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Abstract

This paper examines open market stock repurchases by Greek firms, using a unique dataset covering the period 2000-2010. Positive and statistically significant cumulative average abnormal returns are observed around the date of repurchase program authorizations. Investors react more to authorizations of initial programs than to subsequent programs. After the implementation of the EU Market Abuse Directive in Greece, investors react more favorably to buyback announcements. The reason for initiating a repurchase program, as stated by the companies, is directly related to the market valuation of the program. The paper identifies the characteristics of firms that announce dividend changes, given the decision to initiate a stock buyback. The regression results appear to support the hypothesis of signaling undervaluation.

JEL classification: G14, G15, G35

Keywords: Share repurchases, regulation, repurchase motives, signaling undervaluation.

1. Introduction

A strand of the literature on stock repurchases has shifted its focus away from the US market, and towards other countries with different institutional and legal characteristics. The obvious motive for the shift is to identify factors affecting investors' reaction to buyback announcements, such as the degree of investor protection, transparency, rules of conduct and other legal idiosyncrasies.¹

In Europe, there is an ongoing effort to revise the rules governing capital markets. The Market Abuse Directive 2003/6/EC (MAD) is a landmark that specifies characteristics such as the aims of stock repurchase programs, the repurchase price range, and the volume of daily transactions. It also specifies that every transaction that occurs within a stock repurchase program (SRP) must be published immediately. This is similar to the practice in the USA where companies are required to report the number of shares acquired each month, the average purchase price per share, and the maximum number of shares that can still be bought through the program. However, in the USA, this information is announced at a later time in quarterly financial statements, and although these retroactive disclosures increase transparency in the long run, informing investors about the companies' most recent actions does not occur immediately (Simkovic, 2009).

Regardless of the implied strictness of the rules on stock repurchases in Europe, the MAD was incorporated in the legal system of each state at different times (Christensen et al., 2016), and the impact of its implementation on the capital markets differed, as shown by Andriosopoulos and Lasfer (2015) in their study of France, Germany and the UK. Thus, despite

¹ A partial literature includes: Andriosopoulos and Lasfer (2015) for France, Germany and UK; González and González (2004) for Spain; Ginglinger and L'her (2006) for France; Ikenberry et al. (2000) for Canada; Kang et al. (2011) for Japan; Otchere and Ross (2002) for Australia; Rau and Vermaelen (2002) for the UK; Von Eije and Megginson (2008) for Europe.

the increasing degree of legal unification in the EU, disparities remain, and they can only be brought out by individual market studies.

In Greece, stock repurchases have been allowed since 1993. Acquired shares can be resold to the public, distributed to personnel, or canceled within three years.² In contrast to the USA, where buyback decisions are made by the board of directors, SRP authorizations in Greece are made by shareholders during shareholder meetings and all SRP-related information must be posted on the Daily Official List of the Athens Stock Exchange, notwithstanding prompt publication on the companies' website and other networks.

The present study examines in depth the open market share repurchases in Greece using a hand-collected dataset. More specifically, it investigates the stock market's reaction to announcements of SRP authorizations, the factors influencing the size of this reaction, and the real economic motives driving companies to initiate repurchase programs. The dataset covers the whole population of repurchase announcements from 2000 to 2010 by companies listed on the Athens Stock Exchange, that is, a total of 560 programs.

The paper provides further evidence on stock repurchases in a unique market among the European Union equity markets. In the period under examination, the Greek stock market index was initially correcting after the bubble of 1999 and fluctuating a great deal due to various domestic and international factors for the rest of the 2000s. Therefore, the Greek stock market in the above period provides a diverse economic and legal environment to study the behavior of firms and investors regarding repurchases in Europe, complementing the existing evidence from other countries.

Positive abnormal returns are observed around the SRP authorization dates. Using standard event study methodology, we find that the cumulative average abnormal return for the event window $[-1, +1]$ is approximately 1.03% and is statistically significant at the 0.1% level.

² More regulatory details are provided in the next section.

The results are similar to those in other European countries. For example, Andriosopoulos and Lasfer (2015) find a 0.80% abnormal return for France, 2.32% for Germany, and 1.68% for the UK, whereas González and González (2004) find an abnormal return of 1.74% for Spain.

There are many factors affecting the size of the positive reaction. We examine the frequency of announcements, the changes in the legal framework, the company-stated reason for approving repurchases, the company's investment opportunities, and the decision to change the distributed dividend on the date of the repurchase program authorization.

The factors above are linked to the existing literature. Jagannathan and Stephens (2003) find that the market reaction is stronger for infrequent programs. Andriosopoulos and Lasfer (2015) classify the programs as initial and subsequent and conclude that the market reaction is stronger for the initial programs. For the subsequent programs, a positive abnormal return is observed that is smaller in size but statistically significant, and hence it is an indication that the announcement was not completely expected by the market. We follow the classification of Andriosopoulos and Lasfer (2015) with some modifications to fully exploit the unique nature of our data, and we find that the results are similar in the Greek market.

Stricter regulations regarding the approval of repurchase programs, their execution, and the information provided to the investing public increase the volume of stock repurchases (Grullon and Michaely, 2002; Siems and De Cesari, 2012) and the market liquidity (Christensen et al., 2016; Diamond and Verrecchia, 1991). Andriosopoulos and Lasfer (2015) test the hypothesis that the implementation of the MAD would reduce information asymmetries and lead to a decrease in the market reaction. Their results do not support this specific hypothesis for Germany and the UK, two countries of different legal origin. In Greece, the EU Market Abuse Directive was incorporated into the Greek Law with Law 3340/2005 of May 2005. We observe an increase in the market reaction to SRP announcements after the implementation of the MAD.

Greek companies are required to publicize the reason for the authorization of an SRP on the date on which such an authorization occurs. The analysis of this special information shows that the stated reason for SRP authorizations affects the investors' reaction.

Lie (2000) and Grullon and Michaely (2004) find that the market reaction around the announcements of stock repurchases is stronger for companies with limited investment opportunities. As a measure for estimating the limited investment opportunities they use the lower than unity value of Tobin's q ratio. We find similar results for the case of Greece.

The present study also addresses the choice between dividend distribution, and stock repurchases by companies. In the related literature, there are two basic theories: The substitution hypothesis (Allen et al., 2000; DeAngelo et al., 2000; Grullon and Michaely, 2002), and the flexibility hypothesis (Guay and Harford, 2000; Jagannathan et al., 2000). The substitution hypothesis suggests that repurchases use capital, that would otherwise have been used for dividends. According to the flexibility hypothesis, stock repurchase and dividend distribution are employed at different times, and from companies with different characteristics. The present study examines whether companies alter the distributed dividend concurrently with the approval of repurchases depending on company characteristics. In addition, the market reaction to repurchase announcements is computed, considering the dividend decision.

Identifying the true reason for which companies announce stock buybacks is a difficult issue. In the spirit of Grullon and Ikenberry (2000), it is useful to distinguish between the question "What do companies state as a reason for announcing an SRP?" and the question "What is the economic reason that motivates companies to announce SRPs?" Publicizing the real motive is not always an easy proposition either because the law does not foresee the specific reason or because it entails indirect costs to the firm. An example is the case of distributing free cash flows. It would be particularly difficult for a company to announce that there is a high agency cost, and that the shareholders desire to remove the surplus liquidity

from the company (agency costs of free cash flows). It would also be equally difficult to announce to investors that there are no foreseeable investments with positive net present value, and that the distribution of liquidity is chosen so that they can invest these amounts in a better way elsewhere.

In this paper, we study both questions mentioned above. After finding that the stated reasons affect the magnitude of the market reaction, we attempt to find the real economic reason that motivates share repurchase programs.³ Two leading theories are examined: The signaling hypothesis (Comment and Jarrell, 1991; Lie and McConnell, 1998; Vermaelen, 1981), and the free cash flow hypothesis (Grullon and Michaely, 2004; Jensen, 1986). Our results support the signaling hypothesis.

The rest of the paper is structured as follows. The next section presents the theoretical framework along with the hypotheses for testing. Section 3 describes the data. The empirical results are in Section 4, and Section 5 concludes.

2. Theoretical background and hypotheses for testing

2.1. Market reaction and frequency of repurchase program authorization

The signaling hypothesis in stock repurchases has two aspects. According to the first, if a company expects positive changes in its future profitability, it can convey this information to the market through an SRP, which is considered a credible signal (Grullon and Ikenberry, 2000). Companies that use share repurchases as an indication of future improvements in profits are likely to move from a growth phase to a more mature phase. According to the hypothesis of signaling favorable expectations, repurchase announcements should be followed by positive

³ In the literature there are alternative (and not necessarily mutually exclusive) motives for initiating SRPs, such as dividend substitution (Grullon and Michaely, 2002), capital structure adjustment (Bonaime et al., 2014; Lie, 2002), option exercise in stock option plans (Bens et al., 2003; Fenn and Liang, 2001; Kahle, 2002), and takeover defense (Denis, 1990).

price changes, positive news for the profitability or the cash flows, and positive changes in the market's expectation about future profitability.

The second aspect of the hypothesis is that the company uses share repurchase programs as a means of transmitting a signal that its share is undervalued. Therefore, if managers believe that the economic value of the stock exceeds its market value, they can disclose this information via stock repurchases. The hypothesis of signaling undervaluation predicts that after the announcement that a company intends to buy back shares, positive abnormal returns should be expected. In Greece, during the period 2000-2010, the most common company-stated reason for approving SRPs is to support the stock price, in case the stock is considered undervalued.

Jagannathan and Stephens (2003) classify SRPs in terms of frequency and relate them to company characteristics.⁴ They find that the market reaction is positive and statistically significant in all categories but that the market reaction is stronger for infrequent repurchases. They also suggest that signaling undervaluation is a possible motive of repurchases only for the announcements of infrequent repurchases. Andriosopoulos and Lasfer (2015) examine the signaling hypothesis by focusing on the periodicity of repurchases. More specifically, they test whether initial programs provide information to the market by reducing information asymmetries and whether the subsequent are possibly just routine without more information. The authors use a data set from 1997 to 2006 containing announcements of repurchase approvals from France, Germany, and the UK. They find that the market reaction is positive and statistically significant in both initial and subsequent announcements (indicating that the announcements are not completely expected by the market) but that the proportion of abnormal returns is higher for initial programs.

⁴ The categorization by Jagannathan and Stephens (2003) is as follows: During a five-year period, the first program is classified as infrequent, the second as occasional, and the third as frequent.

We follow the categorization of Andriosopoulos and Lasfer (2015) to examine the market reaction to initial and subsequent SRPs in Greece. With the following hypothesis we examine whether the announcements contain a different signal to the market (or a signal of different size) depending on their periodicity.

H1: The market reaction to repurchase announcements is stronger for initial programs than it is for subsequent programs.

2.2. Changes in the legal and regulatory framework

The legal framework on stock repurchases varies from country to country. For example, in France, repurchases were rather rare before 1998, not because the law prohibited it, but because the procedures required were deterring. In Germany, repurchases were prohibited before 1998 (Vermaelen, 2005). In the UK, repurchases have been allowed since 1981, and all shares bought had to be cancelled; however, since 2003, retention of shares has been allowed for the purpose of sale, distribution to personnel or cancelling.

The European Parliament Directives aim at harmonizing market rules across member states. According to Article 2 of Directive 2003/6/EC, it is forbidden for individuals possessing confidential information to use such information to acquire or sell financial instruments on their own behalf or on behalf of others. This prohibition does not apply to stock repurchase programs or to transactions for stabilizing a financial instrument, as long as the programs are executed according to Regulation 2273/2003 of the European Parliament. The latter specifies the conditions to be met by buy-back programs, and disclosure requirements, including the aims of the stock repurchase programs, the allowed repurchase price range, and the volume of daily transactions. It also requires that every transaction carried out within the framework of an SRP must be publicized by the end of the seventh daily session.

Siems and De Cesari (2012) report that when companies carry out SRPs in line with the European directives, they are protected from possible penalties that could result from market manipulation. Therefore, Regulation 2273/2003 and Directive 2003/6/EC should lessen some companies' reluctance to buy-back stock. Indeed, in studying nine European countries, they find that the proportion of companies that repurchase shares increases after the enactment of MAD. Their results agree with those of Grullon and Michaely (2002) in the USA, who find that the SEC Rule 10b-18 has led to a significant increase in the volume of repurchases.

Christensen et al. (2016) examine how market liquidity is affected by the implementation of Directive 2003/6/EC and Directive 2004/109/EC. The latter, known as the Transparency Directive, concerns disclosure and reporting requirements on firms, aiming at the harmonization of transparency conditions regarding information about issuers with securities traded in a regulated market. Reducing insider trading or enhancing transparency reduces information asymmetries between investors and hence increases the liquidity of a firm's securities (Diamond and Verrecchia, 1991). Using data from 26 European countries, Christensen et al. (2014) conclude that stricter rules increase market liquidity.

Andriosopoulos and Lasfer (2015) study the market reaction after the adoption of the MAD using data from France, Germany, and the United Kingdom. They hypothesize that the implementation of this specific directive will lead to an increase in liquidity (Siems and De Cesari, 2012) and will reduce the cost of capital (Christensen et al., 2016) and the information asymmetries; hence, the market reaction will be less than in the period before MAD. However, they find that this hypothesis is not supported for Germany and the UK, although in France the opposite result was obtained.

A very important regulatory change has taken place in Greece during the period under examination, namely, the implementation of European Directive 2003/6/EC in May 2005 (Law

3340/2005). Following Andriosopoulos and Lasfer (2015), we test whether the market reaction will be lower after the incorporation of Directive 2003/6/EC in the national laws.

H2: The stock market reaction to share repurchase programs is lower after the implementation of the Market Abuse Directive in Greece (2005).

2.3. Company-stated reasons for authorizing repurchases

In Greece, an SRP has to be authorized by the shareholders in a general meeting when the terms and the purposes of the program are also determined. The main terms involve the maximum number of shares that can be bought (which cannot exceed 10% of all shares outstanding), the program duration (a maximum period of 12 months before August 2007 and 24 months from then on), and the repurchase price range.

The main reasons for authorizing SRPs, as stated by the companies on the date of the repurchase authorization for the period under examination, are market price support in case of undervaluation, distribution of shares to employees, and reduction of share capital.

As mentioned earlier, the real motive of firms is not always easy to reveal. With the following hypothesis we attempt to use the information provided by the company itself at the time of approval of the program and examine whether the magnitude of the investors' reaction changes, depending on the motive stated for initiating the repurchase. It is notable that some companies avoid stating a specific reason, and report only that the repurchases will be conducted according to the law that is currently in effect.

H3: The company-stated reason for a program initiation affects the strength of market reaction.

2.4. Market reaction and investment opportunities

Grullon and Michaely (2004) suggest that stock repurchases may be connected to the transition of a company from a stage of high growth rates to a stage with lower growth rates. When the

company enters a maturity phase, profitable investment options are reduced. As growth opportunities become limited, company assets in place play a greater role in the determination of the firm's value, a fact that reduces the systematic risk of the company, and consequently its cost of capital (Berk et al., 1999). The proportion of profits that are reinvested is reduced, and the size of free cash flows increases, which in turn increases the possibility that the firm's management may choose projects with negative net present value.

Companies with free cash flows are likely to invest in projects that reduce firm value. This happens because management executives sometimes are interested more in increasing the size of the company at the expense of profitability and firm value maximization (Grullon and Ikenberry, 2000). The company often opts to distribute excess cash to the shareholders either in the form of dividends or through programs of share repurchases (Easterbrook, 1984; Jensen, 1986). Jensen (1986) argues that the market is in a position to know that the company goes through the maturity stage, and has limited investment opportunities; therefore, announcements of SRPs signal the reduction of free cash flow in the hands of management, i.e., the reduction of agency cost.

Grullon and Ikenberry (2000) suggest that even if there is no agency problem, it is preferable to distribute the free cash flows to shareholders through a repurchase program if the firm does not have profitable opportunities. The idea is that the shareholders could use this capital in other investments outside of the company.

Lie (2000) and Grullon and Michaely (2004) find that the market reaction around repurchase announcements is greater for companies with limited investment opportunities as measured by Tobin's q . (Tobin's q is the market value of equity plus the book value of debt divided by the book value of assets, and is referred in our paper as TQ .) We examine the same question with the following hypothesis:

H4: When Tobin's q is low, the market reacts more favorably during the announcement of stock repurchase programs.

2.5. The interaction between repurchase announcements and dividend announcements

Share repurchases is an alternative way of transferring liquidity from the firm to its shareholders and has led to an extensive literature on the relation of repurchases and dividends.⁵

Our interest is focused on two well-known theories about the choice between dividend distribution and stock repurchase, namely, the substitution hypothesis and the flexibility hypothesis. Grullon and Michaely (2002) examine a sample from 1972 to 2000 and find that after SEC Rule 10b-18, share repurchases increase significantly. According to their results, repurchases are financed with funds that otherwise would have been used for dividends. Allen et al. (2000), and DeAngelo et al. (2000) examine the substitution hypothesis, but their results do not support the validity of this theory.

Jagannathan et al. (2000) introduce the flexibility hypothesis. They argue that share repurchases and dividend distribution are used at different times and from companies with different characteristics. Using a USA sample, they find that repurchases are affected by economic cycles but that dividends follow a steadily increasing course over time. In addition, repurchases are used by companies with greater "temporary" non-operating cash flows, whereas dividends are paid by companies with higher "permanent" operating cash flows. This result is also corroborated by Guay and Harford (2000).

We differentiate the usual question about the companies' choice regarding repurchases and dividends. More specifically, we use the set of firms that have already approved programs of share repurchases and examine whether there is a concurrent change in their dividend policy.

⁵ See Allen et al. (2000), Von Eije and Megginson (2008), Grullon and Michaely (2002), Guay and Harford (2000), Howe et al. (1992), Lee and Rui (2007), and Lie and Lie (1999).

Among other things, we examine if the size of the company, the level of cash equivalents, the operating income, and the market to book value ratio of the companies authorizing SRPs affect their decision to change the dividend distributed compared to the year before. In addition, we compute the market reaction to repurchase announcements, considering the dividend decision.

H5: The market reaction to announcements of repurchase program authorizations is affected by the company's dividend decisions.

3. The data

We examine the whole population of announcements of SRP authorizations in the Greek market from June 2000 to December 2010.⁶ The SRP data were manually collected from company announcements posted in the Daily Official List of the Athens Stock Exchange. The data included the date of authorization, the maximum number of shares to be bought, the program duration, and the reason for initiating the program. This information has been cross-verified from other electronic sources as well. Stock price and accounting data were extracted from Thomson Reuters DataStream and Thomson Reuters WorldScope, respectively.

During the examination period, 615 programs of share repurchase were authorized, representing all Greek SRPs in the period under study. We exclude 42 programs because the company had both common and preferred shares on the repurchase date and 2 because the date of approval could not be determined with accuracy. We also exclude 11 programs of companies for which there are insufficient data available on the stock price or its financial statements. Our final set consists of 560 announcements of open market SRP authorizations.

⁶ Repurchase programs must be authorized by the shareholders in a general meeting. The board of directors proposes the agenda topics, and publicizes them at least 20 days ahead of the meeting. Our data start in June 2000 when the Daily Official List of the Athens Stock Exchange became available on the Exchange's website.

4. Empirical results

4.1. The stock market reaction around the program authorization date

We use the standard event study methodology to estimate the cumulative abnormal return (CAR) around the SRP authorization dates. The event day (day "0") is the day of the general meeting that authorized the repurchase program. As stated before, Greek companies are required to publicize promptly the decisions of their general meetings; thus, investors are immediately notified, a fact that is also reflected in the stock price. The market model is used as a benchmark model, with the estimation period ranging from 200 to 21 days before the announcement $[-200, -21]$, whereas the event window begins 20 trading days before the announcement date and ends 20 days after the announcement $[-20, +20]$.⁷ Market returns are based on the Athens Stock Exchange General Index.

We examine the statistical significance using the Patell Z test.⁸ We find that the market reaction on the date of the repurchase program authorization is positive and statistically significant, as shown by the Cumulative Average Abnormal Return (CAAR) in Table 1. Our results are similar in size to those obtained for other European countries (González and González, 2004; Andriosopoulos and Lasfer, 2015).

In Figure 1, we observe that the CAAR increases from day -20 . A possible explanation is that the board of directors sets the topics of the general meeting agenda and publicizes them at least twenty days before the actual session of the general meeting. Thus, investors are notified of the company's intention to start a repurchase program before the authorization date. It is noteworthy that during the examination period from June 2000 to December 2010, we

⁷ Similar results were obtained when we used the market-adjusted return model, the mean-adjusted return model, and the market model with the Scholes-Williams beta estimation method. The results are available from the authors upon request.

⁸ For robustness, we also use the standardized cross-sectional test and the generalized sign test. The results are qualitatively the same.

have identified only two cases, in which a stock repurchase was proposed as a topic in the agenda but not eventually approved.

[Insert **Table 1** here]

[Insert **Figure 1** here]

4.2. Factors influencing the size of the market reaction

4.2.1. Market reaction depending on the frequency of share repurchase programs

Jagannathan and Stephens (2003), and Andriosopoulos and Lasfer (2015) report, respectively, that “repurchases authorized in infrequent time intervals cause a stronger positive reaction” and that “initial announcements contain more information”. We proceed with testing the hypothesis that the market reaction is greater for the initial programs than it is for the subsequent programs, taking into account that in 2007, the revised corporation law changed the maximum duration of repurchase programs.

To classify a program as initial, we make sure either that it is the first for the company in the study period or that it is authorized at least one year after the expiration of the previous program.⁹ We classify as subsequent or following those programs starting just after the expiration of the previous program. More specifically, a program is classified as initial in the following cases:

- a) If it is the first program of the company during the period under study.
- b) If it has been approved at least two years after the previous repurchase program. This condition applies for programs before August 2007 because the maximum duration of the programs was 12 months.

⁹ The results do not change qualitatively, if we allow a three-year period to separate the two classes. The results are available from the authors upon request.

- c) If it has been approved at least three years after the previous repurchase program. This condition applies for programs after August 2007 because the maximum duration of the programs was 24 months.

Of the 560 programs, 254 (45%) are classified as initial and 306 (55%) are classified as subsequent. As shown in Table 2, the investors' reaction is stronger for the initial programs for each event window. The results are similar to those of Andriosopoulos and Lasfer (2015), who find that the initial announcements provide a stronger signal to the market. Overall, we can say that our results support Hypothesis **H1**.

[Insert **Table 2** here]

4.2.2. The effect of changes in the legal and regulatory framework on the market reaction

We focus on whether the law changes affect the way the market reacts to announcements of authorization of repurchase programs. More specifically, we study the effect of Law 3340/2005 (implementing MAD and Rule 2273/2003 in Greece) on cumulative abnormal returns which are observed around the date of SRP authorization. According to **H2**, the market reaction is to be lower after the legal changes.

The dates the law came into force define two time-periods. In the first period, before Law 3340/2005, there are 307 programs representing 55% of the total. In the period after Law 3340/2005, there are 253 SRPs (45%). We observe an increase in the market reaction after the implementation of the MAD, as shown in Table 3, and, therefore, Hypothesis **H2** is not accepted.

[Insert **Table 3** here]

Siems and De Cesari (2012) suggest that there are two arguments regarding the implementation of Directive 2003/6/EC and the volume of programs. First, this specific

directive in conjunction with Rule 2273/2003 imposes restrictions in the way of SRP execution, a fact that could lead to companies' reluctance to initiate such a program. In contrast, a safe harbor provision is introduced concerning market manipulation, which could allay companies' reservations and motivate them towards share repurchases. Their results are consistent with the second argument.

In the spirit of Siems and De Cesari (2012), we could argue that after the incorporation of Directive 2003/6/EC in Greek Law, investors evaluate more favorably a stock repurchase program because the new framework makes it less likely that a program will be used for market manipulation but rather as a means of achieving various goals of the company, such as signaling to the market, the distribution of free cash flows, or dividend substitution.

4.2.3. Stated reasons for SRP authorizations

We can classify the company-stated reasons for authorizing an SRP in three categories to better examine their importance in the investors' reaction: First, companies announce that supporting the stock price if it is perceived as undervalued is the reason for authorizing an SRP in 216 cases (39%). Second, the reason is not explicitly mentioned in 305 cases (54%), and the company simply announces that it will carry out stock repurchases according to existing law. Third, in 39 cases (7%), the programs are announced with a variety of reasons for authorization such as cancelling shares to reduce the company share capital, selling shares back in the open market, distributing shares to employees, or a mixture of these reasons (e.g., a fraction of the shares is cancelled, and the rest is distributed to employees).

As shown in Table 4, the investors' reaction is positive and statistically significant to the SRP announcements, although there are qualitative similarities and differences in the market reaction. In the first two categories, it is implied that the companies will proceed to repurchases depending on future conditions (undervaluation, or whatever permitted by the

law), and the market reacts positively. In the third category, the investors realize that the specific announcements show a greater commitment of the company to carry out the programs, i.e., the signal is perceived as more credible. Thus, the market reaction is positive but stronger than it is in the other two categories. Hypothesis **H3** is accepted.

[Insert **Table 4** here]

4.2.4. Market reaction relating to investment opportunities

Following Lie (2000) and Grullon and Michaely (2004), we examine whether companies with low investment opportunities experience a stronger market reaction around repurchase announcements than other companies. If Tobin's q is less than one, it is an indication of limited investment opportunities.

Indeed, we observe that the cumulative average abnormal return is high and statistically significant in cases where Tobin's q is lower than one, as shown in Table 5. The results are consistent with Hypothesis **H4** that the market reacts more favorably to the announcement of repurchase programs when companies' investment opportunities are limited.

[Insert **Table 5** here]

4.2.5. Announcements of SRP authorizations, and announcements of dividends

The evolution of company preferences between repurchases and dividends over time is shown in Figure 2. We observe that the number of companies that choose exclusively dividends as a payout method declines for the whole period. The number of companies choosing share repurchase programs is relatively stable until 2008, when there is an obvious increase. In 2008, the stock market falls dramatically, and it appears that companies become more hesitant to approve a dividend distribution. Apparently, companies prefer share repurchases (at least temporarily), possibly because SRPs are not binding commitments and offer the flexibility to

defer the decision on cash distributions and on the size of such distributions. In addition, we note that the number of companies distributing a dividend and at the same time having an active SRP, is higher than the number of companies that have authorized repurchases up to 2008. From 2009, there is a reduction in the number of firms in this category, which is similar to the reduction in the number of companies distributing only dividends. Overall, the number of companies that choose a payout in any form is continuously reduced in the period under study.

[Insert **Figure 2** here]

We now focus on the relationship between company characteristics, and choice of distribution method. We allocate the programs under study in three categories, depending on the dividend that is decided during the general meeting, which also authorized the repurchase program. The first category is identified by dates, on which the companies authorized a stock repurchase program and did not change the dividend compared to the year before. The second category includes dates on which the companies authorized a repurchase program, and at the same time decided to distribute a reduced dividend in comparison with the year before. The third category includes dates on which companies authorized a repurchase program and at the same time decided to distribute an increased dividend compared to the year before.

The company characteristics we examine are denoted as follows: *SIZE* is the natural logarithm of the company market capitalization, the latter measured in million euro. *ASSETS* is total assets, *OPINC* is operating income, and *CASHEQ* is cash and cash equivalents, all measured in thousand euro. *MTBV* is the ratio of market to book value of equity, *LEV* is a leverage ratio of total debt to total assets, *INC* is operating income to total assets, and *CASH* is the ratio of cash and cash equivalents to total assets. All variables are calculated at the end of the year preceding the repurchase announcement.

Apparently, as shown in Table 6, most companies choose not to announce a dividend change at the same time with the repurchase program authorization. Companies that approve a dividend reduction at the same time with a repurchase program authorization are not smaller in size and their operating income to total assets are no less than the average of the companies authorizing repurchase programs. However, they report significantly lower cash and equivalents than the average. Companies that approve a dividend increase and a repurchase program during the same general meeting are companies with greater size, higher operating income than the average of companies announcing SRPs, and lower financial leverage compared to the other two categories.

[Insert **Table 6** here]

We now turn to the market reaction to announcements of repurchases associated with changes in dividend. Grullon and Michaely (2002) find that for companies with repurchase programs, the market reaction to dividend cuts is almost nil. For companies that do not have repurchase programs, the announcement of a dividend cut is followed by a significant price drop. Similarly, we observe that when there is an authorization of a dividend cut at the same time as a program authorization, the market reaction is not significantly different from zero in a short period around the announcement date. When there is an announcement of a dividend increase on the same date, the reaction is higher than in the case where the dividend level remains the same. As shown in Table 7, the cumulative average abnormal return is statistically significant in both cases. Overall, Hypothesis **H5** holds.

[Insert **Table 7** here]

4.3. The drivers of market reaction to SRP authorizations

We use regression analysis to examine the aforementioned Hypotheses **H1-H5** and two theories regarding the real motives of approving repurchase programs under the assumption of signaling undervaluation and the hypothesis of distributing free cash flows. We estimate the following OLS model:

$$CAR_i = \beta_0 + \beta_1 INIT_i + \beta_2 PR_i + \beta_3 L + \beta_4 RPS_i + \beta_5 RO_i + \beta_6 PCT_i + \beta_7 TQ_i + \beta_8 SIZE_i \\ + \beta_9 MTBV_i + \beta_{10} LEV_i + \beta_{11} CASH_i + \beta_{12} FCF_i + \beta_{13} DIVINC_i + \beta_{14} DIVDEC_i + \varepsilon_i$$

where i represents the program, and CAR is the cumulative abnormal return for seven days around the announcement of the repurchase program, i.e., $CAR[-3, +3]$.¹⁰

The independent variables are defined and justified as follows:

INIT: A binary variable taking the value 1 if the program has been classified as initial and 0 otherwise. We include this variable to test Hypothesis **H1** that the market reaction is greater for the programs classified as initial than subsequent programs.

PR: The previous return, i.e., the cumulative abnormal return observed before the program announcement, measured by $CAR[-200, -21]$.¹¹

L: A binary variable taking the value 1 if the program was approved in the period after the enactment of Law 3340/2005 and 0 otherwise. The variable L is used in order to test Hypothesis **H2**, whether the legislative changes affect the market reaction.

RPS: A binary variable taking the value 1 if the company mentions price support in case of undervaluation as the reason for authorizing the program and 0 otherwise.

¹⁰ Other regression models with a different dependent variable ($CAR[-1, +1]$ and $CAR[-5, +5]$) yield qualitatively similar results. Available from the authors upon request.

¹¹ Andriosopoulos and Lasfer (2015) use the variable “Pre-One-Year Returns”, which denotes the cumulative abnormal returns 1 year before the announcement date, and Kang et al. (2011) use a variable “Past 1-year excess return”, which denotes a buy-and-hold return from day -205 to day -5 , net of an equally weighted market return.

RO: A binary variable taking the value 1 if the company mentions a specific reason for authorizing the program, different from stock price support and 0 otherwise. The variables *RPS* and *RO* are used to test Hypothesis **H3**, namely that the company-stated reason of approving a repurchase program affects the market reaction.

PCT: The maximum shares for repurchase in the program as a percent of total shares outstanding.

TQ: Tobin's q , defined in Section 2.4. This variable is used to test the Hypothesis **H4** that companies with low investment opportunities experience a stronger market reaction.

SIZE, *MTBV*, *LEV* and *CASH* have been defined in Section 4.2.5.

FCF: Free cash flow per share.

DIVINC: A binary variable taking the value of 1 if on the date of program authorization an increase in dividend was approved compared to the year before and 0 otherwise.

DIVDEC: A binary variable taking the value of 1 if on the date of program authorization, a decrease in dividend was approved compared to the year before and 0 otherwise. The variables *DIVINC* and *DIVDEC* are used to test Hypothesis **H5**, that the change in the distributed dividend concurrently with the authorization of repurchase program affects the investors' reaction.

For the accounting data, we have selected the annual value for the year before the repurchase announcement. Table 8 shows descriptive statistics of the continuous variables.

[Insert **Table 8** here]

According to the signaling undervaluation hypothesis we expect the following:

- a) The coefficient of *INIT* will be positive because it is expected that the specific announcements provide positive information to the market.

- b) The coefficient of *PR* will be negative because a low value of this variable is an indication that the stock is underpriced and that the market reaction will be stronger.
- c) The coefficient of *PCT* will be positive because the larger repurchases are likely to be an indication of undervaluation (Kang et al., 2011).
- d) The coefficient of *SIZE* will be negative because in smaller companies, it is more likely to have information asymmetries, which lead to a greater market reaction (Kang et al., 2011).
- e) The coefficient of *MTBV* will be negative because companies with low ratio of market to book value of equity are likely to be undervalued; hence, we expect that a low *MTBV* level would cause a greater market reaction.

According to the free cash flow hypothesis we expect the following:

- a) The coefficient of *PCT* will be positive because a higher percentage of cash distribution might mean a mitigation of agency conflicts.
- b) The coefficient of *TQ* will be negative because this ratio provides an estimate of the company's investment opportunities, and thus, the market reaction around repurchase announcements is stronger for companies with limited opportunities (Grullon and Michaely, 2004).
- c) The coefficient of *CASH* will be positive, because this variable indicates the extent of the company's cash flows (Dittmar, 2000; Grullon and Michaely, 2004; Kang and al., 2011).
- d) The coefficient of *FCF* will be positive because when a company with high free cash flows starts a repurchase program, investors might interpret it as a reduction in agency costs (Grullon and Michaely, 2004; Jensen, 1986).

To avoid giving extreme observations a heavy weight in the regressions, the smallest and largest 1% of the observations of the continuous variables are set equal to the next largest or smallest values of the variables (“winsorizing” at the 1st and 99th percentile).¹²

Table 9 shows the regression results. In the Models 1-5, the reported *p*-values in parentheses below the coefficient estimates are clustered by firm (Andriosopoulos and Lasfer, 2015; Kang et al., 2011). The coefficient of initial programs is positive and statistically significant at 5%. The maximum percentage of shares for repurchase does not seem to affect the market reaction. This result is rather expected because most programs (58%) announce the maximum possible number of shares for repurchase. The coefficient of *SIZE* is negative and statistically significant, as predicted by the signaling hypothesis.

The coefficient of *MTBV* is not statistically significant. This result suggests that investors are not interested in whether the shares are undervalued or not on the authorization date. This agrees with Ikenberry and Vermaelen (1996), that an SRP provides companies with the option to repurchase stock within a period of several months, as the true value of the stock diverges from its market value during the program execution. Thus, the program can be considered valuable, even if prices are fair at the time of the announcement.

The coefficient of *PR* is not negative, as predicted by the signaling theory, nor is it statistically significant. This specific result shows that shares of companies announcing SRPs do not exhibit any signs of undervaluation on the announcement date.

It is also interesting that the dividend reduction does not affect the market reaction to announcements of SRPs, but the dividend increase has a positive effect. The dividend increase could be interpreted as also signaling management optimism for the company’s prospects, thereby magnifying the signal from SRP authorizations. No variable related to the free cash flow hypothesis is statistically significant.

¹² The results do not change qualitatively if the models are winsorized at the 2nd and 98th percentile.

The variables not shown (*L*, *RPS*, *TQ*, and *LEV*) were not statistically significant in any of the models.

Overall, there are indications that the signaling undervaluation hypothesis is supported, but the hypothesis of free cash flow is not supported.

In order to confirm that our results are robust to the clustering of stock repurchases on event dates and the clustering of firms, we use alternative techniques to estimate the standard errors and we obtain similar results. We compute standard errors that are adjusted for heteroscedasticity and autocorrelation according to Newey and West (1987). Finally, we also cluster the residuals along two dimensions, that is, by firm and by day, following the two-way clustering technique proposed by Petersen (2009) and Thompson (2011).

[Insert **Table 9** here]

5. Conclusions

This paper examines the reaction of the Greek stock market to announcements of own share repurchases and investigates the hypotheses affecting the size of such reaction. The set under study includes the dates of program authorization from June 2000 to December 2010. In total, 560 open market repurchase programs are examined, representing the whole SRP population for the Greek market in the aforementioned period, after removing programs with incomplete or missing data.

Around the dates of authorization announcements, a positive and statistically significant cumulative average abnormal return is observed. In time period of seven days around the event day this return is computed at 1.57% and is statistically significant at 0.1%. The frequency of program authorization is a factor affecting the size of the above estimate. More specifically, the market reacts more to initial program announcements. The reaction to

announcements of subsequent programs is also positive and statistically significant but smaller in size.

During the period under examination, an important legislative change took place, namely, the incorporation of European Directive 2003/6/EC into Greek Law, through the enactment of Law 3340/2005. With the new regulatory framework for the protection of the capital market from abuse, investors react more favorably to repurchases.

The market's reaction to the company-stated reason for initiating an SRP is positive and statistically significant. It is much stronger, however, in the case where the firm states a specific reason, other than price support due to undervaluation.

Companies that approve an increase in dividend distribution and the authorization of a repurchase program during the same general meeting are companies with a larger size, higher operating income, and a lower degree of financial leverage than the average firm authorizing stock repurchases. Companies that decide a decrease in dividend distribution at the same time with repurchase approval are smaller in size, with no less operating income than average but with much less cash and equivalents than the average firm. In addition, we observe that the market reaction to dividend reductions or omissions are almost nil for the companies that have an active repurchase program.

The results support the hypothesis that the market reaction is stronger for companies with limited investment opportunities. The regression analysis results support the hypothesis of signaling undervaluation, while the free cash flow hypothesis does not seem to be relevant in the Greek market.

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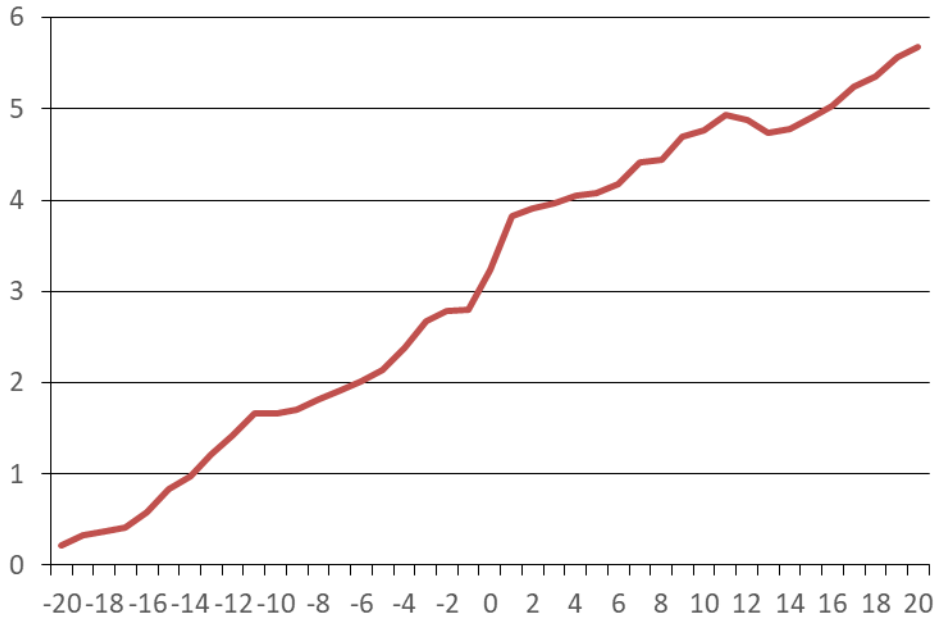


Figure 1. CAAR (%) for 41 days around the date of SRP authorization.

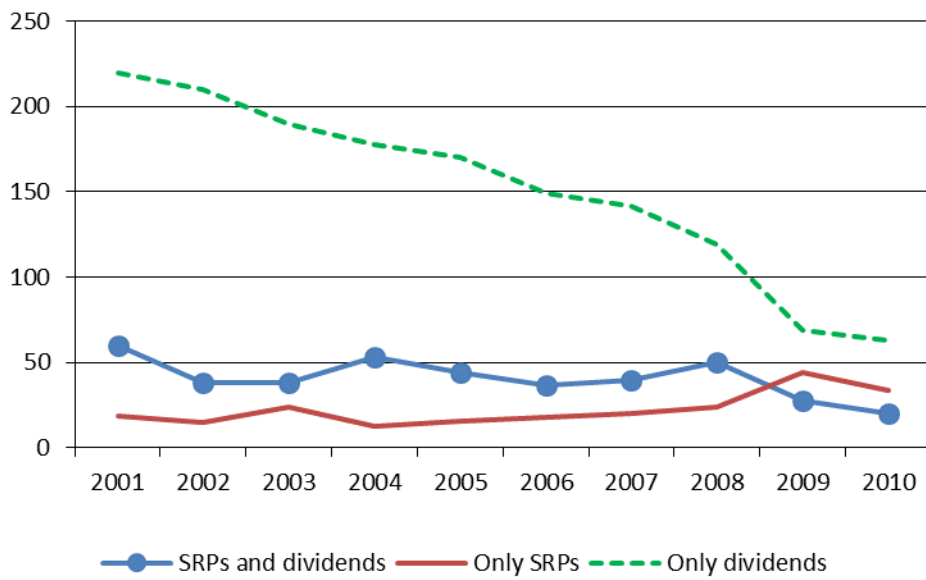


Figure 2: Number of companies that announce SRPs, dividend distribution or both.

Table 1

CAAR for event windows around the authorization date.

Event window	N	CAAR (%)
(-1, +1)	557	1.03*** (6.20)
(-3, +3)	559	1.57*** (6.30)
(-5, +5)	559	2.04*** (6.40)
(-20, -2)	559	2.74*** (6.12)
(+2, +20)	560	1.81*** (3.15)

Note: The table shows the CAAR for event windows around the authorization date of repurchase programs. The market model has been used as a benchmark model for the computation of abnormal returns with the estimation period ranging from 200 to 21 days before the announcement (-200, -21). The Patell Z test for the significance of means is shown in parentheses. The symbol *** denotes statistical significance at the 1% level.

Table 2

CAAR for initial and subsequent programs.

Event window	Initial		Subsequent	
	N	CAAR (%)	N	CAAR (%)
(-1, +1)	252	1.34*** (5.05)	305	0.77*** (3.78)
(-3, +3)	253	2.24*** (5.59)	306	1.01*** (3.43)
(-5, +5)	253	3.22*** (6.41)	306	1.07*** (2.83)
(-20, -2)	253	4.35*** (5.80)	306	1.40*** (3.01)
(+2, +20)	254	2.54*** (3.30)	306	1.20 (1.25)

Note: The table shows the CAAR for event windows around the announcement date of initial and subsequent programs. A program is classified as initial, if it is the first, or if it is authorized at least one year after the expiration of the previous program. The market model has been used as a benchmark model for the computation of abnormal returns with the estimation period ranging from 200 to 21 days before the announcement (-200, -21). The Patell Z test for the significance of means is shown in parentheses. The symbol *** denotes statistical significance at the 1% level.

Table 3

CAAR and legislative changes.

		Before Law 3340/2005		After Law 3340/2005	
Event window	N	CAAR (%)	N	CAAR (%)	
(-1, +1)	307	0.79*** (4.34)	250	1.33*** (4.43)	
(-3, +3)	307	1.39*** (4.48)	252	1.77*** (4.43)	
(-5, +5)	307	1.45*** (3.82)	252	2.76*** (5.32)	
(-20, -2)	307	2.51*** (4.04)	252	3.01*** (4.67)	
(+2, +20)	307	2.84*** (4.10)	253	0.56 (0.17)	

Note: The table shows the CAAR for event windows around the date of authorization of SRPs separately for the two time-intervals, which are defined by the enactment date of Law 3340/2005. The market model has been used as a benchmark model for the computation of abnormal returns with the estimation period ranging from 200 to 21 days before the announcement (-200, -21). The Patell Z test for the significance of means is shown in parentheses. The symbol *** denotes statistical significance at the 1% level.

Table 4

CAAR depending on the company-stated reason for SRP authorization.

Event window	Undervaluation		No specific reason		Other specific reason	
	N	CAAR (%)	N	CAAR (%)	N	CAAR (%)
(-1, +1)	216	0.79*** (3.20)	301	1.09*** (4.97)	39	1.97** (2.04)
(-3, +3)	216	1.38*** (3.35)	303	1.31*** (4.43)	39	4.66*** (3.65)
(-5, +5)	216	1.65*** (3.18)	303	1.73*** (4.41)	39	6.91*** (4.64)
(-20, -2)	216	3.82*** (5.15)	303	2.03*** (3.59)	39	3.24* (1.67)
(+2, +20)	216	1.64* (1.72)	304	1.62** (2.04)	39	4.17** (2.17)

Note: The table shows the CAAR for event windows around the date of authorization of SRPs, depending on the company-stated reason for SRP authorization. The market model has been used as a benchmark model for the computation of abnormal returns with the estimation period ranging from 200 to 21 days before the announcement (-200, -21). The Patell Z test for the significance of means is shown in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.

Table 5

CAAR and investment opportunities

Event window	$TQ < 1$		$TQ \geq 1$	
	N	CAAR (%)	N	CAAR (%)
(-1, +1)	167	1.88*** (5.36)	352	0.75*** (4.12)
(-3, +3)	168	2.84*** (5.73)	353	0.98*** (3.36)
(-5, +5)	168	3.98*** (6.17)	353	1.21*** (3.33)
(-20, -2)	168	3.61*** (4.11)	353	1.78*** (3.60)
(+2, +20)	168	4.16*** (4.21)	354	0.70 (0.49)

Note: The table shows the CAAR for event windows around the date of authorization of SRP, depending on the value of Tobin's q (TQ). The market model has been used as a benchmark model for the computation of abnormal returns with the estimation period ranging from 200 to 21 days before the announcement (-200, -21). The Patell Z test for the significance of means is shown in parentheses. The symbol *** denotes statistical significance at the 1% level.

Table 6

Characteristics of companies authorizing SRPs according to dividend decisions.

	N	Full set	N	No dividend change	N	Dividend decrease	N	Dividend increase
<i>SIZE</i>	538	4.68	291	4.48	120	4.65	127	5.15
<i>ASSETS</i>	526	2,796,648	287	1,456,247	115	3,097,515	124	5,188,710
<i>OPINC</i>	522	59,919	284	40,811	114	53,553	124	105,709
<i>CASHEQ</i>	469	59,855	266	72,985	102	25,956	102	58,944
<i>MTBV</i>	519	3.53	279	4.27	115	2.76	125	2.57
<i>LEV</i>	519	0.26	287	0.27	113	0.28	119	0.24
<i>INC</i>	522	0.04	284	0.04	114	0.04	124	0.07
<i>CASH</i>	469	0.14	266	0.15	102	0.12	102	0.16

Note: The table shows mean values for each variable. *SIZE* is the natural logarithm of market capitalization, the latter measured in million euro. Total assets (*ASSETS*), operating income (*OPINC*), and cash and cash equivalents (*CASHEQ*) are in thousand euro. *MTBV* is the market to book value of equity ratio. *LEV* is a leverage ratio equal to total debt divided by total assets. *INC* is the ratio of operating income to total assets. *CASH* is the ratio of cash and cash equivalents to total assets. The number of programs varies, depending on data availability.

Table 7

Abnormal returns and dividend changes.

Event window	No dividend change		Dividend decrease		Dividend increase	
	N	CAAR (%)	N	CAAR (%)	N	CAAR (%)
(-1, +1)	301	0.93*** (4.29)	122	0.60 (1.25)	133	1.71*** (5.13)
(-3, +3)	303	1.50*** (4.59)	122	1.02 (1.08)	133	2.23*** (4.96)
(-5, +5)	303	1.88*** (4.50)	122	1.49 (1.45)	133	2.96*** (4.99)
(-20, -2)	303	2.56*** (4.24)	122	2.95*** (2.70)	133	3.09*** (3.70)
(+2, +20)	304	1.59** (2.21)	122	2.63** (2.04)	133	1.54 (1.15)

Note: The table shows the CAAR for event windows around the date of SRP authorizations by those general shareholder meetings in which no change in dividend was decided, compared to the previous year. The market model has been used as a benchmark model for the computation of abnormal returns with the estimation period ranging from 200 to 21 days before the announcement (-200, -21). The Patell Z test for the significance of means is shown in parentheses. The symbols **, and *** denote statistical significance at the 5%, and 1% level, respectively.

Table 8

Descriptive statistics of regression variables.

	Mean	Median	Std. Dev.	Min	Max	N
<i>CAR</i>	0.02	0.01	0.08	-0.19	0.25	560
<i>PR</i>	0.00	0.00	0.07	-0.35	0.36	560
<i>PCT</i>	8.36	10.00	2.59	0.50	10.00	503
<i>TQ</i>	1.57	1.17	1.35	0.50	9.45	522
<i>SIZE</i>	4.68	4.41	1.74	1.38	9.29	538
<i>MTBV</i>	2.46	1.55	2.85	0.09	16.34	517
<i>LEV</i>	26.04	27.68	16.80	0.00	65.72	515
<i>CASH</i>	0.14	0.07	0.21	0.00	1.00	469
<i>FCF</i>	-0.50	-0.04	3.57	-24.25	7.63	306

Note: The table shows descriptive statistics for the continuous variables used in regressions. *CAR* is $CAR[-3, +3]$. *PR* is previous cumulative abnormal return observed before the program announcement. *PCT* is percent of shares for repurchase. *TQ* is Tobin's q . *SIZE* is the natural logarithm of market capitalization, the latter measured in million euro. *MTBV* is the market to book value of equity ratio. *LEV* is a leverage ratio equal to total debt divided by total assets. *CASH* is the ratio of cash and cash equivalents to total assets. *FCF* is free cash flow per share. The number of observations is different for each variable, depending on data availability.

Table 9

Regression analysis.

	Model 1	Model 2	Model 3	Model 4	Model 5
<i>Intercept</i>	0.035** (0.017)	0.036** (0.017)	0.029* (0.050)	0.019 (0.107)	0.026** (0.035)
<i>INIT</i>	0.017** (0.032)	0.016** (0.038)	0.016* (0.050)	0.022** (0.021)	0.020** (0.041)
<i>PR</i>		0.020 (0.730)	0.004 (0.949)		
<i>RO</i>			0.043*** (0.001)		
<i>PCT</i>	0.000 (0.746)	-0.001 (0.757)	0.000 (0.850)		
<i>SIZE</i>	-0.004** (0.016)	-0.004** (0.017)	-0.004** (0.047)	-0.003 (0.205)	-0.003 (0.258)
<i>MTBV</i>	0.000 (0.835)	0.000 (0.835)	0.000 (0.769)		
<i>CASH</i>				0.001 (0.970)	-0.000 (0.994)
<i>FCF</i>				0.001 (0.187)	0.002* (0.074)
<i>DIVINC</i>				0.023** (0.027)	
<i>DIVDEC</i>				-0.015 (0.128)	
Obs.	467	467	467	280	280
Companies	155	155	155	116	116
R-squared	0.021	0.021	0.040	0.041	0.033

Note: The dependent variable is $CAR[-3, +3]$. Abnormal returns are measured against the market model with the estimation period from 200 to 21 days before the announcement. *INIT* is a binary variable taking the value 1 if the program has been classified as initial and 0 otherwise. *PR* is previous cumulative abnormal return observed before the program announcement. *RO* is a binary variable taking the value 1 if the company mentions a specific reason for authorizing the program, different from stock price support and 0 otherwise. *PCT* is percent of shares for repurchase. *SIZE* is the natural logarithm of market capitalization, the latter measured in million euro. *MTBV* is the market to book value of equity ratio. *CASH* is the ratio of cash and cash equivalents to total assets. *FCF* is free cash flow per share. *DIVINC* is a binary variable taking the value of 1 if on the date of program authorization an increase in dividend was decided compared to the year before and 0 otherwise. *DIVDEC* is a binary variable taking the value of 1 if on the date of program authorization, a decrease in dividend was decided compared to the year before and 0 otherwise. The number of observations is different for each variable, depending on data availability. Standard errors are clustered at the firm level. *P*-values are reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% level, respectively.