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Abstract

Using a unique, hand-collected data set of actual daily share repurchases from the Athens Stock Exchange, we examine the stock market reaction around the disclosure date of actual share repurchases, the factors that affect the size of that reaction, and the motives behind share acquisitions. We find that different firms proceed to actual repurchases for different reasons: the results for the small firms and the firms with high book-to-market ratio repurchases are consistent with the signaling undervaluation hypothesis, while the results for the large firms and firms with low book-to-market ratio are in line with the price support hypothesis. In contrast to other studies, we find that long-term abnormal returns are higher for repurchasing firms compared to non-repurchasing controls and depend positively on the frequency of repurchases.

JEL Classification: G14, G15, G35

Keywords: Actual share repurchases, market reaction, firm characteristics, stated repurchase reasons, price support hypothesis

1. Introduction

Open-market share repurchases worldwide are characterized by two distinct stages: in the first stage, the firm authorizes a share repurchase program (SRP), and in the second stage, the firm can proceed to the implementation of the program. Depending on the disclosure regulations of the country, a public announcement may follow the SRP authorization and the actual repurchases made. The literature regarding the first stage has been voluminous and has examined issues such as the firm's motives, the market reaction to SRP announcements, and the economic explanations of repurchases, among others.[1] In contrast, the literature regarding the open-market SRP implementation stage is rather thin, largely depending on the availability of transaction data.

Any explanation of the firm's behavior in the first stage may not necessarily be applicable to the second stage. For instance, a firm may be motivated by undervaluation considerations when initiating an SRP. However, in the lengthy implementation period that follows, it may proceed to actual repurchases motivated by different goals (Cook et al., 2004), such as an arising opportunity to lower its acquisition cost, or a necessity to protect the long-term shareholders' wealth in a declining market. The firm's repurchasing pattern reveals much about the firm's financial strength and intentions, and we expect the market to react to the disclosure of any relevant information.

Regarding SRP implementations in the US market, Stephens and Weisbach (1998) find that share repurchases are negatively related to prior stock price performance, and that repurchases are positively related to the firm's cash flow. Using voluntarily disclosed data for 64 firms' repurchase programs, Cook et al. (2004) find no clear evidence about market timing. Starting in 2004, US firms were required to disclose detailed information about their repurchase

[1] For a review see Vermaelen (2005) and the references therein.

activity in their quarterly financial reports. Capitalizing on this requirement, Ben-Rephael et al. (2014) find that firms repurchase at discount prices compared to market prices, and that repurchases are followed by a positive and significant abnormal return later, at the time of company earnings announcements. Dittmar and Field (2015) find that repurchasing firms pay a lower than average price, and that the stock of infrequent repurchasers exhibits a higher long-run return.

Regarding SRP implementations in foreign markets, Brockman and Chung (2001) and Zhang (2005) study the Hong Kong capital market, where firms are required to disclose repurchase details no later than the next trading day. Brockman and Chung (2001) find that managers acquire shares at a lower cost than a naive accumulation strategy, a result consistent with either timing based on insider information, or price support. In contrast, Zhang (2005), using a novel estimation technique by retaining in the sample only the first daily announcement in a sequence of multiple repurchase announcements within a month, finds evidence consistent with price support. In addition, the market reaction is positive for small firms and firms with high book-to-market ratio, which are more likely to be underpriced. Finally, Zhang (2005) finds no long-run effect of actual repurchases on stock returns.

Ginglinger and Hamon (2007) focus on the French market in the 2000-2002 period, with regulation rules requiring firms to disclose monthly detailed information about their repurchase activity. They find that repurchases have a negative effect on liquidity and generally reflect contrarian trading rather than market timing. McNally et al. (2006) find that firms have superior timing ability, using monthly repurchase data from Canada.

Akyol and Foo (2013) connect the two SRP stages, by matching the daily announced repurchase trades of the firms to the company-stated motives for undertaking the respective

repurchase program. The undervaluation motive is shown to be a strong signal, because the firms stating an undervaluation motive exhibit more positive abnormal returns upon the announcement of their actual trades, and fare better than their controls one year after the repurchases.

In the aforementioned literature, there is a general consensus about the beneficial effect of the firm's actual repurchase activity, but there are differences regarding stock returns in the short- and the long-run, and differences regarding the explanations of the firm's behavior. The differences might be attributed to firm characteristics, to the methodology used, or to the institutional factors characterizing each market. One such institutional factor might be the disclosure requirement. In the Greek stock market, which is the focus of our paper, and for the period we are studying, firms disclose their repurchases within seven trading days. Compared to the institutional setting of other published studies on actual share repurchases, the Greek disclosure requirement is different from the daily requirement of Hong-Kong (Brockman and Chung, 2001) or Australia (Akyol and Foo, 2013), and the monthly requirement of France in the 2000-2002 period (Ginglinger and Hamon, 2007). Because the institutional setting is different from other countries, an empirical study of the Greek market would allow us to understand further these controversies.

The present study uses a unique database of hand-collected data from the Athens Stock Exchange regarding open-market repurchases and covering the period from August 2005 to December 2010. During this period, immediately after the European Union directive on insider trading and market abuse (2003/6/EU) was incorporated in the Greek law, the companies were required to disclose their daily transactions on share repurchases no later than seven trading days.

To the best of our knowledge, this paper is the first to gauge the firms' daily repurchasing behavior in Europe after the passage of the new directive.[2]

Furthermore, we employ a rich data set of 7,619 announcements of actual share repurchases, which enables us to draw reliable conclusions regarding the repurchase activity of firms and the reaction of investors. Hence, our study contributes much needed evidence to the non-US literature on actual daily share repurchases.

Overall, we find that companies engage in buybacks when the stock price exhibits a declining trend, and that the short-term market reaction is not statistically significant, a result that is consistent with the price support hypothesis (Cook et al., 2004; Zhang, 2005, Ginglinger and Hamon, 2007; Akyol and Foo, 2013).

However, when we focus on firm characteristics, we find that smaller firms and firms with a higher book-to-market ratio repurchase shares without having observed significant fluctuations in the period preceding the buybacks. For this group of firms, the short-term investor reaction is positive and statistically significant, consistent with the hypothesis that the firm is signaling undervaluation. In contrast, larger firms and firms with a lower book-to-market ratio repurchase shares after periods in which the stock price has been in a declining course, and, after the share acquisitions, a price stabilization takes place, in line with the price support hypothesis. This result agrees with Zhang (2005).

Regarding repurchase characteristics, when there is a short interval between announcements or when the percentage of shares bought back is low, the results confirm the price support hypothesis, and when the percentage of share bought back is high, the findings are in line with the hypothesis that the firm is signaling undervaluation.

[2] For European SRPs, see Lee et al. (2010) and Andriosopoulos and Lasfer (2015).

The stated reason for authorizing an SRP is related to share price movements before and after the actual repurchase as follows: firms which state that their stock is undervalued as a reason for approving an SRP, receive a positive reaction by the market when they proceed with the implementation of the SRP. Firms that avoid mentioning a specific reason for approving SRPs exhibit a pattern of pre- and post-repurchase returns that is consistent with the hypothesis that the firm is using stock buybacks as a means of stopping the declining trend of their share price.

In contrast to the literature of actual share buybacks, such as Zhang (2005) and Akyol and Foo (2013), we find a strong long-term abnormal return for firms that conduct repurchases. This is consistent with the notion that managers have successfully used repurchases to add value for their long-term shareholders. This phenomenon may have been accentuated by the market's underreaction to the actual share repurchase announcement, which leads to a positive long-term drift in stock returns (Ikenberry et al., 1995). In addition, we find that the long-run return of these firms is positively related to the frequency of actual repurchases and negatively related to book-to-market ratios.

This paper examines three possible motivations of firms when conducting actual repurchases, namely, market timing, supporting the stock price, and signaling undervaluation, the first two being most common in the aforementioned literature on actual repurchases and the third one being the most common explanation in repurchases in general. Of course, we realize there may be other motivations for repurchasing firms, which, however, are outside the scope of the present study.

The rest of the paper is organized as follows. The theoretical framework and the hypotheses to be tested are presented in the next section. Section 3 describes the disclosure requirement and the data. The empirical results are shown in Section 4, and Section 5 concludes.

2. Hypothesis development

2.1. Short-term share price performance

When a firm approves an open-market SRP, it is not obligated to complete it. Moreover, if the firm decides to implement the program, management has a wide spectrum of short-term, value-adding actions to benefit the shareholders or itself (through performance-related pay or stock ownership). These actions can have motivations which can only be uncovered by the firm's actual repurchase behavior and can be quite different from the motivations at the SRP initiation stage. Managers can time the market, provide liquidity to curb a downward trend of the firm's stock price, or even give a signal to the investors that the stock is undervalued. We examine if the actual repurchase pattern is consistent with any of these three motivations.

Market timing, or managerial timing ability, is a term that refers to the acquisition of own shares when the stock price is at low levels. The purpose is to exploit the current stock price fluctuations for the benefit of the long-term investors, provided that the market is not characterized by strong form efficiency (Baker and Wurgler, 2002).

A fundamental question related to stock buybacks is to what extend the executives use their private information to proceed with stock repurchases (Barclay and Smith, 1988). Brockman and Chung (2001) use daily data from the Hong Kong stock market and find that executives possess a market timing ability which depends on the market conditions and the special characteristics of the firm. In the same vein, using monthly data from Japan, Ishikawa

and Takahashi (2011) find that firms acquire their own shares if their stock price has followed a declining trend during the previous month, and that the stock returns of firms actually repurchasing shares exceeds the market return during the ensuing months.

The market timing hypothesis implies that the market price of the stock will be lower during the dates of conducting share repurchases in comparison to the subsequent days. The study by De Cesari et al. (2012) for the USA finds that indeed the companies seem to possess the ability to time the market and succeed in acquiring their own shares at a relatively low price. In addition, they find that during the month before the share acquisitions, the stock price follows a declining trend and a negative abnormal return is observed, whereas after the repurchase, a positive abnormal return is observed. Ben-Rephael et al. (2014) and Dittmar and Field (2015) also find results consistent with the market timing hypothesis.

H1: Negative abnormal returns are observed before the actual share repurchases in the open market and positive abnormal returns are observed after the share repurchases.

According to the price support hypothesis, share repurchases are conducted by a company to stem a declining trend in the stock price. The main difference with the market timing hypothesis is that, a stabilization of stock prices is expected after the share repurchase, whereas in the case of the market timing hypothesis, a positive abnormal return is expected.

Ginglinger and Hamon (2007) study the French market and find that companies proceed to stock buybacks following periods of declining stock prices, but they do not observe a significant price increase after the repurchase. The results are consistent with the price support hypothesis. Similar results are found by Cook et al. (2004) for the shares that are traded at the New York Stock Exchange.

H2: Negative abnormal returns are observed in the period before a share repurchase occurs and no abnormal returns are observed during the period after the repurchase.

The signaling undervaluation hypothesis has been popular in the SRP initiation literature and suggests that managers are using share repurchases to signal "their disagreement with how the market is pricing existing public information" (Grullon and Ikenberry, 2000). Regarding its manifestation in the actual repurchase stage, it differs from the market timing hypothesis in that, for the period before the repurchase, the stock price is not necessarily on a declining path, i.e., the firm does not trade against the market (Zhang, 2005).

In the studies of Zhang (2005) and Akyol and Foo (2013), even though the undervaluation hypothesis is not explicitly addressed, the results are in accordance with this hypothesis. Zhang (2005) finds that the market reaction is positive for small and firms with high book-to-market ratio, which are more likely to be underpriced. Akyol and Foo (2013) report that for firms that state undervaluation as the motive for initiating a share repurchase program, the price reaction is positive when those firms proceed to the actual buybacks. The abnormal return for the ten-day period before the repurchase is not statistically significant for the undervaluation motive firms.

H3: Firms conduct repurchases regardless of the preceding share price trend, and the market reacts positively to the actual share repurchase announcements.

2.2. Company characteristics and repurchase behavior

Several studies find that companies with different characteristics exhibit different behavior regarding share repurchase activities and the market reaction is also different. Ikenberry et al. (1995) examine announcements of SRPs (irrespective of whether the shares were eventually

bought back) and find that, in the short-run, the market reaction is more favorable to SRP announcements by companies of smaller size. Examining tender offer share repurchase announcements in the US, Nohel and Tarhan (1998) find significantly higher post-repurchase returns for low-Tobin's-*q* firms compared to high-Tobin's-*q* firms. Cook et al. (2004) use voluntarily disclosed daily data, to find that the larger companies proceed to buybacks after periods in which the stock price exhibits a downward trend, whereas for the smaller companies no such result is observed. Jagannathan and Stephens (2003) argue that frequent buybacks are driven by different motives than infrequent buybacks. The specific characteristics we focus on are size and B/M.

H4: The firm size and the B/M ratio are related to the share price pattern around the actual share repurchase announcements.

2.3. Stated reasons for approving stock repurchase programs

At the SRP initiation stage, and depending on repurchase regulations, firms can state the reason for approving a repurchase program, and an interesting question is whether the firm's statements have any informational content for the investors. Otchere and Ross (2002) examine a sample of announcements of SRPs for which the stated reason for their approval is share undervaluation. These announcements are treated as a positive signal by the investors, and the market reacts favorably for the companies that approve SRPs. Such reaction is smaller, although positive for rival companies in the same industry, a fact that is consistent with the undervaluation hypothesis. Peyer and Vermaelen (2009) find that at the announcement of SRP approval, the market reaction is stronger for firms that state undervaluation as the motive for the approval.

An even more interesting question is whether the firm's statements have any value for investors during the program implementation. Using daily data from Australia, Akyol and Foo (2013) conclude that for companies which announce as a reason for initiating an SRP the fact that the stock is underpriced, the investors reaction is positive and stronger compared to the companies that announce a different reason for SRP approval. This observation holds both for the announcement date of the SRPs and for the dates of the actual repurchases. In addition, companies which mention their stock underpricing as a reason for approving repurchases eventually buy back fewer shares in relation to companies which state a different reason for SRP approval, while daily repurchases do not seem to occur as a response to the stock price trend.

H5: The stated reason for approving an SRP affects the market reaction around the actual share repurchase announcements.

3. Disclosure requirements and share repurchase data

In Greece, an open-market SRP must be authorized by the shareholders' General Meeting, which defines the maximum number of shares that can be purchased, the duration of the SRP and the maximum and minimum price that can be paid. A firm may repurchase up to 10% of its outstanding shares, and certain conditions for trading are imposed: At the date of the actual buyback, the repurchase price cannot be higher than the price of the last trade or the highest current bid. The company cannot repurchase more than 25% of the average daily volume of the shares. The average daily volume figure is based either on the daily volume traded in the month preceding the month of public disclosure of that program, or the daily volume traded in the 20 trading days preceding the date of purchase. In cases of extremely low liquidity, a firm may

repurchase up to 50% of the average daily volume, provided that both the stock market authority and the investors are informed in advance, as per European Regulation No. 2273/2003.

The shares bought back can be resold at the discretion of the board of directors, but not concurrently with an ongoing SRP. Any remaining shares must be distributed to the employees or cancelled within three years with a decision of the general meeting. Beginning in 2007, the maximum duration of the programs changed from twelve to twenty-four months. The key information about the repurchase programs that is available to the investors in the program announcement includes: The date of the general meeting, the maximum number of shares to be repurchased, the duration of the program, and the reason for initiating a repurchase program (Drousia et al., 2018).

Until June 2005, companies disclosed their share repurchase activity in irregular intervals of a few months up to one year. Starting in July 2005, when the Market Abuse Directive 2003/6/EU was implemented with the Greek Law 3340/2005, repurchasing companies have been treated as insiders with privileged information, and their daily share repurchase activity should be posted on the Daily Official List of the Athens Stock Exchange by the end of the seventh trading session from the actual share repurchase. The key available information about the companies' daily repurchase activity includes: The date of the actual repurchase, the date of the announcement of the repurchase, the number of repurchased shares, and the average share price paid.

Capitalizing on this transparency of the Greek stock market, we construct a unique, hand-collected dataset including public announcements of companies whose stocks trade on the Athens Stock Exchange. The data concerning the repurchase programs and the daily open-market share repurchase activity are hand-collected from the *Daily Official List* of the Athens

Stock Exchange. The rest of the data such as stock price, firm size (market value of equity) and book-to-market ratio are obtained from Thomson Reuters DataStream and Thomson Reuters WorldScope.

Table 1 reports the share repurchase activity in Greece from August 2005 to December 2010. We obtain 7,619 announcements of actual share repurchases, made by 74 firms under 120 program authorizations. The total repurchase dates are 9,664, because an announcement may contain information about more than one repurchase-day. A factor that differentiates the present paper from other studies about actual share repurchases is that the number of the announcements and the number of repurchase days do not coincide (Panel A).

To include an announcement in the study, we require that the number of shares that are bought and the average price are reported daily. Several announcements are excluded because: i) the company had preferred shares as well as common shares at the date of the SRP authorization; ii) they contained buybacks for two to seven days but did not report the number of shares or the average price for every day separately, and iii) they were made later (not immediately) and is considered very likely that investors had already been informed by another source, such as the Internet or a newspaper. Other reasons for excluding announcements are repetition of the purchase date and incomplete information. To eliminate extreme observations, announcements that contained buybacks for more than seven trading days or are made after a reverse split (which changed significantly the number and the price of the company's traded shares) are not included in the study. Panel B of Table 1 reports in detail the number of announcements that are excluded. The final dataset includes 7,463 announcements of actual share repurchases, made by 69 firms under 109 program authorizations (Panel C).

The aim of this study is to examine the price performance surrounding the announcements of actual share repurchases as well as long-term. It is obvious that the number of announcements is quite large for the study period. In Panel D, we observe that most firms (53%) made more than fifty announcements. The percentage of firms that announced more than a hundred daily transactions is 33%. Throughout the period under consideration two firms made only one announcement, while one firm made 558 announcements. To avoid undue weighting of firms and clustering problems we follow the approach of Zhang (2005), that is, when a firm makes multiple repurchase announcements within a month, only the first announcement is included in the final sample. Using this approach, we end up with 826 announcements of actual share repurchases, which represent the event days of the study.

(Insert **Table 1** here)

Panel A of Table 2 reports descriptive statistics for the 826 announcements of the final sample. Quartile rankings are determined relative to all firms that are listed on the Athens Stock Exchange on the day of the actual share buyback announcement. Small firms and firms with higher book-to-market ratio (B/M) have made less repurchase announcements, while larger firms report more repurchase days during the study period. In 2008, the number of repurchase announcements almost tripled from the previous year, as the stock exchange index dropped to lower levels following the onset of the global financial crisis. Panel B of Table 2 reports the number of trading days per announcement. The announcements that report more than one repurchase-day are about 23.5% of the dataset. In other words, the disclosure requirement in the present study is different from the next-day requirement of Hong-Kong (Brockman and Chung, 2001) or Australia (Akyol and Foo, 2006), and the monthly requirement of France in the 2000-2002 period (Ginglinger and Hamon, 2007).

We proceed with the estimation of the short-term market reaction surrounding the actual share repurchase announcements.

(Insert **Table 2** here)

4. Empirical evidence

4.1. Short-term market reaction

We use the standard event study methodology to estimate the cumulative abnormal return (CAR) around the announcements of actual daily share repurchases. The market model is used as the benchmark model, with an estimation period ranging from 200 to 21 days before the announcement (−200, −21) and an event window that starts 120 trading days before the date of the announcement and ends 20 days after the announcement (−120, +20). The market returns are based on the General Index of the Athens Stock Exchange. The event day (day "0") is the day of the actual share repurchase announcement at the *Daily Official List* of the Athens Stock Exchange. To determine statistical significance of the mean CARs, we use the Patell Z-test.

Table 3 reports the average cumulative abnormal return around the announcements of actual share repurchases. The windows (−120, −1), (−60, −1), (−20, −1) and (−10, −1) are used to examine whether firms tend to repurchase when the stock price underperforms the market. Repurchasing when the stock price follows a downward trend is consistent with both the market timing and the price support hypothesis. The window (0, +1) aims to capture the effect of the initial announcement. The windows (+2, +10) and (+2, +20) are used to examine the short-term market reaction after the announcement day, approximately one calendar month.

The results for the full sample (Panel A of Table 3) suggest that companies buy shares after intervals where the stock price shows a downward trend. The immediate response is not

statistically significant. In the period immediately after the announcement, i.e., event window (+2, +10), investors show a slightly positive reaction that gradually disappears. Between (+2, +20), the reaction is not statistically different from zero. The results are consistent with the price support hypothesis (**H2)** rather than the market timing hypothesis (**H1**), and agree with Ginglinger and Hamon (2007).

The next section examines whether and how some company and repurchase characteristic affect the company repurchase decision and the market reaction.

(Insert **Table 3** here)

4.2. Share price performance related to company and repurchase characteristics

Various studies suggest that company characteristics affect the company repurchase activity as well as the investors' reaction. Dittmar (2000) argues that different firms proceed to buybacks for different reasons. Ikenberry et al. (1995, 2000) find that companies with higher book-to-market ratio report higher long-term abnormal return after the announcement of SRP authorizations. Furthermore, the market reacts more favorably to buyback announcements of smaller companies. Cook et al. (2004) observe that larger firms repurchase after periods when the price of the stock underperforms the market.

We proceed with the examination of the company characteristics. In Panel B of Table 3 the announcements are grouped according to firm size and B/M ratio. The firm size is estimated as the market value of equity. Quartile rankings are computed using all listed firms on the Athens Stock Exchange on the day of the actual share repurchase announcement.

Overall, the results suggest that smaller firms and firms with higher B/M ratio (whose shares are likely to be undervalued) repurchase shares even though the share price has not

experienced any abnormal change in the period preceding the announcement. Investors short-term reaction is positive and statistically significant. Larger firms and firms with lower B/M ratio repurchase shares after intervals when the shock price follows a declining path. Following the share buyback, we observe a stabilization of prices. Thus, the results for smaller firms and firms with higher B/M ratio are in accordance with the signaling undervaluation hypothesis (**H3**). The results for the larger firms and firms with lower B/M ratio are consistent with the price support hypothesis (**H2**). Furthermore, these results are confirmed by the significance for the difference between mean CARs in the subsamples. This is corroborated by Figures 1 and 2, which shows the cumulative average abnormal return for the 41-day period surrounding the announcement date (−20, +20) according to size quartile and B/M ratio quartile, respectively. Overall, we conclude that hypothesis **H4** holds. The findings are similar to those of Zhang (2005).

In Panel C of Table 3 the data are grouped according to repurchase characteristics. Following the methodology of Zhang (2005) we used three variables: a) the number of days that elapse between the actual share repurchase announcement under consideration and the immediately preceding announcement of the company within a year period, b) the number of company announcements in the quarter preceding the current announcement, and c) the percentage of shares acquired over the number of outstanding shares. The first two variables estimate the degree of "surprise" of the actual share repurchase announcement, that is, whether it was expected or unexpected by investors. The announcements are divided into two categories with cut-off point the median of each distribution, i.e., 3 days and 13 announcements, respectively. The third variable is an estimate of the signal's strength. In this case the announcements are divided into two equal subsets.

When the actual share repurchase announcements are frequent (either the interval between the announcements is less than 3 days or the number of announcements is greater than 13 during the preceding three months), the initial reaction is not statistically significant, which is somehow expected. For the cases where the number of days since the previous announcement and the repurchase size are small, we observe a negative and statistically significant abnormal return in the twenty trading days preceding the event day. The CAR(+2, +20) is not statistically significant. The results are in accordance with the price support hypothesis. For the cases where the number of announcements is small in the quarter before the event day, the findings are consistent with the market timing hypothesis. For the cases where the repurchase size is high, the results support the signaling undervaluation hypothesis. However, the results are not confirmed by the test for the difference between mean CARs in the subsamples.

(Insert **Figure 1** here)

(Insert **Figure 2** here)

4.3. Share price performance related to the reason for program authorization

In Greece companies are required to announce the reason for initiating an SRP at the date of the program authorization. The most common reason for authorization, as stated by the companies, is stock undervaluation. For a large percentage of programs, the reason is not explicitly stated (the company just states that the acquisitions will be conducted in accordance to the existing laws). Few programs fall into a third category, with various causes of approval, for example, the cancellation of shares to reduce its share capital, sell-back to the market, distribution to employees or a combination of these reasons.

Using the categorization mentioned above, we examine the market reaction to announcements of actual share repurchases. The evidence in Table 4 indicates that the short-term market reaction is greater when the firm-stated reason for authorizing a SRP is to support the stock price in case of undervaluation. When the reason is not explicitly stated, the CAR for the preceding period is negative and statistically significant, while the short-term CAR(+2, +20) is not statistically significant. The results are consistent with the price support hypothesis. When the reason is very specific but other than stock undervaluation, it appears that the information is already incorporated in the share price and there is no statistically significant reaction. Therefore, there is evidence that hypothesis **H5** holds.

(Insert **Table 4** here)

4.4. Factors affecting the market reaction

Cross-sectional regression analysis is used, to examine whether and to what extent some characteristics of companies and announcements affect the market reaction to actual share repurchase announcements. Following Zhang (2005), we regress the initial market reaction, CAR(0, +1), the immediate short-term reaction, CAR(+2, +10), and a month after the announcement, CAR(+2, +20), on firm and repurchase characteristics.

Table 5 reports summary statistics for the variables we use in our regression analysis. "Firm size" is the natural logarithm of the market value of equity and "B/M" is the book-to-market ratio, both measured on the day of the actual share repurchase announcement. "CAR(−20, −1)" denotes the abnormal return for the month before the announcement. "NDLR" is the number of days since the last repurchase announcement of the company and estimates the time between the actual share repurchase announcement under consideration and the previous one,

within a year. “NAP3M” is the number of the company’s announcements during the preceding 3 months, calculated by the announcements made within the last 90 days before the event day under examination. The variables “NDLR” and “NAP3M” are determined based on Zhang's (2005) methodology. “NTDA” is the number of trading days included in the actual share repurchase announcement and reports the trading days that the firms acquired shares and are disclosed on the same day. “Repurchase size” is the percentage of repurchased shares relative to shares outstanding. We also include dummy variables for the three different groups of stated reasons for SRP authorization: stock undervaluation, not specific reason, and stated reason other than stock undervaluation. Because the coefficients of the dummy variables are not statistically significant in any case, they are not further reported. In addition, to reduce the influence of extreme values, the variables are formed by winsorizing at the 1st and 99th percentiles.

(Insert **Table 5** here)

Table 6 shows the results of three main regression models with the method of ordinary least squares (OLS). We control for year fixed effects in all models, and standard errors are clustered at the firm level. We observe that the coefficient of the B/M ratio is positive, a finding that supports the signaling undervaluation hypothesis. Also, the investors reaction is negatively related to the number of announcements in the previous quarter, a result that is different from Zhang (2005). Interestingly, the coefficient of the abnormal performance in the period before the announcement is positive and statistically significant only in the period (+2, +10).

(Insert **Table 6** here)

4.5. Long-term price performance

To examine whether managers successfully exploit stock undervaluation, Ikenberry et al. (1995, 2000) find that, after announcing SRP authorizations, firms exhibit strong abnormal long-term returns, and that this result is more pronounced in firms with higher book-to-market ratio. Regarding actual daily share repurchases, Akyol and Foo (2013) and Zhang (2005) do not find significant long-term abnormal returns for repurchasing firms compared to a matching sample of non-repurchasing firms. However, Zhang (2005) finds that firms with high book-to-market ratio perform better in the long-term.

In our analysis so far, we assume that the market is efficient in incorporating the publicly available information in the actual share repurchase announcements. If this is not the case, it is likely that the market will correct its short-term misreaction in a longer horizon. We examine long-term returns to see if investors revise their expectations upward following actual share repurchases. We follow the methodology of Barber and Lyon (1997) and compare one-, two- and three-year buy-and-hold returns (BHRs) against a control sample, using monthly data.[3] The firms in the control sample are selected by first requiring the matching firm to have a market value between 70% and 130% of the repurchasing firm in the same calendar year, and then selecting the firm with the closest B/M ratio to that of the repurchasing firm.

As shown in Panel A of Table 7, the repurchasing firms outperform the control firms for all periods. The negative return signs are a result of the falling equity market especially after 2007. The buy-and-hold abnormal returns (BHARs) are 11.57%, 18.1% and 29.18% for the one-, two-, and three-year holding periods and significantly different from zero at the 1% level. This is consistent with the notion that managers have successfully used repurchases to support the stock

[3] Thus, our total data coverage extends to 2013, three years beyond the announcements period.

price to add value for their shareholders. The high long-run returns phenomenon may have been accentuated by the market's underreaction to the actual share repurchase announcement, which leads to a positive long-term drift in stock returns (Ikenberry et al., 1995). In any case, the result is different from Akyol and Foo (2013) and Zhang (2005), who do not find significant long-term abnormal returns for repurchasing firms.

Further examination of the BHARs by size quantile in Panel B of Table 7, the repurchasing firms exhibit statistically significant buy-and-hold abnormal returns, especially the smaller ones. Furthermore, considering the B/M characteristics of the firms, we observe that the BHARs for repurchasing firms are positive and most of them are significant at the 1% level. The firms with the highest B/M ratios (quartile 1 and 2), seem to perform better than control firms, especially in three-year holding horizons, and this result agrees with Zhang (2015).

Regarding the relationship between announcement reasons and long-term returns, all the stated reasons for conducting a repurchase are positively related to BHARs, as shown in Table 8. However, when the company's reason for conducting a repurchase is specified in the announcement and it is different from stock undervaluation, the repurchasing firms seem to exhibit the strongest long-term abnormal performance.

The three-year BHARs are regressed against several variables, as shown in Table 9. We conclude that the B/M variable is negatively related to BHARs, as expected. In addition, the number of repurchases made during the preceding three-month period (NAP3M) is positive and statistically significant. In other words, frequent repurchasers seem to be characterized by high long-term price performance.

Insert **Table 7** here.

Insert **Table 8** here.

Insert **Table 9** here.

4.6. Robustness tests

We perform various sensitivity tests: (1) using alternative estimation periods (−250, −31) and (−300, −41); (2) using alternative short-run announcement period return windows such as (−1, +1) and (−2, +2); (3) winsorizing the returns at the 1st and 99th or 5th and 95th percentiles to control for outliers; (4) using other parametric and non-parametric test methods such as the standardized cross-sectional test of Boehmer et al. (1991), which accounts for event-induced variance, and the rank test of Corrado (1989); and (5) using other benchmark models such as the market-adjusted return model, the mean-adjusted return model, and the market model with the Scholes-Williams beta estimation method. None of these variations changes our results.

Akyol and Foo (2013) follow the methodology of Zhang (2005) with a slight variation: For the calculation of the variables that assess the degree of "surprise", they impose a further restriction that the announcements are made under the same program. We use the same modification to re-estimate the abnormal returns. The results are similar.

During the period under examination, some firms made only one share repurchase announcement. Other firms repurchased almost daily while their SRP was in effect. To examine if the Mean CAR has been affected by the companies with the largest number of announcements, we conduct the following test. We calculate the average cumulative abnormal return for each company separately and then carry out significance tests across firms. The results do not change.

To ensure that our regression results are robust to the clustering problem, we use alternative techniques for estimating standard errors and found similar results. We calculate standard errors adapted for heteroskedasticity and autocorrelation according to Newey and West

(1987). Finally, we group the residuals in two dimensions, by company and by day, following the two-way technique proposed by Petersen (2009) and Thompson (2011). The coefficients of the variables about the stated reasons for SRP authorizations are not statistically significant in any model.[4]

5. Conclusions

Compared to the literature regarding the initiation stage of open-market repurchase programs, the literature regarding actual repurchases is very thin and focuses on non-US markets characterized by a timely disclosure of buyback transactions. Using an extensive dataset of announcements regarding conducted repurchases in the Greek stock market, we examine when companies choose to implement their approved SRPs and the investors' reaction. In addition, we investigate how some company characteristics (firm size and book-to-market ratio) and repurchase characteristics (frequency and size of repurchases), as well as the preceding mandatory company announcement stating the reason for approving an SRP, affect the behavior of companies and investors in the short- and the long-term.

Overall, we find that companies engage in buybacks when the stock price exhibits a declining trend, and that the short-term market reaction is not statistically significant, a result that is consistent with the price support hypothesis. However, the price pattern around repurchases of smaller firms and firms with a higher book-to-market ratio is consistent with the hypothesis that the firm is signaling undervaluation. In contrast, larger firms and firms with a lower book-to-market ratio repurchase shares to stabilize their stock price. Regarding repurchase characteristics, when there is a short interval between announcements or when the percentage of shares bought

[4] All robustness tests are available from the authors upon request.

back is low, the results confirm the price support hypothesis, and when the percentage of share bought back is high, the findings are in line with the hypothesis that the firm is signaling undervaluation.

The company's stated reason for approving an SRP affects the market reaction at the time of actual share repurchases. In contrast to the literature, we find that long-term abnormal returns are higher for repurchasing firms compared to non-repurchasing controls and depend positively on the frequency of repurchases.

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Figure 1

Mean CAR of firms according to size quartile (Q1: Small, Q4: Large) in the window (−20, +20). Day "0" on the horizontal axis is the date of the announcement of the actual share repurchases.

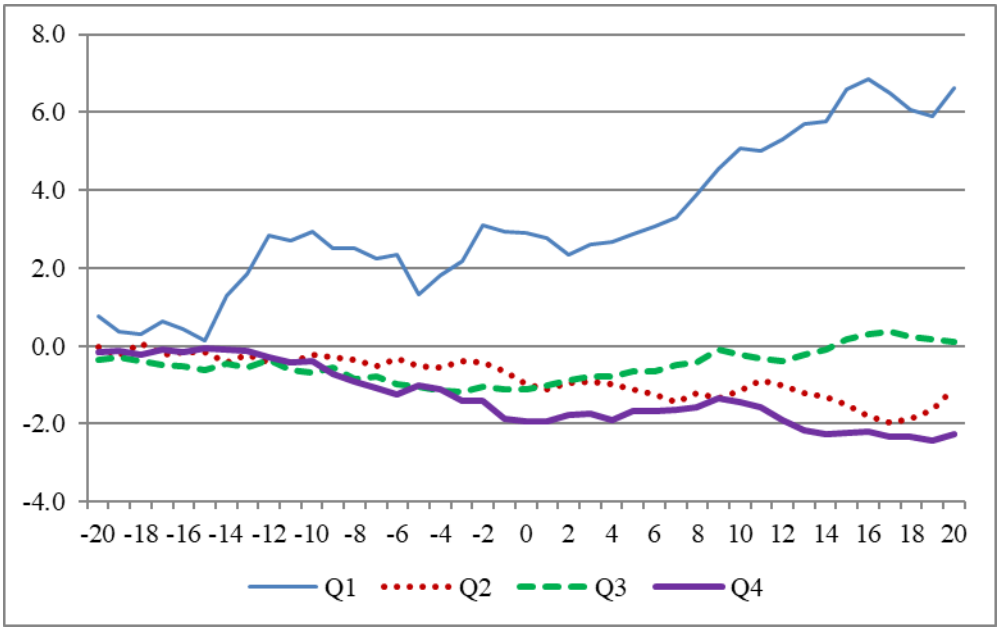

Figure 2

Mean CAR of firms according to B/M ratio quartile (Q1: High, Q4: Low) in the window (−20, +20). Day "0" on the horizontal axis is the date of the announcement of the actual share repurchases.

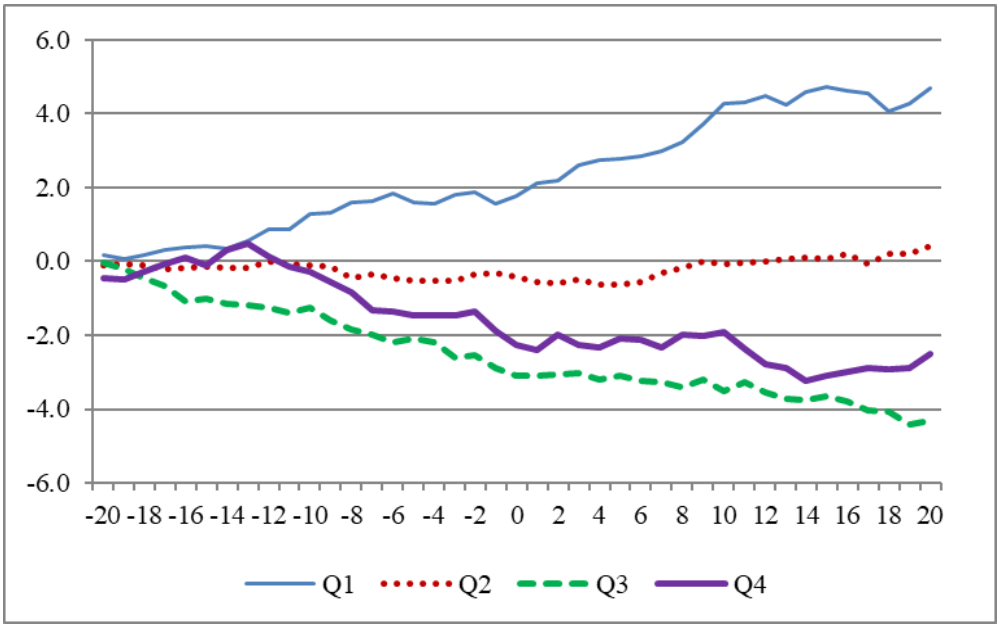

Table 1

Summary statistics of daily share repurchases in Greece from August 2005 to December 2010

Panel A: Full dataset	
Number of firms	74
Number of program authorizations	120
Number of repurchase announcements	7,619
Number of repurchase days	9,664
Total number of shares repurchased	276,627,699
Value of repurchased shares (in euro)	1,946,269,573
Average repurchase days (per firm)	131
Average repurchase announcements (per firm)	103
Panel B: Reason for excluding announcements	
Preference shares	87
The number of shares or the average price is not known for every day separately	42
Late announcements	1
Repetition of repurchase date	9
Missing information	2
The announcement reported more than seven trading days	10
Reverse split	5
Panel C: Dataset after excluding the announcements in Panel B	
Number of firms	69
Number of program authorizations	109
Number of repurchase announcements	7,463
Number of repurchase days	9,065
Total number of shares repurchased	269,574,548
Value of repurchased shares (in euro)	1,827,838,405
Average repurchase days (per firm)	131
Average repurchase announcements (per firm)	108
Panel D: Number of repurchase announcements per firm	
Number of firms with less than 10 repurchase announcements	11 (16%)
Number of firms with 11-20 repurchase announcements	9 (13%)
Number of firms with 21-50 repurchase announcements	12 (18%)
Number of firms with 51-100 repurchase announcements	14 (20%)
Number of firms with more than 100 repurchase announcements	23 (33%)

Table 2

Descriptive statistics of open market share repurchases from August 2005 to December 2010

Panel A: Size and B/M quartiles

Year	Repurchase announcement	Size quartile				Book-to-market quartile			
		1(small)	2	3	4(large)	1(high)	2	3	4(low)
2005	10	0	7	3	0	0	7	3	0
2006	49	0	21	14	14	5	22	13	9
2007	86	2	16	33	35	33	12	17	24
2008	240	19	70	35	116	50	43	77	70
2009	230	39	46	57	88	39	110	30	51
2010	211	16	48	61	86	32	63	65	51
All	826	76	208	203	339	159	257	205	205

Panel B: Distribution of repurchase days per announcement

Repurchase days per announcement	1	2	3	4	5	6	7
Number of announcements	631	59	37	26	49	21	3
Percent	76.5	7.1	4.5	3.1	5.9	2.5	0.4

To avoid undue weighting of firms and clustering problems we follow the approach of Zhang (2005), i.e., when a firm makes multiple repurchase announcements within a month, only the first announcement is included in the final sample.

Table 3
Abnormal share price performance surrounding announcements of actual share repurchases

			Window						
		N	(−120,−1)	(−60,−1)	(−20,−1)	(−10,−1)	(0,+1)	(+2,+10)	(+2,+20)
Panel A: Full sample									
CAR		826	−1.49%	−1.10%*	−0.95%***	−0.74%***	−0.14%	0.58%**	0.46%
			(−1.63)	(−1.72)	(−2.88)	(−2.83)	(−0.98)	(2.05)	(0.84)
Panel B: Announcements grouped by firm characteristics									
1. By size quartile									
CAR	1 (small)	76	−0.03%	2.28%	2.22%	0.16%	−0.17%	2.19%*	3.67%**
			(−0.32)	(0.64)	(1.21)	(0.12)	(0.06)	(1.77)	(2.50)
CAR	2	208	−1.31%	−1.18%	−0.62%	−0.22%	−0.47%*	−0.05%	0.01%
			(−0.48)	(−0.30)	(−0.59)	(−0.12)	(−1.89)	(−0.15)	(0.15)
CAR	3	203	−0.65%	−0.13%	−0.98%	−0.45%	0.08%	0.77%*	1.10%
			(−0.43)	(−0.23)	(−1.33)	(−0.71)	(0.29)	(1.67)	(1.17)
CAR	4 (large)	339	−2.44%*	−2.38%***	−1.85%***	−1.44%***	−0.06%	0.50%	−0.36%
			(−1.68)	(−2.58)	(−3.58)	(−3.83)	(−0.29)	(1.12)	(−0.90)
Difference (Q1−Q4)		Mean	2.41%	4.66%**	4.07%**	1.60%	−0.11%	1.69%*	4.03%***
			[0.88]	[2.09]	[2.45]	[1.29]	[−0.19]	[1.71]	[2.77]
2. By B/M quartile									
CAR	1 (high)	159	4.07%	2.54%	1.53%	0.70%	0.56%*	2.15%***	2.56%**
			(0.86)	(0.99)	(0.79)	(0.77)	(1.88)	(2.67)	(2.21)
CAR	2	257	−1.91%	−0.18%	−0.28%	−0.26%	−0.22%	0.48%*	0.95%*
			(−0.85)	(0.10)	(0.04)	(−0.42)	(−0.64)	(1.70)	(1.75)
CAR	3	205	−3.08%	−4.46%***	−2.82%***	−1.44%***	−0.22%	−0.39%	−1.18%*
			(−1.37)	(−2.93)	(−3.64)	(−2.66)	(−0.56)	(−0.87)	(−1.78)
CAR	4 (low)	205	−3.71%*	−1.71%	−1.84%***	−1.77%***	−0.50%**	0.47%	−0.13%
			(−1.72)	(−1.50)	(−2.88)	(−3.24)	(−2.34)	(0.72)	(−0.45)
Difference (Q1−Q4)		Mean	7.78%***	4.25%**	3.37%**	2.47%**	1.06%***	1.68%*	2.69%**
			[3.89]	[2.24]	[2.57]	[2.43]	[2.76]	[1.95]	[2.09]

Table 3 (continued)

Panel C: Announcements grouped by repurchase characteristics									
1. By number of days since last repurchase announcement									
CAR	≤ 3	422	−1.61%	−0.85%	−1.34%***	−1.10%***	−0.11%	0.97%**	0.70%
			(−1.43)	(−1.33)	(−2.97)	(−3.21)	(−0.46)	(2.00)	(0.52)
CAR	> 3	404	−1.38%	−1.35%	−0.55%	−0.37%	−0.17%	0.17%	0.22%
			(−0.88)	(−1.10)	(−1.09)	(−0.77)	(−0.93)	(0.89)	(0.66)
Difference (≤ 3) – (> 3)		Mean	−0.23%	0.50%	−0.79%	−0.73%	0.06%	0.80%	0.48%
			[−0.17]	[0.42]	[−0.97]	[−1.19]	[0.23]	[1.51]	[0.61]
2. By number of announcements during the preceding 3 months									
CAR	≤ 13	416	−2.51%	−1.94%*	−1.79%***	−1.08%***	−0.15%	1.31%***	1.38%**
			(−1.63)	(−1.73)	(−3.36)	(−2.60)	(−0.98)	(3.70)	(2.44)
CAR	> 13	410	−0.46%	−0.24%	−0.10%	−0.40%	−0.13%	−0.16%	−0.47%
			(−0.68)	(−0.71)	(−0.71)	(−1.40)	(−0.40)	(−0.82)	(−1.27)
Difference (≤ 13) − (> 13)		Mean	−2.05%	−1.70%	−1.69%**	−0.68%	−0.02%	1.47%***	1.85%**
			[−1.57]	[−1.43]	[−2.06]	[−1.10]	[−0.10]	[2.78]	[2.37]
3. By repurchase size (%)									
CAR	low	413	−1.38%	−1.24%*	−1.18%***	−0.80%**	−0.24%	0.26%	−0.03%
			(−1.23)	(−1.67)	(−2.69)	(−2.46)	(−1.18)	(0.60)	(−0.65)
CAR	high	413	−1.61%	−0.95%	−0.73%	−0.68%	−0.03%	0.90%**	0.95%*
			(−1.08)	(−0.76)	(−1.38)	(−1.54)	(−0.20)	(2.30)	(1.83)
Difference (low − high)		Mean	0.23%	−0.29%	−0.45%	−0.12%	−0.21%	−0.64%	−0.98%
			[0.17]	[−0.24]	[−0.55]	[−0.19]	[−0.82]	[−1.20]	[−1.25]

The CARs are measured against the market model with the estimation period from 200 to 21 days before the actual share repurchase announcement. The Patell Z-test for the significance of mean CARs is shown in parentheses. Significance for the difference between mean CARs is based on the t-test assuming unequal variances (in brackets). The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Table 4

Mean CAR grouped by the reason for initiating the SRP, as stated by the company.

	Window						
	(−120,−1)	(−60,−1)	(−20,−1)	(−10,−1)	(0,+1)	(+2,+10)	(+2,+20)
1. Stock considered undervalued							
CAR	−0.65%	0.82%	−0.68%	0.27%	0.08%	1.11%*	1.77%**
	(−0.11)	(0.88)	(−0.02)	(1.17)	(0.29)	(1.76)	(2.10)
2. Non-stated reason							
CAR	−2.01%*	−2.03%***	−1.37%***	−1.20%***	−0.19%	0.65%*	0.52%
	(−1.85)	(−2.66)	(−3.52)	(−4.05)	(−0.98)	(1.71)	(0.63)
3. Stated reason, other than stock undervaluation							
CAR	−0.05%	1.20%	0.49%	0.35%	−0.09%	−0.08%	−0.70%
	(−0.10)	(0.45)	(0.15)	(0.34)	(−0.62)	(0.00)	(−1.04)

The CARs are measured against the market model with the estimation period from 200 to 21 days before the actual share repurchase announcement. The stated reasons are provided by the company when announcing the SRP initiation. The number of announcements is 104, 576 and 146 for the first, second and third category of stated reason, respectively. The Patell Z-test for the significance of mean CARs is shown in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.

Table 5

Descriptive statistics

	CAR (0,+ 1)	CAR (+2,+10)	CAR (+2,+20)	Firm Size	B/M	CAR (−20,−1)	NDLR	NAP3M	NTDA	Repurchase size (%)
Mean	−0.001	0.006	0.005	11.667	1.591	−0.01	11.838	21.505	1.642	0.038
Median	−0.003	0.002	0.002	11.161	1.104	−0.011	3	13	1	0.014
Std. Dev.	0.037	0.076	0.112	1.93	2.441	0.118	25.996	20.02	1.356	0.069
Min	−0.15	−0.474	−0.652	8.53	0.112	−0.69	0	0	1	0
Max	0.224	0.488	0.409	16.922	16.915	0.409	247	66	7	0.848
Obs.	826	826	826	826	826	826	826	826	826	826

The CARs are measured against the market model with the estimation period from 200 to 21 days before the actual share repurchase announcement. “Firm size” is the natural logarithm of the market value of equity on the actual share repurchase announcement date. “B/M” is the book-to-market ratio measured on the actual share repurchase announcement date. “NDLR” is the number of days since the last repurchase announcement of the company, i.e., the time between the actual share repurchase announcement under consideration and the previous one, within a year. “NAP3M” is the number of the company’s announcements during the preceding 3 months, calculated by the announcements made within the last 90 days before the event day under examination. “NTDA” is the number of trading days included in the actual share repurchase announcement and reports the trading days that the firms acquired shares and are disclosed on the same day. “Repurchase size” is the percentage of repurchased shares relative to shares outstanding.

Table 6

Regression results

	CAR (0,+1)	CAR (+2,+10)	CAR (+2,+20)
Intercept	0.000	0.012	0.086**
	(0.01)	(0.55)	(2.04)
CAR (−20,−1)	−0.021	0.051**	0.046
	(−1.22)	(1.99)	(1.09)
Firm size	0.001	0.000	−0.004
	(0.17)	(−0.25)	(−1.67)
B/M	0.001***	0.002**	0.001
	(4.57)	(2.08)	(0.75)
NDLR	0.000	0.000	0.000
	(−0.80)	(−0.15)	(−0.25)
NAP3M	0.000	−0.001**	−0.001**
	(0.44)	(−2.33)	(−2.29)
NTDA	0.001	−0.001	0.001
	(0.57)	(−0.51)	(0.32)
Repurchase size	−0.002	0.050	0.034
	(−0.14)	(1.22)	(0.59)
Year FE	Yes	Yes	Yes
Obs.	826	826	826
Number of firms	69	69	69
R-squared	0.024	0.027	0.025

The CARs are measured against the market model with the estimation period from 200 to 21 days before the actual share repurchase announcement. "Firm size" is measured by the natural logarithm of the market value of equity. "B/M" is the book-to-market ratio. "NDLR" is the number of days since the last repurchase announcement of the company, i.e., the time between the actual share repurchase announcement under consideration and the previous one, within a year. "NAP3M" is the number of the company's announcements during the preceding 3 months, calculated by the announcements made within the last 90 days before the event day under examination. "NTDA" is the number of trading days included in the actual share repurchase announcement and reports the trading days that the firms acquired shares and are disclosed on the same day. "Repurchase size" is the percentage of repurchased shares relative to shares outstanding. *t*-tests are reported in parentheses. The regressions include year fixed effects. Standard errors are clustered at the firm level. The symbols **, and *** denote statistical significance at the 5% and 1% levels, respectively.

Table 7

Long-term buy-and-hold abnormal returns following actual share repurchases up to three years

		1-Year		2-Year		3-Year	
		N	Return	N	Return	N	Return
Panel A: Full sample							
Repurchase firms		701	−9.58%	612	−27.82%	519	−22.81%
Control firms			−21.15%		−45.92%		−51.99%
Difference			11.57%***		18.10%***		29.18%***
t-test			(7.97)		(9.14)		(8.87)
Panel B: Announcements grouped by firm characteristics							
1. By size quartile							
Repurchase firms	1 (small)	54	−12.83%	36	11.73%	10	49.01%
Control firms			−27.84%		−37.88%		−70.08%
Difference			15.01%**		49.61%***		119.09%**
t-test			(2.14)		(3.41)		(2.75)
Repurchase firms	2	175	−14.25%	150	−29.99%	125	−29.68%
Control firms			−17.41%		−47.08%		−43.88%
Difference			3.16%		17.09%***		14.20%**
t-test			(1.12)		(4.60)		(2.49)
Repurchase firms	3	173	−7.70%	142	−17.28%	127	10.43%
Control firms			−28.18%		−44.15%		−55.31%
Difference			20.48%***		26.87%***		65.74%***
t-test			(7.61)		(6.57)		(7.17)
Repurchase firms	4 (large)	299	−7.36%	284	−36.95%	257	−38.68%
Control firms			−18.08%		−47.21%		−53.58%
Difference			10.72%***		10.26%***		14.90%***
t-test			(4.99)		(4.14)		(5.10)

Table 7 (continued)

2. By B/M quartile							
Repurchase firms	1 (high)	147	−17.58%	128	−30.73%	95	−28.42%
Control firms			−27.09%		−44.83%		−59.06%
Difference			9.51%***		14.10%***		30.64%***
t-test			(3.27)		(3.71)		(4.71)
Repurchase firms	2	226	−9.09%	187	−19.40%	171	1.02%
Control firms			−25.26%		−46.62%		−50.72%
Difference			16.17%***		27.22%***		51.74%***
t-test			(5.99)		(7.08)		(6.67)
Repurchase firms	3	151	−11.82%	132	−28.66%	101	−33.06%
Control firms			−14.53%		−46.88%		−46.81%
Difference			2.71%		18.22%***		13.75%***
t-test			(0.87)		(4.07)		(2.96)
Repurchase firms	4 (low)	177	−1.67%	165	−34.42%	152	−39.29%
Control firms			−16.64%		−45.20%		−52.43%
Difference			14.97%***		10.78%***		13.14%***
t-test			(5.34)		(3.02)		(3.09)

Long-term returns are measured using the Barber and Lyon (1997) control-firm methodology using monthly data. The symbols **, and *** denote statistical significance at the 5% and 1% levels, respectively.

Table 8

Long-term buy-and-hold abnormal returns grouped by the reason for initiating the SRP, as stated by the company.

	1-Year		2-Year		3-Year	
	N	Return	N	Return	N	Return
1. Stock considered undervalued						
Repurchase firms	84	−5.78%	70	−16.93%	68	−25.45%
Control firms		−11.76%		−39.14%		−53.76%
Difference		5.98%		22.21%***		28.31%***
t-test		(1.58)		(3.36)		(3.25)
2. Non-stated reason						
Repurchase firms	482	−10.05%	411	−30.52%	345	−26.70%
Control firms		−20.58%		−44.71%		−47.47%
Difference		10.53%***		14.19%***		20.77%***
t-test		(5.89)		(6.15)		(6.47)
3. Stated reason, other than stock undervaluation						
Repurchase firms	135	−10.28%	131	−25.15%	106	−8.45%
Control firms		−29.05%		−53.33%		−65.55%
Difference		18.77%***		28.18%***		57.10%***
t-test		(5.91)		(6.33)		(5.42)

Long-term returns are measured using the Barber and Lyon (1997) control-firm methodology using monthly data. The stated reasons are provided by the company when announcing the SRP initiation. The symbol *** denotes statistical significance at the 1% level.

Table 9

Regression Results

	1-Year BHARs			2-Year BHARs			3-Year BHARs		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Intercept	0.307	0.312	0.354	1.109***	1.143***	1.189***	1.716**	1.752**	1.955***
	(1.33)	(1.35)	(1.59)	(2.71)	(2.89)	(2.97)	(2.52)	(2.54)	(2.85)
CAR (−20,−1)	0.183	0.185	0.181	0.143	0.161	0.133	0.568**	0.593**	0.549*
	(1.31)	(1.31)	(1.28)	(0.78)	(0.89)	(0.72)	(2.06)	(2.12)	(1.93)
Firm size	−0.018	−0.018	−0.016	−0.074**	−0.074**	−0.068**	−0.122**	−0.124**	−0.116**
	(−1.07)	(−1.08)	(−0.96)	(−2.46)	(−2.59)	(−2.37)	(−2.55)	(−2.56)	(−2.63)
B/M	−0.020	−0.020	−0.023	−0.050**	−0.050***	−0.057***	−0.062*	−0.061*	−0.087**
	(−1.33)	(−1.33)	(−1.51)	(−2.49)	(−2.65)	(−2.69)	(−1.86)	(−1.87)	(−2.23)
NDLR	0.000	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.000
	(0.41)	(0.41)	(0.46)	(0.61)	(0.46)	(0.65)	(0.06)	(−0.02)	(0.08)
NAP3M	0.004**	0.004**	0.004**	0.004**	0.005**	0.004**	0.009**	0.010**	0.009**
	(1.99)	(2.01)	(2.03)	(2.07)	(2.29)	(2.11)	(2.13)	(2.28)	(2.26)
NTDA	−0.016	−0.024	−0.025	−0.036	−0.076**	−0.053*	0.007	−0.032	−0.029
	(−0.97)	(−1.22)	(−1.34)	(−1.52)	(−2.20)	(−1.91)	(0.25)	(−0.69)	(−0.74)
Repurchase size	−0.131	−0.107	−0.185	−0.338	−0.086	−0.404	−1.642	−1.390	−1.786
	(−0.28)	(−0.22)	(−0.38)	(−0.39)	(−0.09)	(−0.44)	(−1.29)	(−0.99)	(−1.34)
Stated reason - undervaluation		0.056			0.290*			0.282	
		(0.68)			(1.77)			(1.46)	
Non-stated reason			−0.077			−0.158*			−0.317*
			(−1.30)			(−1.77)			(−1.94)

Table 9 (continued)

Obs.	701	701	701	612	612	612	519	519	519
Number of firms	65	65	65	60	60	60	53	53	53
R-squared	0.059	0.061	0.067	0.122	0.147	0.141	0.157	0.169	0.190

Long-term abnormal returns (BHARs) are measured using the Barber and Lyon (1997) control-firm methodology using monthly data. "Firm size" is measured by the natural logarithm of the market value of equity. "B/M" is the book-to-market ratio. "NDLR" is the number of days since the last repurchase announcement of the company, i.e., the time between the actual share repurchase announcement under consideration and the previous one, within a year. "NAP3M" is the number of the company's announcements during the preceding 3 months, calculated by the announcements made within the last 90 days before the event day under examination. "NTDA" is the number of trading days included in the actual share repurchase announcement and reports the trading days that the firms acquired shares and are disclosed on the same day. "Repurchase size" is the percentage of repurchased shares relative to shares outstanding. *t*-tests are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5% and 1% levels, respectively.