repurchase dates

#	Repurchasing firms			Non-repurchasing firms		
	Name	Ticker	Industry	Repurchase date	Name	Ticker
1	Bossa Tic. ve San. İşl. T.A.Ş	BOSSA.IS	Mfg	11.03.2020	Vakko Tekstil ve Hazır Giyim San. İşl. A.Ş	VAKKO.IS
2	TAV Havalimanları Holding A.Ş	TAVHL.IS	Hld	12.03.2020	Çelebi Hava Servisi A.Ş	CLEBI.IS
3	Verusaturk GSYO A.Ş	VERTU.IS	VCITs	12.03.2020	Ostim Endüstriyel Yat. ve İşl. A.Ş	OSTIM.IS
4	Metentur Oteliçilik ve Tur. İşl. A.Ş	METUR.IS	Rest. & Hotels	13.03.2020	Ulaşlar Tur. Yat. ve Day. Tük. Mal. Tic. Paz. A.Ş	ULAS.IS
5	A.V.O.D. Kuru, Gıda ve Tarım Ürün. San. Tic. A.Ş	AVOD.IS	Mfg	16.03.2020	Konfrut Gıda Sanayi ve Ticaret A.Ş	KNFRT.IS
6	Aksa Akriçlik Kimya San. A.Ş	AKSA.IS	Mfg	16.03.2020	Kordasa Teknik Tekstil A.Ş	KORDS.IS
7	Türkiye Vakıflar Bankası T.A.O	VAKBN.IS	Banks	17.03.2020	Yapı ve Kredi Bankası A.Ş	YKBNK.IS
8	Türkiye Halk Bankası A.Ş	HALKB.IS	Banks	17.03.2020	Türkiye İş Bankası A.Ş	ISCTR.IS
9	Desa Deri San. ve Tic. A.Ş	DESA.IS	Mfg	19.03.2020	Derimod Konif. Ayak. Deri San. ve Tic. A.Ş	DERIM.IS
10	Hedef GSYO A.Ş	HDFGS.IS	VCITs	19.03.2020	Metro Yatırım Ortaklığı A.Ş	MTRYO.IS
11	Emlak Konut GYO A.Ş	EKGYO.IS	REITs	20.03.2020	Özak GYO A.Ş	OZKGY.IS
12	Akiş GYO A.Ş	AKSGY.IS	REITs	23.03.2020	Doğuş GYO A.Ş	DGGYO.IS
13	İndeks Bilgisayar Sis. Müh. San. ve Tic. A.Ş	INDES.IS	Tech	23.03.2020	Armada Bilgisayar Sis. San. ve Tic. A.Ş	ARMDA.IS
14	Despec Bilgisayar Paz. ve Tic. A.Ş	DESPC.IS	Tech	23.03.2020	Arena Bilgisayar San. ve Tic. A.Ş	ARENA.IS
15	Datagate Bilgisayar Malzemeleri Tic. A.Ş	DGATE.IS	Tech	23.03.2020	Arena Bilgisayar San. ve Tic. A.Ş	ARENA.IS
16	Euro Kapital Yatırım Ortaklığı A.Ş	EUKYO.IS	SITs	23.03.2020	Garanti Yatırım Ortaklığı A.Ş	GRNYO.IS
17	Euro Menkul Kıymet Yatırım Ortaklığı A.Ş	EUYO.IS	SITs	23.03.2020	Egeli & Co Yat. Holding A.Ş	EGCYH.IS
18	Euro Trend Yatırım Ortaklığı A.Ş	ETYAT.IS	SITs	23.03.2020	Marka Yatırım Holding A.Ş	MARKA.IS
19	Izmir Fırça San. ve Tic. A.Ş	IZFAS.IS	Mfg	25.03.2020	Ayes Çelik Hasır ve Çit San. A.Ş	AYES.IS

This table displays the names, tickers and industries of firms which repurchased their stocks during the sample period alongside with the exact repurchasing dates. Repurchasing date refers to the announcement/transaction date. The table also provides the names and tickers of these firms' non-repurchasing counterparts, which are industry-matched with each other on the basis of size (total assets and market capitalization) and relative valuation (market-to-book and price-to-earnings) criteria

Mfg. manufacturing, *Rest. & Hotels* restaurants and hotels, *Tech.* technology, *Hld.* holdings, *VCITs* venture capital investment trusts, *REITs* real estate investment trusts, *SITs* securities investment trusts

Appendix 2

See Table 8.

Table 8 Number of repurchaser firms and amount of stock repurchases

Before March 11, 2020						After March 11, 2020					
Date	# of rep. firms	Amount of rep. (TRY)	Date	# of rep. firms	Amount of rep. (TRY)	Date	# of rep. firms	Amount of rep. (TRY)	Total rep. freq.	Total rep. size (%)	
3.01.2020	1	4,455,839.40	6.02.2020	1	6,956,502.00	11.03.2020	4	5,165,766.38	20	0.079	
6.01.2020	1	932,640.09	7.02.2020	0	–	12.03.2020	2	3,718,932.30	–	–	
7.01.2020	1	1,025,262.62	10.02.2020	0	–	13.03.2020	3	7,676,182.92	1	0.117	
8.01.2020	1	3,757,426.51	11.02.2020	0	–	16.03.2020	6	13,575,485.22	5	0.515	
9.01.2020	0	–	12.02.2020	1	5,219,810.59	17.03.2020	10	84,251,077.64	44	1.554	
10.01.2020	0	–	13.02.2020	1	4,807,513.07	18.03.2020	4	3,044,436.68	12	0.365	
13.01.2020	0	–	14.02.2020	1	8,063,289.75	19.03.2020	6	6,094,166.47	18	0.444	
14.01.2020	0	–	17.02.2020	1	2,708,841.73	20.03.2020	6	18,422,504.26	20	0.785	
15.01.2020	0	–	18.02.2020	1	5,649,559.47	23.03.2020	7	4,143,862.88	19	0.662	
16.01.2020	0	–	19.02.2020	1	1,574,383.79	24.03.2020	3	2,540,468.84	11	0.770	
17.01.2020	0	–	20.02.2020	1	5,680,592.87	25.03.2020	2	3,710,986.62	1	0.390	
20.01.2020	2	2,419,114.54	21.02.2020	0	–	26.03.2020	4	4,040,862.25	5	0.898	
21.01.2020	1	6,597,179.50	24.02.2020	0	–	27.03.2020	2	878,730.13	3	0.785	
22.01.2020	1	5,503,424.06	25.02.2020	0	–	30.03.2020	2	2,671,979.92	7	4.014	
23.01.2020	1	789,768.24	26.02.2020	1	7,748,966.86	31.03.2020	0	–	–	–	
24.01.2020	1	6,107,373.32	27.02.2020	1	8,980,060.05	1.04.2020	0	–	–	–	
27.01.2020	1	3,229,066.28	28.02.2020	3	3,945,712.10	2.04.2020	1	1,869,900.00	1	0.032	
28.01.2020	1	6,673,109.50	2.03.2020	1	686,514.65	3.04.2020	0	–	–	–	
29.01.2020	1	6,676,608.51	3.03.2020	0	–	6.04.2020	0	–	–	–	

Table 8 (continued)

Before March 11, 2020		After March 11, 2020								
Date	# of rep. firms	Amount of rep. (TRY)	Date	# of rep. firms	Amount of rep. (TRY)	Date	# of rep. firms	Amount of rep. (TRY)	Total rep. freq.	Total rep. size (%)
30.01.2020	1	3,325,660.00	4.03.2020	1	2,575,859.34	7.04.2020	0	—	—	—
31.01.2020	0	—	5.03.2020	0	—	8.04.2020	0	—	—	—
3.02.2020	0	—	6.03.2020	1	5,766,200.72	9.04.2020	0	—	—	—
4.02.2020	0	—	9.03.2020	2	6,489,905.20	10.04.2020	0	—	—	—
5.02.2020	1	5,906,534.93	10.03.2020	4	6,506,932.70	13–22.04.2020	0	—	—	—

This table provides information regarding the number of repurchasing firms and amount of stock repurchases in the period of 03.01.2020 and 22.04.2020. Our sample includes 19 firms that initiated their repurchase activity starting from March 11, 2020. Before this date, only one regular and a few occasional repurchaser firms have existed and, therefore, we have excluded them from our sample. Freq. denotes for frequency of repurchases and Size is the ratio of repurchase amount to the outstanding shares for the sample firms

Acknowledgements The author would like to thank the editor and the anonymous reviewers for the helpful and constructive feedback, which was instrumental in improving this article.

Code availability Available upon request.

Declarations

Conflict of interest We have no conflict of interest to declare.

References

- Ali, M., Alam, N., & Rizvi, S. (2020). Coronavirus (COVID-19)—An epidemic or pandemic for financial markets. *Journal of Behavioral and Experimental Finance*. <https://doi.org/10.1016/j.jbef.2020.100341>.
- Andriopoulos, D., & Hoque, H. (2013). The determinants of share repurchases in Europe. *International Review of Financial Analysis*, 27, 65–76.
- Ashraf, B. (2020). Stock markets' reaction to COVID-19: Cases or fatalities? *Research in International Business and Finance*. <https://doi.org/10.1016/j.ribaf.2020.101249>.
- Basdas, Ü., & Oran, A. (2014). Event studies in Turkey. *Borsa Istanbul Review*, 14(3), 167–188.
- Bhattacharya, S. (1979). Imperfect information, dividend policy, and “the bird in the hand” fallacy. *Bell Journal of Economics*, 10, 259–270.
- Bhattacharya, U., & Jacobsen, S. (2016). The share repurchase announcement puzzle: Theory and evidence. *Review of Finance*, 20(2), 725–758.
- Bonaimé, A., Hankins, K., & Jordan, B. (2016). The cost of financial flexibility: Evidence from share repurchases. *Journal of Corporate Finance*, 38, 345–362.
- Cejnek, G., Randl, O., & Zechner, J. (2020). *The Covid-19 Pandemic and Corporate Dividend Policy*. Available at SSRN 3576967.
- Chen, H. C., Harper, J. T., & Iyer, S. R. (2018). Economic shock and share repurchases. *The North American Journal of Economics and Finance*, 44, 254–264.
- Chen, H. C., & Yeh, C. W. (2021). Global financial crisis and COVID-19: Industrial reactions. *Finance Research Letters*. <https://doi.org/10.1016/j.frl.2021.101940>.
- CMB. (2020, 03 23). Announcement on measures with respect to capital markets in response to the COVID-19 outbreak. Retrieved 06 22, 2020, from Capital Markets Board of Turkey: <https://www.cmb.gov.tr/Duyuru/Dosya/2020323/0>
- Comment, R., & Jarrell, G. (1991). The relative signalling power of Dutch-auction and fixed price self-tender offers and open-market share purchases. *Journal of Finance*, 46, 1243–1271.
- Crabb, J. (2020, 04 03). Covid-19 illuminates corporate buyback issues. *International Financial Law Review*.
- DeCambre, M. (2020, 03 12). *Chart of Wall Street's 'fear' index in 2020 illustrates how unhinged stock markets have been over coronavirus compared to the 2008 crisis*. Retrieved 06 20, 2020, from MarketWatch: <https://www.marketwatch.com/story/this-chart-of-the-stock-markets-fear-index-in-2020-illustrates-how-unhinged-markets-have-been-over-coronavirus-compared-to-the-2008-crisis-2020-03-10>
- Dittmar, A. (2000). Why do firms repurchase stock? *Journal of Business*, 73(3), 331–355.
- Fahlenbrach, R., Ragheth, K., & Stulz, R. (2020). *How Valuable is Financial Flexibility when Revenue Stops? Evidence from the COVID-19 Crisis*. NBER Working Paper.
- Flammer, C. (2021). Corporate green bonds. *Journal of Financial Economics*. <https://doi.org/10.1016/j.jfineco.2021.01.010>.
- Fox, J. (2020, 04 01). *Critics of Stock Buybacks Will Outlast Coronavirus*. Retrieved 06 21, 2020, from Bloomberg: <https://www.bloomberg.com/opinion/articles/2020-04-01/coronavirus-aid-ban-on-stock-buybacks-won-t-stop-criticism>
- Green, R., & Hollifield, B. (2003). The personal-tax advantages of equity. *Journal of Financial Economics*, 67(2), 175–216.

- Grullon, G., & Michaely, R. (1992). Dividends, share repurchases, and the substitution hypothesis. *Journal of Finance*, 57(4), 1649–1684.
- Ha, C., Im, H., & Kang, Y. (2017). Sticky dividends: A new explanation. *Finance Research Letters*, 23, 69–79.
- Hackethal, A., & Zdantchouk, A. (2006). Signaling power of open market share repurchases in Germany. *Financial Markets and Portfolio Management*, 20(2), 123–151.
- Heyden, K. J., & Heyden, T. (2020). Market reactions to the arrival and containment of COVID-19: An event study. *Finance Research Letters*. <https://doi.org/10.1016/j.frl.2020.101745>.
- Jagannathan, M., & Stephens, C. (2003). Motives for multiple open-market repurchase programs. *Financial Management*, 32, 71–91.
- Jiang, Z., Kim, K., Lie, E., & Yang, S. (2013). Share repurchases, catering, and dividend substitution. *Journal of Corporate Finance*, 21, 36–50.
- Kilgore, T. (2020, 04 07). *More stock market volatility, less buying the dip, and slower earnings per share growth ahead, Goldman Sachs says*. Retrieved 06 21, 2020, from MarketWatch: <https://www.marketwatch.com/story/more-stockmarket-volatility-less-buying-the-dip-and-slower-earnings-per-share-growth-ahead-goldman-sachs-says-2020-04-07>
- Lakonishok, J., & Vermaelen, T. (1990). Anomalous price behavior around repurchase tender offers. *Journal of Finance*, 45, 455–477.
- Lie, E. (2005). Operating performance following open market share repurchase announcements. *Journal of Accounting and Economics*, 39(3), 411–436.
- Liu, H., Manzoor, A., Wang, C., Zhang, L., & Manzoor, Z. (2020a). The COVID-19 outbreak and affected countries stock markets response. *International Journal of Environmental Research and Public Health*, 17(8), 2800. <https://doi.org/10.3390/ijerph17082800>.
- Liu, M., Choo, W. C., & Lee, C. C. (2020b). The response of the stock market to the announcement of global pandemic. *Emerging Markets Finance and Trade*, 56(15), 3562–3577.
- Mazur, M., Dang, M., & Vega, M. (2021). COVID-19 and the March 2020 stock market crash. Evidence from S&P1500. *Finance Research Letters*, 38, 1. <https://doi.org/10.1016/j.frl.2020.101690>.
- Mazur, M., Dang, M., & Vo, T. T. A. (2020). Dividend policy and the COVID-19 crisis. Available at SSRN 3723790.
- Okorie, D., & Lin, B. (2021). Stock markets and the COVID-19 fractal contagion effects. *Finance Research Letters*. <https://doi.org/10.1016/j.frl.2020.101640>.
- Persons, J. (1997). Heterogeneous shareholders and signaling with share repurchases. *Journal of Corporate Finance*, 3, 221–249.
- Pettenuzzo, D., Sabbatucci, R., & Timmermann, A. (2020). *Dividend Suspensions and Cash Flow Risk during the COVID-19 Pandemic*. Available at SSRN 3628608.
- Pirgaip, B., & Dinçergök, B. (2019). Share repurchases under uncertainty: U.S. evidence. *Finance Research Letters*, 30, 130–138.
- Rahman, M. L., Amin, A., & Al Mamun, M. A. (2021). The COVID-19 outbreak and stock market reactions: Evidence from Australia. *Finance Research Letters*. <https://doi.org/10.1016/j.frl.2020.101832>.
- Ramelli, S., & Wagner, A. (2020). Feverish stock price reactions to Covid-19. *The Review of Corporate Finance Studies*, 9(3), 622–655.
- Schell, D., Wang, M., & Huynh, T. L. D. (2020). This time is indeed different: A study on global market reactions to public health crisis. *Journal of Behavioral and Experimental Finance*. <https://doi.org/10.1016/j.jbef.2020.100349>.
- Şenocak, A., & Ak, A. (2020, 04 27). *The amount of cash dividends that can be distributed until 30 September 2020 shall not exceed 25% of the net profit generated in 2019*. Retrieved 06 22, 2020, from Gide Loyrette Nouel: <https://www.gide.com/en/actualites/covid-19-new-legislation-mitigating-the-impact-of-covid-19-on-economic-and-social-life-in>
- Sheth, J. (2020). Business of business is more than business: Managing during the COVID crisis. *Industrial Marketing Management*, 88, 261–264.
- Singh, B., Dhall, R., Narang, S., & Rawat, S. (2020). The outbreak of COVID-19 and stock market responses: An event study and panel data analysis for G-20 countries. *Global Business Review*. <https://doi.org/10.1177/0972150920957274>.
- Skinner, D. J. (2008). The evolving relation between earnings, dividends, and stock repurchases. *Journal of Financial Economics*, 87(3), 582–609.
- Stonham, P. (2002). A game plan for share repurchases. *European Management Journal*, 20(1), 37–44.
- Vermaelen, T. (1981). Common stock repurchases and market signalings. *Journal of Financial Economics*, 9, 139–183.

- Vermaelen, T. (1984). Repurchase tender offers, signalling, and managerial incentives. *Journal of Financial and Quantitative Analysis*, *19*, 163–181.
- Yong, H. H. A., & Laing, E. (2020). Stock market reaction to COVID-19: Evidence from US Firms' International exposure. *International Review of Financial Analysis*. <https://doi.org/10.1016/j.irfa.2020.101656>.
- Zaremba, A., Kizys, R., Aharon, D., & Demir, E. (2020). Infected markets: Novel coronavirus, government interventions, and stock return volatility around the globe. *Finance Research Letters*, *35*, 101597.
- Zhang, D., Hu, M., & Ji, Q. (2020). Financial markets under the global pandemic of COVID-19. *Finance Research Letters*. <https://doi.org/10.1016/j.frl.2020.101528>.
- Zhang, H. (2005). Share price performance following actual share repurchases. *Journal of Banking and Finance*, *29*(7), 1887–1901.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.