Financing Activities and Payout Policies of Entrepreneurial Firms:

Empirical Evidence from Initial Public Offerings in Germany

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Abstract

Entrepreneurial high-technology start-up firms usually need equity in order to finance their research, product development, and in particular growth opportunities due to new ideas and innovation. In an advanced stage they often require even larger financial resources and may raise equity by going public (IPO) and, if successful, by a seasoned equity offering (SEO) later on. If these are the typical financing stages then it is surprising when firms that just went public start paying dividends or even repurchase shares. For a sample of 245 IPOs in Germany that either issued additional equity or initiated a share repurchase program, we analyze the valuation effects and the factors that explain the magnitude of these returns. For repurchasing firms we find significantly positive announcement returns (9.23%) but no abnormal stock price performance thereafter. For seasoned equity offerings we find a long term negative performance for the year prior to the announcement (-11.55%) which continues in the subsequent year (-30.20%). For the 30 day period before the SEO, we observe, however, a strong outperformance (7.63%) suggesting that management was able to time the market. In various probit models we provide strong evidence that the decision to engage in repurchase activities is explained by free cash flow problems rather than by undervaluation signaling. Our finding for repurchase decisions, however, is in contrast to the explanation of the announcement effects. For SEOs we conclude that IPOs return to the equity market to finance further growth opportunities. This is consistent with our evidence for the cross-sectional regressions and the probit analysis. Overall, the cash position and the cash flows from operations turn out to be pivotal for the decision to engage either in repurchasing shares or in issuing additional equity.

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1. Introduction

Entrepreneurial firms and especially high-technology start-up firms usually have a high need for risk capital in order to finance their research, product development, production process, marketing efforts and in particular to exploit all available growth opportunities that may arise, for example, from new ideas, inventions and innovations. Equity capital for such entrepreneurial ventures is usually supplied either in the form of private equity, venture capital or mezzanine financing. In contrast, debt financing is often very limited. In an advanced stage successful entrepreneurial firms often require even larger financial resources and may consider raising additional equity capital by going public. If, on the one hand, the firm has been successful after going public as measured by the relative stock price performance and if, on the other hand, further growth opportunities exist then we would expect - and in fact often observe - that these initial public offerings (IPOs) raise additional equity through a seasoned equity offering (SEO). Very successful firms with growth opportunities may go more often to the equity market even over a relatively short period of time after the initial public offering (Bessler and Thies, 2007a).

If this is the conventional financing model or the typical financing stages that investors generally have in mind when investing in high-tech entrepreneurial firms, then it must come as a surprise when some firms that just went public start returning equity to their shareholders by paying dividends or even initiate share repurchase programs (Bessler, Drobetz, and Seim, 2009). From a theoretical point of view there are many different explanations for such a behavior. One possible reason is that the equity holders of apparently overvalued start-up firms used the initial public offering as a pure exit strategy to cash in on their equity stakes. In this case, specific conflicts of interest and market timing considerations may explain such a behavior and we would expect negative valuation effects following the announcement of a share repurchase program. Another explanation is that the motive of these firms was to return redundant surplus liquidity to shareholders in order to reduce the agency problems in the sense of Jensen's free cash flow hypothesis. This seems to be a plausible explanation due to the fact that firms that went public at the "Neuer Markt" in Germany were forced by the very specific rules and regulations of the German Stock Exchange ("Deutsche Börse") to issue a predetermined amount of new equity at the time of the IPO. In this case we would expect positive abnormal returns after the announcement or at least no further decline if the stock price has been decreasing in the pre-event period. In addition, share repurchases that firms announced within some time period after the IPO, e.g. five years, could not only be interpreted as a means to mitigate free cash flow problems but also as a measure to signal positive inside in-

formation, e.g. that the firm is currently undervalued but will do quite well in the future. Another possible explanation for share repurchases that were initiated some time after the IPO is that firms with a substantial increase in the market value of equity may want to readjust their capital structure towards an optimal level by reducing market leverage (Welch, 2004; Bessler, Drobetz, and Pensa, 2008). In contrast, market timing considerations, for example due to a substantial stock market decline as during the period from 2000 to 2003, and a perceived undervaluation of its own shares may play an important role as well. Overall, there are a number of reasons and hypotheses why firms should repurchase their own shares even soon after they had just gone public and issued additional equity.

The academic literature so far has focused on seasoned equity offerings and share repurchases with respect to potential short- and long-run valuation effects and firm motives to conduct equity offerings and repurchases. The empirical studies for share repurchases provide evidence that the announcements of share repurchases lead to abnormal returns not only around the announcement (Dann, 1981; Vermaelen, 1981; Comment and Jarrell, 1991) but also in subsequent years (Ikenberry, Lakonishok, and Vermaelen, 1995; Gong, Louis, and Sun, 2008). While many motives have been derived to explain the positive stock price reaction to a firm's repurchase decision, the most important theories are the information signaling hypothesis, on the one hand, and the free cash flow (or agency costs) hypothesis, on the other hand. The former claims that firms announce repurchases to signal favorable information that is not yet reflected in the current stock prices, whereas the latter argues that excess cash reserves should be distributed to shareholders in order to withdraw these funds from managerial discretion thereby reducing agency problems. With respect to seasoned equity offerings the empirical studies in general provide evidence that there are negative announcement returns and that these stocks underperform in the long-run. This observation is consistent with the pecking order theory. Due to the general run-up during the year prior to the SEO, the conclusion is often that managers are able to time the market or exploit windows of opportunities. Whether investment banks or analysts of the underwriter support the stock price prior to the SEO has not been investigated thoroughly.

For the German capital market there are only a few studies that have analyzed the stock price reaction to seasoned equity offerings and to share repurchases. One obvious reason for this lack of empirical research is the fact that share repurchases were historically a very unusual form of distributing cash to shareholders. In fact, before May 1998 repurchases in Germany were only allowed under very restrictive conditions and therefore practically prohibited. Nevertheless, the distribution policies of entrepreneurial firms that just went public on the German

capital market have been investigated by Bessler, Drobetz and Seim (2009). They conclude that the market reaction for established firms as well as for IPOs that repurchase shares is best explained by financial signaling. However, there is also some evidence in favor of the free cash flow hypothesis. The valuation effects of SEOs of established firms and firms that just went public (IPOs) were analyzed by Bessler and Thies (2007a and 2007b) for the period before the "Neuer Markt". One interesting result is that IPOs that issued additional equity later on outperformed the market up to the time of the SEO. In addition, they observe the usual run-up before the SEO but negative announcement returns. The relative performance subsequent to the SEO, however, depends on the future financing activities of the firm. IPOs that issue additional equity later on outperform the market, whereas the other firms underperform. Thus, the research on the sequential financing activities such as share repurchases and seasoned equity offerings of entrepreneurial firms that just went public is of great interest and should provide new insights.

The objective of this research is to investigate the stock market reactions resulting from various financing activities and changes in the payout policy for a sample of initial public offerings in Germany. In particular, we analyze the short- and long-run valuation effects and explain the magnitude of these effects with various market-wide and company-specific factors. The decision to either raise or pay out equity should depend on a number of factors such as the cash or liquidity position of the firm, cash flow from operations as well as capital expenditure and growth opportunities as measured, for example, by R&D spending, the number and quality of patents and Tobin's Q. Finally we try to shed some light on the question why young firms engage either in issuing additional equity or repurchase their own shares. For this we estimate various probit models to evaluate the likelihood of either a repurchase or SEO announcement of German IPOs at the "Neuer Markt".

In our empirical analysis we provide evidence that repurchasing firms have substantial and significant positive announcement returns (9.23%) but insignificant abnormal stock price performance thereafter. Given that these firms underperformed the market for the 6-months period before the event (-24.46%) we conclude that they did either send a positive signal to the market or reduced agency conflicts. For SEOs the long-term downward trend from the year prior to the announcement (-11.55%) continues during the year subsequent to the additional equity issue (-30.20%). However, for the 30-day period before the SEO, we observe a significant and strong outperformance (7.63%) suggesting that management was somehow able to time the market. Probit model estimates provide strong evidence that the decision to engage in repurchase activities can be explained by free cash flow problems rather than by undervalua-

tion signaling. These findings for the repurchase decision are in contrast to the explanation of announcement effects. In addition, some evidence is found that IPO firms are more likely to announce a repurchase the more pre-IPO owners tender into the IPO. With higher participation ratios the probability of a repurchase increases. This is in line with the free cash flow hypothesis as higher participation ratios lead to higher ownership dispersion at the time of the IPO and hence reduce inefficient corporate governance mechanisms (Stulz, 1988). For SEOs we conclude that these firms return to the equity capital market to fund growth opportunities and innovation which is empirically supported by both the cross-sectional results of announcement returns as well as the probit analysis.

The remainder of the paper is organized as follows. In the next section we review the literature with respect to share repurchases and seasoned equity offerings of IPOs and the various motives for these financing decisions. The data is analyzed and the methodology is described in section 3. The empirical results are presented in the next four subsections of section 4. These are first the short-term valuation effects (4.1) and the long-run performance (4.2) for share repurchases and seasoned equity offerings of IPOs as well as cross sectional regressions for both samples (4.3). Finally, the reasons for share repurchases and for seasoned equity offerings are analyzed with probit models (4.4). Section 5 concludes and offers some ideas for future research.

2. Review of the Literature

There exists a vast amount of literature for the financing behavior and valuation effects of initial public offerings. In the next sections we discuss some of this literature by first providing the framework and perspective for our analysis (2.1). We then discuss the issues and empirical findings for seasoned equity offerings (2.2.) and share repurchases (2.3.) before focusing on the empirical evidence for initial public offerings in Germany (2.4.).

2.1 Review of the Issues

One of the most important decisions that young entrepreneurial firms face is whether or not to go public and raise external equity. This is also one of the more challenging questions in academic research. Consequently, initial public offerings have been among the most important research topics in corporate finance over the last 30 years, resulting in a large number of theoretical and empirical publications. At the center of theses studies are the firm valuation at the time of the IPO and the valuation effects following the IPO. This includes an analysis of the

factors that determine the short- and long-run financial and operating performance. As a result, there are at least three main phenomena associated with initial public offerings: Underpricing, long-run underperformance and hot issue periods (windows of opportunity). The factors that typically have a significant impact or explain these phenomena are underwriter reputation and analyst behavior, venture capital involvement and ownership structure, exit behavior and lock-up periods, management compensation and stock options plans as well as R&D spending and the number and quality of patents. The theoretical reasoning for explaining these phenomena is usually information asymmetry, agency problems, the free cash flow hypothesis, etc.

In addition, the management of the firm is usually faced with other important decisions subsequent to the going public. This may include production, product and marketing decisions as well as possible cooperation and joint ventures with suppliers and customers and in some cases even mergers and acquisitions either in the form of a growth option or as an exit strategy. From a financial perspective, the management has to guarantee that it always has sufficient funds available for financing its operations and its growth opportunities. Thus, it has to make sure that it either generates sufficient cash flows from operations or has raised sufficient funds at the time of the IPO, or gets new financing in the form of additional debt or by issuing more equity. In contrast, very successful and cash rich firms may have to decide on their payout policies and strategies which means distributing cash flows to shareholders by either paying dividends or by repurchasing the shares that in fact they just have issued. In some cases, newly listed firms have a higher need for funds or a more aggressive financing policy and consequently have multiple rounds of either issuing new equity or repurchasing their own shares within the first years after going public. In addition, it has been observed that firms sometimes engage in both buying back their own shares and issuing new equity. In this case the sequencing is important and should be informative.

2.2 Initial Public Offerings and Seasoned Equity Offerings

Beginning with the seminal paper of Modigliani and Miller (1958), there is a large body of literature that deals with financing decisions and financing behavior of firms. The pecking order theory (Myers and Majluf, 1984), the cash flow shortfall theory (Miller and Rock, 1985), and the free cash flow hypothesis (Jensen, 1986) are among the most dominant theories. They all are based on information asymmetries and agency problems as the main arguments. More precisely, these models assume that management has an information advantage over investors. Financing decisions are therefore viewed by the market as a reliable signal

about the firm's quality. Myers and Majluf (1984) argue that financing decisions reveal information to the market because the decision to issue equity signals that the firm is overvalued. Consequently, issuing equity should result in negative valuation effects in the short-run around the announcement date. Jensen's (1986) free cash flow hypothesis is based on agency problems that result from the fact that management prefers to maximize its own utility. According to this theory, managers may use the free cash flow to invest in negative net present value (NPV) projects and therefore do not maximize shareholder value. Consequently, the market has to evaluate whether the cash flows are properly invested or wasted at the announcement of a financing decision. Thus, it is interesting to investigate whether a firm that just went public has the opportunity to raise additional equity.

Empirical studies for the U.S. market find evidence that some firms issue additional equity (FSEO) in a relatively short time period after the IPO (Welch, 1989). It should be noted, however, that the percentage of IPOs with subsequent seasoned equity offerings is only 25% in the U.S. In contrast, the relative number for IPOs with subsequent SEOs was much higher in Germany with about 50% for the period from 1977 to 1995. The much smaller relation for the U.S. supports the observation that for some U.S. firms the IPO is the only time that they issue equity. James (1992) investigates the financing behavior of IPOs with respect to other financing instruments and finds that these firms do hardly return to the financial markets within the first eight years after the IPO. Because only 3.5% of the IPOs return to the equity market twice and only 1% of the IPOs return three times it can be assumed that the poor quality and performance of these firms excludes them from raising additional equity. Welch (1989) supports this view in that he also finds for the first 10-year period after the IPO that the public financing activities of these firms diminish over time. He reports that the total proceeds start to decline about two years after the IPO and level off after about six years. This all suggests that firms that plan to return to the equity market will try to seek additional equity as soon as possible after they went public. In a recent study, Hertzel, Huson and Parrino (2009) focus on the time between the initial public offering and the first subsequent equity offering and contrast the risk of overinvestment with the issuing costs of sequential financing. The pivotal question is: How much funds should be provided to firms at the initial public offering and how much should be provided later on? They find that firms with a higher proportion of intangible assets, higher R&D, and less proceeds raised at the time of the IPO return sooner to the capital market. This is in line with staging considerations and subsequent financing rounds commonly observed in the venture capital market.

In an earlier study of the long-run performance of initial public offerings for the U.S., Ritter (1991) revealed first positive but then evenly increasing negative abnormal returns for the first three years following the IPO. The analysis of 1,254 IPOs for the period from 1975 to 1984 resulted in substantial negative abnormal returns of -29.1% for the 36-months period after the IPO. A very interesting aspect is that this figure is very similar to the long-run performance (36 months) of seasoned equity offerings. With the exception of Chalk and Peavy (1987), most studies find negative abnormal returns independent of the calculation method (CAR or Wealth Relative). This predominantly negative long-run return pattern may suggest that investors are too optimistic about the firms' long-run prospects and are getting more realistic through time when additional information becomes available. It is also possible that IPOs are fairly priced in the primary market but are overpriced on the first day of trading in the secondary market due to pronounced underpricing. Therefore, taking the offer price as a starting point, IPO firms are overpriced in the secondary market and their true value is uncovered in the long-run. Thus, the explanation of long-run underpricing would turn into a short-term overpricing story. Thus, raising new equity either in the primary or secondary market usually leads to long-run underperformance suggesting distinct information asymmetries or agency problems. The poor long-run performance of SEOs is investigated by Carlson, Fisher, and Giammarino (2006). They show theoretically that the long-run return pattern is driven by replacing growth options with assets in place. Expected returns decrease because assets in place are less risky than growth options. Their model also explains the pre-issue price run-up. Because negative long-run abnormal returns are average results we need to be aware that some firms outperform an appropriate benchmark substantially but that some other firms significantly underperform. Therefore, Autore, Bray, and Peterson (2009) investigate the reason why established firms seek additional equity financing. If firms announce an SEO to use the proceeds to pursue investment opportunities, these firms do not experience the typical long-run underperformance. In contrast, firms that state recapitalization or general purposes exhibit negative abnormal returns in the subsequent years. Thus, one of the most interesting issues for empirical research is to investigate which IPOs underperform or outperform and which factors may best explain the respective performance.

2.3 Initial Public Offerings and Share Repurchases

There are many reasons why firms repurchase their shares. The main motives and theoretical explanations as well as the empirical findings are presented in this section. The two major theories generally considered are the signaling and the free cash flow hypothesis. However, other explanations may offer additional insights as well.

2.3.1 Signaling hypothesis

In many empirical studies signaling is identified as the main reason for share repurchases especially when tender offers are used.[1] In these instances shares are bought back at a substantial premium relative to the current share price. It is argued that the market usually interprets this as a signal of current undervaluation and therefore the announcement should result in an immediate stock price increase. Empirical studies of this short-run valuation effect, for example, by Dann (1981), Comment and Jarrell (1991), and Vermaelen (1981) for the U.S. find significantly positive valuation effects of about 10% around the day of the repurchase announcement supporting this argument.

The long-run valuation effects for a sample of open market repurchases in the U.S. for the period from 1980 to 1990 are analyzed by Ikenberry, Lakonishok, and Vermaelen (1995). They find buy-and-hold abnormal returns of about 12% for the four year period subsequent to the announcement. These results suggest, however, that the stock price reaction around the announcement does not fully capture the undervaluation prior to the share repurchase (Peyer and Vermaelen, 2009). In particular the empirical evidence indicates that the market underreacts to the information revealed in repurchase announcements at least for so-called 'value' stocks (low market-to-book ratios). Investments in these stocks generate buy-and-hold abnormal returns (BHAR) of 45.3% over a four year period. In a study for Australia, Mitchell, Izan and Lim (2006) explain the degree of undervaluation with the market-to-book ratio. In a study for Canada, Ikenberry, Lakonishok, and Vermaelen (2000) also conclude that it takes some time before the information is correctly priced, i.e. undervaluation disappears. Again, the market-to-book-ratio serves as a good proxy for potential undervaluation. Gong, Louis, and Sun (2008) find for the U.S. that post-repurchase long-run abnormal returns are associated with significant negative pre-repurchase abnormal accruals, i.e. deflated earnings numbers. Hence, they suggest that post-repurchase abnormal returns are due to the underestimated earnings growth during the pre-repurchase period.

It may be expected that information asymmetries are more pronounced for IPOs due to their relatively small size, less analyst coverage, and simply their shorter track record. Profitable firms that just went public, however, could employ the signaling nature of repurchase announcements to convey either undervaluation or other positive information. In contrast, there is some evidence that IPOs might manipulate earnings numbers prior to the IPO to maximize

[1] In principle there exist three methods for conducting a share repurchase: open-market repurchases, tender offers (subdivided in fixed-price offers, Dutch-auction offers, and the issuance of transferable put rights), and negotiated repurchases. For an illustration see Schremper (2002), p. 37ff.

initial proceeds (Teoh, Welch, and Wong, 1998). Following this argument, repurchase announcements could be used as an alternative means to boost share prices, earnings per share, and mislead investors about the true value of the firm (Chen, Ho, and Wang, 2008). Consequently, it may be rational for firms that went public to repurchase shares relatively soon after the IPO. In any case, the investor needs to be aware of the reasons.

2.3.2 Free cash flow hypothesis

An alternative and very common explanation why firms engage in repurchasing shares is their intention to reduce agency costs by distributing excess cash to their shareholders especially in the absence of growth opportunities. In line with the arguments of Jensen (1986), repurchasing shares is an effective means of reducing agency problems by distributing free cash flows to shareholders, thus preventing management from wasting free cash flows by investing in unprofitable investment projects. For Canadian open market repurchases, Li and McNally (1999) find support for the free cash flow hypothesis rather than the signaling hypothesis. They report that firms repurchasing shares are smaller and more closely held compared to non-repurchasing firms, but exhibit similar book-to-market ratios and higher free cash flows which favors the free cash flow hypothesis. Although there are relatively small share price declines prior to the announcement, the repurchase seems to be motivated by managements' objective to reduce agency costs as free cash flow is withdrawn from managerial discretion. More recently, hedge funds have taken an active role in corporate governance in Germany by often convincing management to distribute free cash flow to shareholders, either by increasing dividends or by initiating share repurchase programs. The early empirical findings suggest that this strategy is on average value enhancing, at least in times of increasing stock prices (Bessler, Drobetz, and Holler, 2009a). For periods of decreasing stock prices, the firms underperform, suggesting that the corporate governance by hedge funds did not improve the operating performance of the firm (Bessler, Drobetz and Holler, 2009b). Thus, we need to be aware of the fact, and this reasoning applies to seasoned equity offerings and share repurchases as well, that optimizing the capital structure and the various financing activities may not or only marginally increase shareholder value in the long-run.

In another study Oswald and Young (2008) separate firms according to the risk of overinvestment and find that agency considerations only affect the repurchase decision when investment opportunities are rare as proxied by low market-to-book ratios. In contrast, Nohel and Tarhan (1998) focus on operating performance as measured by the EBITDA-to-market value of assets for the three year period following the announcement. In order to observe dif-

ferences in growth opportunities following share repurchases, they calculate Tobin's Q and partition their sample of tender offer share repurchases into high-Q and low-Q firms where low values of Q indicate overinvesting.[2] Overall, they provide empirical evidence supporting the free cash flow hypothesis as the cumulative operating performance for the low-Q sample improves substantially compared to the high-Q sample. In another line of research, Grullon and Michaely (2004) report for repurchasing firms a reduction in systematic risk and in the cost of capital. This finding is consistent with the free cash flow hypothesis as cash payouts to shareholders in the form of repurchases indicate that a firm has fewer growth opportunities, needs less cash for investments, and moves towards a more mature phase of the corporate life cycle. Therefore, investors often underestimate the reduction in the cost of capital which leads to a stock price underreaction to repurchase announcements. Recently, Koerniadi, Liu, and Tourani-Rad (2007) confirm these findings for New Zealand.

2.3.3 Other Explanations

There are a number of alternative hypotheses to explain the valuation effects of share repurchase announcements. Some studies argue that repurchases are primarily driven by the objective to substitute dividends with share repurchases (*dividend substitution and tax effects hypothesis*). This should be particularly true for countries with a relative tax advantage of capital gains over dividends and should provide evidence on whether a firm's payout policy depends on the tax situation of its shareholders. Grullon and Michaely (2002) find empirical evidence that the higher the relative tax benefit of repurchases over dividends, the higher is a firm's propensity to repurchase shares.[3] Similarly, Hsieh and Wang (2008) find that firms prefer repurchases to dividends when the level of insider ownership is high or increases, especially in years when dividends are more tax *disadvantaged* relative to capital gains. Jagannathan, Stephens, and Weisbach (2000) argue that share repurchases are more transitory events to pay out short-term temporary cash surpluses while dividend payout policy depends more on permanent cash flows. This questions to some extent the substitutability of dividends and repurchases. For the U.S. Skinner (2008) recently points out that when comparing dividends with repurchases the latter have become the dominant form used for payouts and von Eije and Megginson (2008) confirm these findings for a broad sample of dividends and share repur-

[2] As in many other studies, Nohel and Tarhan (1998) approximate Tobin's Q by the ratio of the market value of assets to the book value of assets.

[3] There exists some empirical evidence that management usually does not include the tax considerations of the individual investors into the decision making process. For Germany Ellermann (2003) provides evidence for dividends and Kaserer, Wenger, and Roos (2006) for different groups of taxable equity.

chases in the European Union. Jain, Shekhar, and Torbey (2009) investigate in particular whether firms that went public IPOs choose dividends or share repurchases as their predominant form of payout and find that there is a preference for repurchasing shares among IPOs.

Another rationale for share repurchases is that management aims to implement its optimal capital structure because by distributing excess funds to its shareholders a firm simultaneously reduces its equity and increases its leverage *(capital structure hypothesis).* Dittmar (2000) emphasizes that many studies only focus on few motives for repurchases and hence ignore the potential influence of omitted hypotheses. She therefore tests several hypotheses simultaneously and finds that firms repurchase shares to increase leverage when it is below the target ratio. In addition, share repurchases often lead to an expropriation of at least one group of stakeholders *(expropriation hypothesis).* Because repurchases usually result in lower asset values, this also reduces the value of debt. This reduction should lead to lower bond prices and consequently transfers wealth from bondholders to shareholders. While Vermaelen (1981) and Dann (1981) do not find evidence for the expropriation hypothesis, Masulis (1980) provides at least some evidence for a wealth transfer between tendering and non-tendering shareholders as well as between different classes of securities. In a more recent paper, Maxwell and Stephens (2003) find that both the signaling and expropriation hypothesis hold for repurchase announcements.

There is also growing evidence that some firms initiate repurchase programs in combination with stock option programs *(option-funding and managerial wealth hypothesis).* Kahle (2002) analyses this relation between the growing popularity of stock options and the increasing numbers of share repurchases in the U.S. On the one hand, she examines the option-funding hypothesis which predicts that repurchases are used to fund employee stock options as the exercise of such options would dilute stock prices and earnings multiples.[4] On the other hand, she investigates the managerial wealth hypothesis which argues that dividend payments reduce stock prices at the ex-dividend date and hence the value of unprotected stock options (the overwhelming number of options to U.S. CEOs are not dividend protected). In any case, and most likely, stock repurchases usually enhance stock prices. She provides evidence for both the option-funding as well as the managerial wealth hypothesis. The findings of Liljeblom and Pasternack (2006) for Finland support Kahle's results. The high fraction of stock options being dividend protected, in contrast to the U.S., allows them to directly test the managerial wealth hypothesis.

[4] For an explanation of the economic rationale for the option-funding hypothesis see Kahle (2002), p. 240.

While the aforementioned reasons for repurchases are a result of firm internal decisions, there exist rationales where a repurchase announcement can be triggered by outside parties as well (*takeover defense hypothesis).* Takeovers can be hampered because repurchases raise the cost of an acquisition as only those shareholders will tender in the repurchase that have the lowest reservation prices. The repurchase will then increase the lowest price for which a raider can buy the stock from dispersed outside shareholders (Bagwell, 1991).

2.4 Empirical Studies for IPOs in Germany

Although the number of IPOs in Germany is on average relatively small and the time period with a higher issuing activity is limited to the "Neuer Markt" and therefore rather short (Figure 1b), there are nevertheless a number of studies that analyze the underpricing and long-run performance behavior as well as the factors that influence the magnitude of these valuation effects. Most of the studies covering the period prior to the "Neuer Markt" find negative long-run performance. The magnitude ranges from -28.0% (Schuster, 1996) and -12.1% (Ljungqvist, 1997) to numbers that are close to zero or positive or even yielding strong positive returns of 16.1% (Stehle, Erhardt, and Przyborowsky, 2000) for the very early time period from 1960 to 1987. The significant differences in Stehle, Erhardt, and Przyborowsky (2000) are due to different weighting approaches of the benchmark. Other differences are due to the time period investigated and the methodology used. A review of this literature is provided in Bessler and Becker (2007). However, there is some evidence that the subsequent financing decision is one of the main factors and has a measurable impact on the long-run performance (for the U.S. Kale and Payne, 2000; Michaely and Shaw, 1994 and for Germany Ljungqvist, 1997). Bessler and Thies (2007a and 2007b) provide empirical evidence that firms that have the opportunity to issue additional equity subsequent to the initial public offering outperform the market up to that point in time. This means that investors are willing to provide additional funds to successful IPOs, or that successful IPOs are in a position to raise additional equity. So far this issue has not been investigated for firms that went public on the "Neuer Markt" in Germany between 1997 and 2002.

However, there already exist quite some empirical findings for the short- and long-run valuation effects and the factors that determine the performance of IPOs at the "Neuer Markt". Obviously, most studies find underpricing and underperformance as well the existence of hot and cold issue periods. With respect to the factors explaining the return behavior, Bessler and Kurth (2007) provide empirical evidence on the impact of venture capital, lock-up periods and hot and cold issue periods as well as capital gains taxes on performance. This research also

reveals the agency problems inherent in the German universal banking system. These problems become even more visible in a study of analyst behavior in that the financial analysts of the underwriter provide more positively biased earnings forecasts and issue more buy recommendation at least during the first year following the IPO (Bessler and Stanzel, 2009). There exists also some evidence on the impact of stock option plans on performance (Bessler, Becker and Wagner, 2009). Other studies provide evidence of the positive impact of R&D and patents on firm survival and IPO performance (Bessler and Bittelmeyer, 2007 and 2008, respectively). In fact, IPOs with patents outperform IPOs without technology at least during the first year after going public. In the long run there is hardly any performance difference, suggesting that the market might have been too optimistic with respect to the growth potential of technology.

With respect to share repurchases of IPOs in Germany, there exist only a few studies so far. One obvious reason for this lack of empirical research is the fact that share repurchases could hardly be employed for distributing cash to shareholders. In fact, repurchases in Germany were only allowed under very restrictive conditions and therefore practically forbidden before May 1998. In one of the first studies for the period from May 1998 to December 2000 Schremper (2002) reports abnormal returns of about 4% for repurchase announcements. Gerke, Fleischer, and Langer (2003) investigate the period from 1998 to early 2002 and attribute the announcement returns of 6% to the inexperience of German firms with this payout method. When partitioning the sample according to the stated repurchase reason, they find abnormal returns of 8.9% at the announcement day providing evidence for undervaluation and the signaling hypothesis. It is quite interesting to note that abnormal returns are higher for the repurchase announcements for the period of dramatically falling stock prices (bear market) between 2000 and 2002. Seifert and Stehle (2003), however, disagree to some extent with these findings of Gerke, Fleischer, and Langer (2003) because they find no evidence supporting the signaling hypothesis in that the positive announcement effects and the undervaluation vanish after several days. They characterize the bear market effect as a “Neuer Markt” effect. In addition, Hackethal and Zdantchouk (2006) covering the period from May 1998 to April 2003 find positive abnormal returns of 5% around the announcement (invitation to the annual shareholders meeting) and abnormal returns of 7% at the time of the repurchases. By taking these two events together, the valuation effects sum up to about 12%. In a more recent study Bayer, Hoffmann, and Weinmann (2007) concentrate on the announcement effects of open market repurchases covering the period from 2000 to 2005. They find on average significant CARs of 5.4% around the announcement date. When separating the sample, they find some-

what higher valuation effects of about 7% for the period before 2003 and lower effects of about 3% for the subsequent period. Overall, repurchase announcements in Germany have resulted in positive abnormal returns.

The objective and contribution of our study is to provide additional empirical evidence and new insights of the issuing and repurchasing behavior of German firms that went public at the "Neuer Markt" during the period from 1998 to 2002. For this we explicitly compare the short- and long-run valuation effects of share repurchase and share issuing activities and employ accounting and financial variables to explain the magnitude of the stock price reactions. In addition, we employ these variables in probit models to estimate the likelihood that initial public offerings will issue additional equity or repurchase their shares within a relatively short period after going public.

3. Data and Methodology

3.1 Data

In our empirical analysis we focus on share repurchase (SRP) and share issuance (SEO) announcements of all German IPOs that went public on the "Neuer Markt" between 1998 and 2002. The "Neuer Markt" was a special stock market segment for young, innovative and high technology entrepreneurial firms in Germany. This new economy period is best described by two extreme periods of increasing and decreasing stock prices as shown in Figure 1a. The importance of IPOs at the "Neuer Markt" relative to other German stock market segments over an extended period of time is shown in Figure 1b. The black bars indicate IPOs at the "Neuer Markt" in Germany, which was opened in 1997 and closed in 2002. It becomes immediately obvious that the new economy boom and this stock market segment created a special period with a relatively large numbers of firms that went public in Germany.

[Insert Figure 1a and 1b around here]

When a firm intends to repurchase its shares, it is obliged under German law to make this information immediately publicly available by issuing an ad hoc announcement. For our study this press release is chosen as the event date. It is assumed that this is the first time that a firm's intentions of initiating a repurchase program become public information. Similarly, firms that intend to issue equity have to release an ad hoc announcement containing the basic information regarding their plan for this equity offering. Subsequent to these initial announcements further information is generally released such as the amount of the offering, the

subscription price, etc. In our event-study framework we use the first announcement as the event date. Ad hoc announcements for repurchase as well as for new issue announcements were obtained with a keyword search within the LexisNexis database. We also searched for ad hoc announcements of share repurchases and share issues within the DGAP database.[5]

We start our analysis with all 329 IPOs from the German "Neuer Markt", but then concentrate on the first announcement within the five year period after going public. All event firms are matched with the COMPUSTAT database. As usual, all financial services firms and all utilities are excluded. Moreover, we exclude all firms that went public in 1997 and IPOs that were involved in stock price manipulations.[6] We identified 65 firms that announced an SEO within the first five years after going public and 60 firms that announced a share repurchase program. Interestingly, there are 14 firms that announced both, an SEO as well as a repurchase program. These events are excluded from our analysis. Consequently, our final sample consists of 245 German initial public offerings of which we analyze 46 SRP and 51 SEO announcements. 148 IPOs had no financing activity during that time period. Stock and benchmark returns were obtained from Thomson Financial Datastream. Figure 2 presents the distribution of SRP and SEO announcements by calendar year and Figure 3 shows the distribution relative to the time when the firm went public. First of all it appears that the SRP and SEO activity of the IPOs are quite similar in each year and thus may be driven by other factors than market timing. Generally, we would have expected a high frequency of SEO in the up market and a higher frequency of SRP in the down market. Interestingly, the distribution by calendar year reveals that most SRP and SEO announcements occurred in the down market in 2000 and 2001 (Figure 2) and relatively soon after going public (Figure 3). These issues need to be discussed in more detail for SEO and for SRP.

[Insert Figure 2 and 3 around here]

The decision of having an additional financing round (SEO) just after going public may depend on various factors. Either the firm raised sufficient funds at the time of the IPO and an SEO is not necessary or the firm raised only a smaller amount of funds and additional funding is required. The reason for the latter strategy is either that management intended to exploit the initial returns and the usual run-up subsequent to the IPO by implementing the equity issue in a two staged process, i.e. small IPO and larger SEO. This is advantageous for the firm when thereby equity is placed on average at higher prices, which means that management exploited

[5] DGAP is a German institution that provides ad hoc announcements of more than 1,250 public companies.

[6] Kurth (2005), p. 354 ff. provides some rationale explanation for this procedure.

its information advantage or has some pseudo market timing abilities. Although this may be in the interest of the current investors or the investors that got shares allocated at the time of the IPO, this is to the disadvantage of the investors that bought shares at the SEO. To implement such a strategy it is necessary that the underwriter and the analysts of the underwriter support this behavior which, however, is often observed (Bessler and Stanzel, 2009). The other reason for a sequential initial and seasoned equity offering is that investors are only willing to provide funds in stages such as in venture capital financing, which means that additional funds are only provided when certain milestones are reached. Obviously, more funds are also needed when the realized growth rate exceeded the expectations or new business opportunities arise. In addition, we would most likely expect more SEOs in an up-market. However, when management forecasts dramatically declining stock prices, then it may be beneficial even in a down market to issue equity before the market weakens further.

For SRP we would hardly expect that they occur soon after the IPO. However, there are two explanations for such a behavior. The firm may have raised too much funds at the time of the IPO, either because they overestimated the growth opportunities, or they were forced to issue more equity than needed as was often the case at the "Neuer Markt" due to its special rules and regulations. The other explanation is that management has market timing abilities and repurchases shares at lower prices and issues additional shares later on at higher prices. This is consistent with the strategy that management wants to signal undervaluation to the market and then issues additional equity later on. Thus, we would expect more SRP in the down market.

Most surprisingly, at least for the SEO sample, the number of SEOs peaked in 2000 and 2001 when the German capital market experienced a dramatic downturn as illustrated in Figure 1a. Similar to SEOs, Figure 2 reveals that most repurchase programs were announced in 2000 and 2001. Figure 3 indicates that some newly listed firms issue additional capital and engage in share repurchases rather quickly after going public. Relative to the time of the IPO both figures for SRPs and SEOs center in the second year after going public. Therefore, it seems to be interesting and of major importance to analyze the financing activities and distribution policies of firms that just went public in more detail.

3.2. Methodology

In our empirical analysis of SRP and SEO announcements we employ the standard event study methodology and calculate cumulative abnormal returns (CAR) around the event window as well as long-term buy-and-hold abnormal returns (BHAR).

3.2.1 Cumulative Abnormal Returns

For the short term event study we employ the standard abnormal return (AR) procedure in that we adjust stock returns for each event at time t with the expected return of the stock market which is approximated by the CDAX index as a benchmark:

(1) $$AR_{i,t} = r_{i,t} - E(r_{i,t}).$$

The German CDAX is a performance index that includes all German companies belonging to the EU regulated market segment of the Frankfurt Stock Exchange.

In the next step we weight the AR in (1) for each event equally by dividing the abnormal returns by the number of events in our sample. We then sum up the abnormal returns of this equally weighted portfolio over time which results in the cumulative abnormal returns (CAR) for a certain time period:

(2) $$CAR_T = \sum_{t=1}^{T} dAR_{p,t} \quad \text{with} \quad dAR_{p,t} = \frac{1}{n}\sum_{i=1}^{n} AR_{i,t}.$$

To test for significance, we employ a bootstrapped version of the skewness adjusted t-test in order to correct for the usually positive skewness in CAR and especially in BHAR. Following Lyon, Barber, and Tsai (1999), we draw1000 samples of size $m = n/2$ to calculate the critical values of the transformed t-statistic:

(3) $$t_{sa} = \sqrt{m}\left(S + \frac{1}{3}\hat{\gamma}S^2 + \frac{1}{6m}\hat{\gamma}\right)$$

with

(4) $$S = \frac{\overline{AR_\tau}}{\sigma(AR_\tau)} \quad \text{and} \quad \hat{\gamma} = \frac{\sum_{i=1}^{n}(AR_{i,\tau} - \overline{AR_\tau})^3}{m\sigma(AR_\tau)^3}.$$

Additionally, we employ the signed-rank test proposed by Wilcoxon (1945) to test whether the median of the abnormal return distribution differs significantly from zero.

3.2.2 Buy-and-Hold Abnormal Returns

To analyze the long-run valuation effects of seasoned equity offering and repurchase announcements we employ the standard buy-and-hold abnormal returns (BHAR) procedure and calculate abnormal returns on a daily basis:

(5) $$\text{BHAR} = \frac{1}{n}\sum_{i=1}^{n}\left[\left(\prod_{t=1}^{T}(1 + R_{i,t})\right) - \left(\prod_{t=1}^{T}(1 + R_{M,t})\right)\right].$$

We vary the event window from 1 day to 250 days before and after the event. This BHAR performance measure compares the average performance of a buy-and-hold investment in a

portfolio consisting of all events of either equity offering or share repurchase announcements to the buy-and-hold investment in the market index which is approximated by the CDAX.

In addition, we perform some cross sectional regressions that are presented in section 4.3 to first check for the robustness of our results and second to extend our analysis by including accounting and financial variables. The econometric procedures employed are explained in section 4.3. Finally, and maybe most interesting, we apply probit models for both SEO and repurchase announcements in order to identify the driving factors that force firms to announce the financing or payout decision. At last, we directly compare the repurchase and SEO decision in a single probit and a multinomial probit model to disentangle the factors that significantly influence either decision. This procedure and the results are explained in more detail in section 4.4.

4. Empirical Results

In our empirical analysis we first investigate short- and long- term abnormal returns and then concentrate on the factors that may explain the magnitude of these valuation effects. In addition we employ probit models to estimate the probability that a firm issues new equity or repurchases shares.

4.1 Short-Run Valuation Effects

In order to analyze the short-term valuation effects we calculate cumulative abnormal returns for various time periods around the event date where the interval ranges from t=-60 to t=60. The CAR for SRP and SEO events are presented in Figure 6 and Table 2. The significance of the abnormal returns for both samples is tested with a skewness adjusted t-test. In the next section, we first analyze the valuation effects of share repurchase programs and then focus on SEO announcements.

4.1.1 Short-Run Valuation Effects of Share Repurchase Announcements

The results for the short-run valuation effects of share repurchase announcements for different intervals prior to the event are presented in Table 2 (Panel B). It becomes immediately evident that the mean (median) CAR strongly decline during the 60 trading days or three months period prior to the announcement with a relative underperformance of -14.86% (-15.01%). For the interval around the event date (-1; 1), the mean and median CAR sharply increases by a significant 8.61% and 6.99%, respectively (Table 2, Panel A). The mean (median) abnormal

return of 9.23% (11.65%) for the extended event window (-3; 3) is even higher and also significant at the 1% level. One possible explanation for this observation is that firms may react to their relative stock price decline by announcing a repurchase program. This would be in line with undervaluation signaling initially suggested by Vermaelen (1981). The exceptional pronounced mean abnormal announcement return of more than 9% is nearly three times as high as found in studies for the U.S. (Vermaelen, 1981; Grullon and Michaely, 2004) and more than twice as high as for other studies for the German stock market (Seifert and Stehle, 2003; Bessler, Drobetz and Seim, 2009).

[Insert Figure 6 about here]

[Insert Table 2 about here]

For the analysis of abnormal returns subsequent to the event date it is important to note that the magnitude of the CAR depends on the fact whether or not the event date is included in our calculation. Therefore, the CAR is presented for time intervals beginning one trading day prior to the event (Table 2, Panel C). The mean abnormal returns for the intervals of up to 10 trading days subsequent to the event are stable between 6% and 7% and are significantly different from zero. When starting the calculations directly subsequent to the event (Table 2, Panel D), the median CAR for the 60-trading-day period is slightly negative but insignificant for each time interval. However, albeit more negative in absolute value, the mean CAR also does not differ significantly from zero. From this analysis it seems that the management of these IPO firms might have reacted immediately to their unfavorable market valuations by announcing a repurchase program in order to halt a further stock price decline. At a first glance, the strong and positive announcement returns seem to suggest that these firms were successful in signaling undervaluation to outside investors. Moreover, if the IPO firms have raised as much equity as possible at the time of the IPO or were forced to issue more equity than needed, excess cash holdings paired with a lack of investment opportunities or negative NPV projects should result in the usual agency costs of free cash flow (Jensen, 1986). One option to reduce these problems is by distributing this surplus cash to shareholders either in the form of dividends or share repurchases. Whether signaling or the free cash flow hypothesis is better suited to explain the valuation effects of the repurchase decision is investigated in more detail in section 4.3.

4.1.2 Short-Run Valuation Effects of SEO Announcements

In contrast to our findings for SRP, we would expect quite different and maybe opposite results for SEO announcements, due to the basic idea that additional equity is usually issued

when attractive investment and growth opportunities become available or when high market valuation or firm overvaluation should be exploited. In fact, when analyzing the short-run valuation effects of SEO announcements of IPOs at the "Neuer Markt", the results change considerably which is due to the different motivation and information inherent in either SRP or SEO announcements. In contrast to a negative return pattern for SRP during the 60 trading days prior to the repurchase announcement, there is a considerable run-up before the SEO as presented in Table 2 (Panel B). There is a significant mean (median) run-up before the event of 7.63% (3.29%) and 6.33% (6.19%) for the intervals (-30; -1) and (-60; -1), respectively. This result is consistent with market timing considerations of management that try to cash in on a positive past performance. Thus, these firms return to the capital market at a time when their financing conditions are favorable to obtain higher offering proceeds or, equivalently, to issue overvalued equity. In accordance with previous studies, we do not find large announcement returns as shown in Table 2 (Panel A). Although we do find significantly positive mean CAR of 4.04.% (5% level) for the narrowest window of three trading days around the event, the median CAR for larger intervals of three or five trading days around the event is slightly negative, though insignificant abnormal returns. When we analyze the period subsequent to the event, we find an underperformance relative to the event day. This result is independent of whether we include or exclude the event day returns (Table 2, Panel C and Panel D, respectively). For the time intervals of (-1; 30) and (-1; 60), the mean (median) abnormal returns are negative with -2.34% (-4.28) and -4.24% (4.22%), respectively. The magnitude of the negative performance even increases when the calculation of abnormal returns begins at the first trading day subsequent to the event. In this case, the mean CAR for the intervals of (1; 10), (1; 30), and (1; 60) sum up to -3.11%, -6.12%, and --7.97%, respectively. The median CAR for the same intervals are -4.81%, -4.71%, and -8.98%, and each of these performance measures is significantly different from zero. In general we would expect that firms return to the equity market to issue additional equity only when there is a need for new funds, for example, to pursue growth strategies. At the same time this could also minimize conflicts of interest between management and outside investors. Therefore, the negative performance during the three months period following the SEO announcement might either signal that investors were too optimistic about the firms' growth opportunities and ongoing investment projects or that management simply exploited windows of opportunities. Whether this reasoning is supported by empirical evidence or not will become more evident when we analyze the abnormal returns for longer time periods in the next section.

4.2 Buy-and-Hold Abnormal Returns

In addition to the short-term stock price reactions it is of interest to get a detailed understanding of the long-term valuation effects before and subsequent to the announcements of share repurchases and seasoned equity offerings. For this we investigate abnormal returns (BHAR) for different intervals ranging from 250 trading days before to 250 trading days after the event. Because BHAR are sensitive to the starting point of the calculation, we calculate the returns for various intervals before, around, and subsequent to the event. Due to the limited data available for those firms that had financing activities relatively soon following the IPO, the sample sizes decrease for longer time horizons. The abnormal performance for various intervals is presented in Table 3 and in Figures 4a, 4b, 5, 7, and 8. Again, we first discuss the results for SRP and then for SEO announcements.

[Insert Table 3 about here]

4.2.1 BHAR of Share Repurchase Announcements

The buy-and-hold abnormal returns (BHAR) for different event windows prior to the announcement are reported in Table 3 (Panel B). For the one year period from 250 trading days to 1 day prior to the events we find significantly negative mean (median) BHAR of -21.73% (-34.33%). Starting closer to the event date, we find for the shorter interval of about 6 months (-125; -1) that the magnitude of the negative abnormal returns is even higher with significantly negative mean (median) BHAR of -24.46% (-29.79%). For the 60-day-trading period subsequent to the SRP announcement, the IPO firms were obviously able to stop the downward trend in their abnormal stock price behavior. This finding is consistent with the short-run valuation effects. The results for the time intervals around the event are reported in Table 3 (Panel A). For the longest time period from one year prior to one year after the event the mean BHAR is -15.52% (Figure 4a). Although this return is substantial but insignificant, the median value is larger with -38.31% and significantly different from zero. The mean BHAR for periods that begin closer to the event date, we find for the intervals (-125; 125) and (-30; 125) negative but insignificant BHAR of -18.68% and -2.36%, respectively. These return patterns are graphed in Figure 5. Most notably, the notion of potential price stabilization through share repurchase announcements becomes evident in Figure 7 and Figure 8. While in Table 3 (Panel B) a negative mean BHAR of -5.79% for the 30 days prior to the event is reported (negative and significant median BHAR of -9.24%), the mean BHAR pattern thereafter is hardly different from zero. Thus, it appears that firms that announced a share repurchase program significantly underperformed the market during the last year.

For the 250 trading days subsequent to the announcement we find a mean (median) BHAR of -12.03% (-26.42%) as reported in Table 3 (Panel C). In this case it seems important to analyze the valuation effects by including the event window, because this reveals whether the management strategy of signaling either undervaluation or a reduction of free cash flow problems was successful. For the intervals subsequent to the event but including the event window (-1; 125) there are insignificant mean (median) BHAR of 4.47% (5.57) as reported in Panel D. For the one year period (-1; 250) (Panel D), the mean BHAR declines to insignificant -5.31% due to the strong abnormal price reaction at the announcement date (Figure 8). If the intention of management was either to signal undervaluation or to signal a reduction in potential free cash flow problems, then it seems fair to conclude that this strategy has been very successful because, on average, the performance of these IPOs over an extended period of time is hardly distinguishable from the market. This is remarkable, because these firms have significantly underperformed the market index prior to the SRP announcement. Nevertheless, it appears that the undervaluation signal or reduction in agency problems was not strong enough to reverse the stock price performance and led to a long-term stock price increase as has been observed in other studies on share repurchases.

[Insert Figures 4a, 4b, 5, 7, and 8 about here]

4.2.2 BHAR of SEO Announcements

For the long-run performance of SEOs prior and subsequent to the announcement we would expect different results than for SRP in the previous section. Overall, we find abnormal price run-ups prior to the SEO announcement followed by a long-run underperformance subsequent to the SEO. These results are presented in Table 3 and Figures 4a and 5. There is evidence of a clear downward trend in the performance of SEOs except for a run-up some weeks prior to the announcement. The mean BHAR for the time intervals (-250; -1) and (-125; -1) prior to the event are -8.93% and -11.55%, respectively, but insignificant. For the time period (-30; 125) around the SEO event (Table 3, Panel A), mean buy-and-hold abnormal returns are significantly negative and sum up to considerable -18.65%. Although the BHAR for the longer time intervals of (-125; 125) and (-250; 250) are also substantial and negative with -29.13% and -23.88%, respectively, they are insignificant. In Figure 4b, we report the buy-and-hold returns that reveal an even stronger negative trend. It needs to be mentioned, however, that the sample size for this larger time window includes only 39 events. For the remaining 12 events we do not have sufficient return data before the event as these firms had their first SEO within a relatively short time span after going public. In Table 3 (Panels C and D) and Figures 7 and

8 we present additional results covering various time intervals. For the time period starting at trading day -1 and ending 125 days or 250 days after the SEO announcement, the IPOs with subsequent SEOs are faced with a substantial underperformance with negative mean abnormal returns of -24.79% and significant -29.70%, respectively. The results for the relatively short time interval beginning 30 days prior and ending 1 day prior to the event (Panel B), is most interesting and in line with previous research findings in that the abnormal performance reveals the typical run-up pattern prior to SEO announcements. For this time period, IPOs manage to have a mean outperformance of 6.17%. However, in terms of the median BHAR, this run-up pattern virtually disappears. Figure 5 clearly reveals the performance reversal around the event date. Following this short term run-up prior to the event, the trend reverses and the BHAR strongly decrease following the day of the SEO announcement. This run-up and the decline of the average abnormal performance relative to the market of more than 30% for the first year after the SEO announcement indicates a substantial overvaluation at the time of the SEO which may be consistent with market timing abilities of management. Another explanation for this performance pattern is that expected growth opportunities did not materialize following the equity issue. It is also possible that overvaluation was signaled to market participants but due to the adverse selection cost of SEOs, the stock prices declined thereafter (Myers and Majluf, 1984).

4.3 Cross-Sectional Regressions for Short-Run Valuation Effects

Our analysis so far revealed significant short-term valuation effects for the interval around the share repurchase and SEO announcements. In order to get a more comprehensive understanding of the factors that influence the magnitude of the stock price reactions we analyze these short-term valuation effects in more detail. For this we first present the methodology and the variables employed and then our empirical findings.

4.3.1 Methodology and Variables

In a first step we perform OLS cross-sectional regressions with different explanatory variables in order to rationalize the valuation effects for the period of one trading day before to one trading day after the announcement (-1; 1) and then compare our results to previous studies.[7] This allows us to test the most common hypotheses in the context of share repurchases and SEO announcements.

[7] We checked for the robustness of the cross-sectional regressions and extended the event window to three and five trading days around the announcement. Our results remain largely unchanged.

(6) $$CAR_i = \beta_0 + \sum_{d=1}^{l} \beta_d D_{d,i} + \sum_{j=l+1}^{k} \beta_j X_{j,i} + \varepsilon_i,$$

The CAR of an event is regressed on a constant, some explanatory dummies, and a set of explanatory variables as indicated by the matrix X. The accounting variables described below enter the regression model in the fiscal year prior to the announcement. To control for potential heteroskedasticity, we estimated the regressions with White (1980) standard errors.

The variables included in the regressions are as follows:

- **Hot-Event**: The sample period is characterized by distinct hot and cold issue market periods as is evidenced in Figure 1a. In order to account for the increasing and declining stock market periods as well as for the differences in issuing activity, this dummy variable is set to 1 if the respective announcement took place between 1998 and 1999 (hot market).
- **Size:** To account for the return differences caused by the size of the IPO, the natural logarithm of total assets (in bn. EUR) at the end of the year prior to the announcement is included.
- **Tangibility:** The ratio of tangible assets to total assets. Information asymmetries should be less pronounced in the presence of more tangible assets. In contrast, growth intensive firms are associated with a lower ratio of tangible assets.
- **R&D-to-Assets:** IPOs that have a higher ratio of R&D expenses to total assets are usually viewed as research oriented high technology firms that should have above average growth opportunities. This should result in an abnormal performance and in a high demand for additional equity. Because not every firm had or is reporting R&D, this variable is set to zero for firms where this variable was missing in COMPUSTAT.
- **CAPEX-to-Assets:** The ratio of capital expenditures to total assets is used as an indication of growth opportunities and investment behavior. We expect a higher ratio for SEOs and a lower for SRP.
- **Cash Flow-to-Assets:** The ratio of cash flows to assets is used as a measure for operating performance and the generation of operating cash flows. Larger relative cash flows should indicate a successful business model but most importantly, these firms have cash surpluses that may be employed for share repurchases.
- **Cash-to-Assets:** A high ratio of cash holdings to assets indicates that this IPO raised either sufficient cash at the time of the IPO and did not invest it so far or that the firm is generating a surplus of operating cash flows. In either case, there is no need for additional equity but there exists the chance to return cash to shareholders.

- **Pre-Market:** The market returns from day 30 to day 2 for the pre-announcement period may be an indication of market timing ability in that management responded quickly to a favorable or unfavorable market environment with an appropriate financing decision.
- **Run-Up**: Buy-and-hold abnormal returns from 30 days to 2 days before the event may be a good indication whether the announcement is new information to the market or whether this has been known to some market participants before or was even influenced in a certain direction before the official announcement. We may expect a positive figure for SEOs and a negative figure for SRP.
- **Dividend:** Dividends and share repurchases are often viewed as substitutes for distributing cash flows to shareholders. Thus, when analyzing share repurchases it is important whether a firm already pays dividends. Jain, Shekhar, and Torbey (2009), for example, find differences between dividend paying and repurchasing IPOs. A dummy variable that takes the value of 1 if the IPO paid a dividend in the last fiscal year prior to the announcement and zero otherwise.

Recent empirical studies for IPOs at the German "Neuer Markt" provide evidence that venture capital (Bessler and Kurth, 2007) and patents (Bessler and Bittelmeyer, 2008) are important valuation factors. In order to analyze whether the involvement of venture capital before the IPO as well as the focus on technology as measured by the patenting activity of these IPOs have any impact on firm valuation, we included two additional dummy variables:

- **VC:** A dummy that takes the value of 1 if the IPO is venture-backed and zero otherwise.
- **Patent:** A dummy variable that takes the value of 1 if the IPO had patents at the time of the IPO and zero otherwise.

In Table 1a we present the descriptive statistics of all variables that are included in the cross-sectional and the probit regressions (see part 4.4). Table 1b compares the means and medians of the three groups of IPOs using a conventional two-sample t-test and the Wilcoxon (1945) rank-sum test.

[Insert Table 1a and 1b around here]

Obviously, IPOs that engage in repurchases or SEOs have significantly higher participation ratios at the time of the IPO.[8] Furthermore, repurchasing firms exhibit higher cash holdings as well as cash flows from operations than both IPO firms in the group without financing activities and especially SEO firms. This provides a first indication of possible conflicts of interest

[8] We come back to this point in more detail in part 4.4.

and free cash flow problems of these firms. Relative to firms without either financing or distribution decision, SEO firms have significantly less cash on their balance sheet, spend more on investment projects (CAPEX), are comparatively smaller, and have higher relative market valuations (M/B). These are characteristics primarily of growth and innovative firms that need additional equity. This is investigated in more detail in the next sections.

In the cross-sectional regressions we precede as follows. First, we consider each explanatory variable sequentially to gain a preliminary understanding of the factors that influence the announcement return (Model I). Then, we report the coefficient estimates of Models II and III, where the variables are separated into two groups. In Model IV all variables are included simultaneously.

4.3.2 Empirical Results for Share Repurchase Announcements

According to the results of the sequential OLS regressions presented in Table 4a, SRP that were announced in a hot market environment have a significantly lower announcement effect compared to events that occur in the cold market period. This finding confirms the notion that an announcement of cash distribution by entrepreneurial firms, especially in hot markets, is interpreted by the market as bad news. This is due to the fact that investors in general would expect that excess internal funds are used to exploit growth opportunities and profitable investment projects instead of repurchasing shares.

[Insert Table 4a and 4b around here]

The positive and significant coefficient for the ratio of R&D expenses to assets contradicts to some extent the expected behavior of growth firms. If higher R&D is a good proxy for growth intensive IPOs, then a negative sign would be expected. However, the R&D-to-assets ratio has to be interpreted with caution as missing values of R&D expenses were set to zero resulting in a median value of zero of that variable. In addition, only one third of all IPOs at the "Neuer Markt" owned patents, indicating that these IPOs were not all high technology firms, although this was supposed to be a market segment especially for this group of firms. Furthermore, a high ratio of cash flow to assets also reduces the announcement effect significantly. This is in contrast to the free cash flow hypothesis of Jensen (1986) that argues that high free cash flows or excess cash indicate agency problems which might be reduced by distributing excess funds to shareholders.

The enlarged models in Table 4b are robust to the findings of the simple regression models. While the R&D ratio turns out to be insignificant in the full model, the Hot-Event dummy remains significant in Model II as well as in the Model IV. The same holds for the ratio of

cash flow to assets. Therefore, market participants seem to interpret the SRP announcement as a lack of ideas and growth opportunities of newly listed firms. Interestingly, in Model III the significantly negative coefficient for the Run-Up variable indicates a higher announcement effect the lower the firm performance over the last six weeks. In related studies on SRP announcements, this variable is consistently interpreted as a proxy for undervaluation (Comment and Jarrell, 1991; Peyer and Vermaelen, 2009; Bessler, Drobetz, and Seim, 2009). Hence, at least to some extent, the SRP was initiated by management to signal undervaluation. Overall, while we cannot confirm the free cash flow hypothesis for SRP announcements, we argue that a lack of investment opportunities combined with high cash flows and/or cash holdings were the main factors of the SRP announcement. In any case, this is interpreted negatively by outside investors. To corroborate these findings we investigate the repurchase decision of IPOs in more detail in section 4.4.

4.3.3 Empirical Results for SEO Announcements

In Table 5a and Table 5b we present the empirical findings for the cross-sectional regressions of the SEO announcement returns. It is much of a surprise that in Model I no explanatory variable indicates a significant correlation with the announcement effect. The small sample size might be one reason why we are only able to interpret the tendency of some of the variables.

[Insert Table 5a and 5b around here]

The Pre-Market variable has the highest t-statistic in Model I which indicates that higher market returns prior to the SEO announcement result in higher valuation effects. Most likely, SEO firms took advantage of a relatively favorable market environment to raise additional capital. It seems that outside investors view the issuance of new equity more optimistic when market conditions are more favorable. Furthermore, the Patent dummy has the second highest t-statistic in Model I. Hence, SEO announcements of IPOs with patents are viewed as good news by the market and lead to a higher valuation by market participants. Besides the significant Pre-Market variable in the full model specification in Table 5b, the t-statistic of 1.66 for the Patent dummy corresponds to a p-value of roughly 10%. If firms engage in research projects that prove successful and lead to patented technology, an SEO announcement might reflect the need for additional funds to pursue growth opportunities and the development of ad-

ditional innovation.[9] This result is also in line with staging considerations of capital issuing and obviously favorably valuated by the capital market (Hertzel, Huson and Parrino, 2009).

4.4 Determining Factors for Share Repurchase and Share Issuance of IPOs

4.4.1 Data and Methodology

After the investigation of the announcement effects for SRP and SEO announcements, we now analyze the *decision* of the IPOs in our sample to repurchase shares or to issue equity by estimating the following probit model.

(7) $$y_i^* = \beta_0 + \sum_{d=1}^{l} \beta_d D_{d,i} + \sum_{j=l+1}^{k} \beta_j X_{j,i} + \varepsilon_i$$

In (7), y_i^* is a non-observable latent variable. Therefore, we use the observable dummy variable y_i

(8) with $$y_i = \begin{cases} 1 & \text{if } y_i^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

In other words, y_i is set to 1 for SRP or SEO announcing firms and zero otherwise. Then y_i^* can be interpreted as the "propensity to announce an SRP / SEO".

As in the cross-sectional analysis, the accounting variables enter the probit models in the fiscal year prior to the announcement. For non-event firms we employ the following approach. The median time until the first financing or distributing event occurs subsequent to the IPO is two years for both the SRP and the SEO announcement. Therefore, we consider the second fiscal year after the time of the IPO as the relevant year for all firms in our probit models that neither announced an SRP nor an SEO. The descriptive statistics for this group are provided in Tables 1a and 1b.

From our cross-sectional regressions of the announcement effect in section 4.3 we include the following variables: Size, Tangibility, R&D, CAPEX, Cash Flow, Cash, Dividend, as well as the VC and Patent dummies. In addition, we include the following explanatory variables in the analysis in order to analyze in more detail staging considerations and potential agency problems as well as conflicts of interest. These problems may have emerged at the time of the IPO and may be the result of the rules and regulations of the "Neuer Markt" listing segment:[10]

9 When we use raw returns instead of abnormal returns as the dependent variable, the coefficient for patenting IPOs turns out to be significant which underlines its importance.

10 We used the data from Bessler and Kurth (2007) and Kurth (2005).

- **Dilution:** Dilution factor. A special listing requirement of Deutsche Börse for the IPOs at the "Neuer Markt" was the mandatory SEO at the time of the IPO. The number of floated secondary shares was limited to a maximum of 50% (Bessler, Kurth, and Thies, 2003; Bessler and Kurth, 2004). Dilution is the ratio of primary shares offered in the IPO to the total number of shares before the offering.
- **Participation**: Participation ratio. This variable is defined as the ratio of offered secondary shares at the time of the IPO to the total number of shares before the offering. Higher values of Participation imply higher fractions of secondary shares issued at the time of the IPO.
- **Hot-IPO**: Dummy variable that takes the value of 1 if the firm went public during the hot market years of 1998 and 1999 and zero otherwise.
- **M/B (Tobin's Q)**: The ratio of the book value of total liabilities plus the market value of equity to total assets.[11] This ratio is often referred to as Tobin's Q.

We follow the same approach as in the cross-sectional regressions of the announcement returns. First, we report simple binary probit regressions and enlarged binary models for comparing two of the three outcomes with each other in section 4.4b: IPOs with SRP announcements, SEO announcements, and IPOs with no financing activity. Finally, in section 4.4c we present the results of a multinomial probit model where we include all three groups. Effectively, this model specification with k categories simultaneously estimates k-1 probit models. In our case, k equals three. The dependent variable takes the value of zero for the group 'No Financing Activity', 1 for 'Repurchase', and 2 for 'SEO'. In the regression, we use either 'No Financing Activity' or 'Repurchase' as the base case. Thus, the signs of the coefficients of the explanatory variables represent an increase or decrease in the probability of the respective outcome relative to the base case.

4.4.2 Empirical Results: Binary Probit Models

We report the results of the coefficient estimates for the binary outcome of an SRP announcement compared to the 'No Financing Activity' group in Tables 6a and 6b. In the simple models (Table 6a) the coefficient for the Dividend dummy indicates that IPO firms that paid a dividend in the year prior to the SRP announcement are more likely to distribute addi-

[11] Compared to all other explanatory variables, M/B has some missing values, so that the inclusion of M/B reduces the sample size in each regression considerably. Therefore, we did not include M/B in the cross-sectional regressions in section 4.3 to avoid estimation difficulties.

tional cash through share repurchases. However, in the following models this variable becomes less important.

[Insert Table 6a and 6b around here]

More interestingly, the participation ratio is positive and significant. A high participation ratio at the time of the IPO reduces insiders' relative stakes in the firm, thus increasing the agency costs from the separation of ownership and control (Jensen and Meckling, 1976). However, a reduction in the proportion of insiders can be viewed as a positive signal as high levels of management ownership might lead to managerial entrenchment and inefficient corporate governance mechanisms. This is in line with the results in Stulz (1988). A high participation ratio accelerates the dispersion of ownership and exposes these IPOs more strongly to the market for corporate control. Corporate governance mechanisms become more effective when excess cash reserves are distributed. Another result supports this rationale. Despite the fact that young and innovative firms usually have high capital needs, it appears that high cash holdings and cash flows relative to assets also increase the likelihood of a payout. Finally, the positive coefficient of the dilution factor indicates a higher propensity to engage in share repurchases when the fraction of primary shares, i.e. the mandatory SEO at the time of the going public and hence the IPO proceeds, is higher. In the full Model IV (Table 6b) Dilution remains significant while Participation and Cash Flow lose their explanatory power. When summarizing our empirical findings, it seems fair to conclude that agency problems are the best explanations why firms that just went public announce share repurchase programs.

The results for the probability of an SEO announcement are presented in Tables 7a and 7b. It is worth mentioning that the explanatory power is nearly twice as high in terms of the pseudo R^2 (18.96% for SEO compared to 9.92% for SRP) and the coefficient estimates are more stable across the different model specifications.

[Insert Table 7a and 7b around here]

First of all, the likelihood of an SEO announcement decreases with size. Presumably these IPO firms are yet in a more mature phase of their life cycle given the relatively small firm size of "Neuer Markt" IPOs. It seems that they have relatively less capital requirements or are able to obtain debt financing more easily. Therefore, they might abstain from issuing equity at unfavorable market conditions in the period following the New Economy bubble. Moreover, R&D intensive IPOs and IPOs with less cash holdings are significantly more likely to issue equity to fund their growth opportunities. Additionally, in Model I (Table 7a) the ratio of CAPEX to assets is also positively related to the probability of an SEO announcement, which

is in line with Cosh, Cumming and Hughes (2009), who report a higher likelihood to seek external finance for high CAPEX-to-profits firms. Overall, our results strongly support the notion of a staging strategy that may be demanded by certain investor groups. To minimize conflicts of interest and agency problems, additional funds are only provided when there are actual financing needs and past investment projects were successful. Evidently, this finding is corroborated by an increasing probability of a seasoned equity offering when the IPO firm generated large cash flows in the past. A high ratio of cash flows to assets indicates successful investment projects with large operating cash inflows. This may convince capital providers to commit to a new financing round.

Finally, we present our results from comparing the SRP and SEO decision of our IPO sample in Table 8a and 8b. Overall, the results confirm our previous findings. Again, a high participation ratio as well as high cash holdings and cash flows increase the likelihood of an SRP announcement. The higher the fraction of secondary shares offered at the time of the IPO the faster is the dispersion of ownership. From a corporate governance perspective, this should lead to less entrenched managers, more effective internal control mechanisms and reduce agency problems that emerge from high cash flows and cash holdings. These agency problems are especially pronounced in the absence of growth opportunities.

[Insert Table 8a and 8b around here]

In contrast, especially patenting firms (Model IV, Table 8b) and firms with a large CAPEX-to-assets ratio (Model I, Table 8a) are significantly more likely to return to the capital market to raise additional capital. This finding underlines the notion that staging considerations mainly impact the SEO decision of IPO firms as already discussed in the last paragraph.

4.4.3 Empirical Results: Multinomial Probit Model

In so far we provided evidence for the main factors that influence the likelihood of a distribution of funds through share repurchases or the need of IPO firms to issue new equity. Therefore we estimated binary probit models. In this section, we now consider the multinomial case where we simultaneously estimate the likelihood of the respective outcomes relative to a benchmark alternative. The results are presented in Table 9.

[Insert Table 9 around here]

Overall, our results from the binary case models are largely confirmed. More precisely, considering the ‘No Financing Activity’ group as the base case, the likelihood of an SRP announcement increases significantly with a higher participation ratio, higher cash holdings, and

higher operating cash flows relative to assets (see first column of Table 9). In contrast, cash rich and large IPO firms are significantly less likely to engage in seasoned equity offerings, while the likelihood increases with a higher R&D expense to asset ratio (see second column of Table 9). Moreover, in the probit model using SRP as the benchmark alternative, cash to assets is statistically negative at the 1% level (fourth column of Table 9). This means that IPO firms with substantial cash reserves are more likely to announce share repurchase programs rather than to seek additional equity finance. Although we cannot directly interpret the coefficient estimates as probabilities, the impact of cash to assets on the likelihood of an SEO relative to the announcement of an SRP is nearly twice as high compared to firms with no financing activity. The negative coefficient for the cash flow to assets variable provides further evidence of a higher likelihood to engage in SRPs but this outcome is less reliable. Its t-statistic corresponds to a p-value of only 10.6%. This is consistent with the binary probit models where cash flow was weakly related to SRPs relative to SEOs. Again, our results confirm the staging considerations for SEO firms while agency problems and conflicts of interest are more likely to force IPOs firms to engage in SRPs. Especially the cash in hand as well as the cash flows generated by the firm's operating activities turn out to be pivotal for the decision to engage in share repurchase programs or to seek new external finance in an SEO.

5. Conclusion

Entrepreneurial high-technology start-up firms usually need equity in order to finance their research, product development, and in particular growth opportunities due to new ideas and innovation. In an advanced stage they often require even larger financial resources and may raise equity by going public (IPO) and, if successful, by a seasoned equity offering (SEO) later on. If these are the typical financing stages then it is surprising when firms that just went public start paying dividends or even repurchase shares. For a sample of 245 of entrepreneurial firms that went public on the German stock market between 1997 and 2002 we investigate the financing activities and payout policies within the first five years after going public. In our empirical analysis we provide evidence that repurchasing firms have substantial and significant positive announcement returns (9.23%) but no significant abnormal stock price performance thereafter. Given that they underperformed the market for the 6-months period before the event (-24.46%) we conclude that they did either sent a positive signal to the market or reduced agency conflicts. For seasoned equity offerings we find a long term negative performance for the year prior to the announcement (-11.55%) which continues in the subsequent year (-30.20%). For the 30 day period before the SEO, we observe, however, a strong outperformance (7.63%) suggesting that management was able to time the market. Furthermore, in

probit models we provide strong evidence that the decision to engage in repurchase activities is best explained by free cash flow problems rather than by undervaluation signaling. In addition, some evidence is found that IPO firms are more likely to announce a repurchase the more pre-IPO owners tender into the IPO. A high participation ratio accelerates the dispersion of ownership and exposes these IPOs more strongly to the market for corporate control. Thus, corporate governance mechanisms become more effective when excess cash reserves are distributed. For SEOs, we argue that young entrepreneurial firms that just went public return to the equity capital market to finance growth opportunities and innovations. This is revealed by our empirical evidence for the cross-section of announcement returns. Additionally, our probit models strongly support the notion of a staging strategy that may be demanded by certain investor groups. To minimize conflicts of interest and agency problems, additional funds are only provided when there are actual financing needs and past investment projects were successful. Overall, the cash position and the cash flows from operation turn out to be pivotal for the decision to engage either in repurchasing shares or in issuing additional equity.

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	Repurchase max. number of obs. = 46			SEO max. number of obs. = 51			No Financing Activity max. number of obs. = 148		
	Mean	Sd	Median	Mean	Sd	Median	Mean	Sd	Median
Participation	10.70%	11.76%	8.20%	10.98%	11.36%	7.23%	7.58%	7.52%	5.37%
Dilution	43.10%	41.43%	34.00%	37.52%	25.02%	33.36%	34.16%	11.12%	33.23%
Tangibility	9.86%	10.11%	6.00%	12.70%	13.56%	7.69%	11.57%	11.43%	7.63%
R&D	2.77%	5.17%	0.00%	4.49%	9.98%	0.00%	3.33%	7.13%	0.00%
CAPEX	7.56%	7.21%	5.34%	11.79%	13.77%	6.67%	7.78%	10.15%	4.32%
Cash Flow	0.83%	19.35%	4.96%	-9.71%	27.24%	-0.49%	-14.56%	42.51%	-2.54%
Cash	40.53%	25.77%	36.38%	17.61%	18.65%	9.72%	29.19%	21.06%	29.07%
M/B	2.87	3.43	1.59	3.27	3.33	2.42	2.85	7.84	1.35
Size	3.84	1.06	3.76	3.71	0.94	3.75	4.15	1.05	3.91
Pre-Market	-3.80%	8.27%	-3.04%	1.20%	8.75%	0.86%			
Run-Up	-6.06%	23.86%	-9.03%	5.83%	29.50%	-0.73%			
VC	32.61%			41.18%			32.43%		
Patent	24.44%			32.00%			32.19%		
Hot-IPO	52.17%			66.67%			47.97%		
Dividend	22.73%			14.29%			13.97%		
Hot-Event	13.04%			11.76%					

Table 1a: The table reports the mean, standard deviation, and median values for the variables used in the cross-sectional and probit regressions. The variables are the participation ratio (Participation) and the dilution factor (Dilution) at IPO, the ratio of tangible assets to total assets (Tangibility), the ratio of R&D to assets (R&D), the ratio of capital expenditures to total assets (CAPEX), the ratio of cash flow to assets (Cash Flow), the ratio of cash accounts to assets (Cash), the market-to-book ratio (M/B), the natural logarithm of total assets (Size), and the market and the firm performance in the interval [-30;-2] relative to the event day (Pre-Market and Run-Up, respectively). The dummy variables are whether the IPO was venture backed (VC), held at least one patent at the IPO (Patent), whether the event took place in an hot market environment or not (Hot-Event), and whether the IPO paid a dividend in the year prior to the announcement (Dividend) An IPO firms is classified into the Repurchase group when it announced a share repurchase program within the first five years after IPO, into the SEO group when it announced an SEO within the first five years after IPO, or into the Nothing group when it announced neither of them. Accounting variables are evaluated for the last fiscal year prior to the respective announcement. Accounting variables of the non-event firms (No Activity group) are evaluated for the second year after the going public as the median time after going public until the first financing or distributing event occurs, is two years for SRP as well as for SEO announcements.

	t-test			Wilcoxon z-Score		
	Repurchase vs. No Activity	**SEO vs. No Activity**	**Repurchase vs. SEO**	**Repurchase vs. No Activity**	**SEO vs. No Activity**	**Repurchase vs. SEO**
Participation	**2.121****	**2.417****	-0.120	1.445	1.586	-0.181
Dilution	**2.376****	1.304	0.813	1.126	0.616	0.520
Tangibility	-0.904	0.572	-1.158	-0.969	0.123	-1.076
R&D	-0.486	0.888	-1.046	0.048	-0.303	0.263
CAPEX	-0.135	**2.100****	**-1.813***	0.683	1.271	-0.662
Cash Flow	**2.345****	0.757	**2.158****	**3.542*****	0.394	**2.272****
Cash	**2.985*****	**-3.455*****	**5.051*****	**2.528****	**-3.619*****	**4.486*****
M/B	0.016	0.347	-0.533	1.030	**-2.650*****	-1.185
Size	**-1.756***	**-2.627*****	0.614	-1.531	**-2.046****	0.354

Table 1b: The table reports the t-statistics and z-scores for the two-sample t-test and the Wilcoxon rank-sum test, respectively. The variables are the participation ratio (Participation) and the dilution factor (Dilution) at IPO, the ratio of tangible assets to total assets (Tangibility), the ratio of R&D to assets (R&D), the ratio of capital expenditures to total assets (CAPEX), the ratio of cash flow to assets (Cash Flow), the ratio of cash accounts to assets (Cash), the market-to-book ratio (M/B), and the natural logarithm of total assets (Size). For the mean and median values of the variables see Table 1a. An IPO firms is classified into the Repurchase group when it announced a share repurchase program within the first five years after IPO, into the SEO group when it announced an SEO within the first five years after IPO, or into the Nothing group when it announced neither of them. Accounting variables are evaluated for the last fiscal year prior to the respective announcement. Accounting variables of the non-event firms (No Activity group) are evaluated for the second year after the going public as the median time after going public until the first financing or distributing event occurs, is two years for SRP as well as for SEO announcements. *, **, *** represent the 10%, 5%, and 1% significance level, respectively.

	Repurchase, n=46				**SEO, n=51**			
	CAR		t-stat	z-score	CAR		t-stat	z-score
interval	Mean	Median	skew-adj	signed-rank	Mean	Median	skew-adj	signed-rank
Panel A: Intervals around the event								
CAR [-1; 1]	**8.61%*** **	**6.99%*** **	(3.050)	(4.802)	**4.04%** **	0.11%	(2.340)	(1.603)
CAR [-3; 3]	**9.23%*** **	**11.65%*** **	(2.880)	(3.600)	3.00%	-0.77%	(1.370)	(0.225)
CAR [-5; 5]	7.38%	**6.24%*** **	(1.570)	(2.791)	2.56%	-0.02%	(0.960)	(0.150)
CAR [-30; 30]	-0.09%	0.02%	(-0.170)	(0.961)	5.25%	1.96%	(0.900)	(0.403)
CAR [-60; 60]	**-13.63%** **	**-12.37%* **	(-2.080)	(-1.906)	2.10%	1.50%	(0.300)	(0.300)
Panel B: Intervals prior to event, excluding the event								
CAR [-3; -1]	1.11%	2.01%	(0.720)	(0.967)	0.55%	-0.59%	(0.360)	(-0.394)
CAR [-5; -1]	0.21%	-0.06%	(0.120)	(-0.115)	0.32%	0.29%	(0.180)	(0.141)
CAR [-30; -1]	-5.61%	-8.76%	(-1.300)	(-1.644)	**7.63%* **	**3.29%* **	(1.870)	(1.706)
CAR [-60; -1]	**-14.86%*** **	**-15.01%*** **	(-3.150)	(-2.835)	6.33%	6.19%	(0.980)	(0.815)
Panel C: Intervals after the event, including the event								
CAR [-1; 5]	**7.18%** **	**4.63%*** **	(2.060)	(2.999)	2.24%	0.41%	(1.010)	(0.281)
CAR [-1; 10]	**6.08%* **	**4.68%** **	(1.880)	(2.256)	0.62%	-3.98%	(0.270)	(-0.750)
CAR [-1; 30]	4.73%	3.06%	(0.980)	(1.317)	-2.34%	**-4.28%* **	(-0.410)	(-1.762)
CAR [-1; 60]	1.23%	6.81%	(0.220)	(0.737)	-4.24%	-4.22%	(-0.860)	(-1.312)
Panel D: Intervals after the event, excluding the event								
CAR [1; 5]	-1.01%	0.34%	(-0.610)	(-0.322)	-1.50%	**-3.19%* **	(-1.050)	(-1.856)
CAR [1; 10]	-2.11%	-3.68%	(-1.050)	(-0.934)	**-3.11%* **	**-4.81%** **	(-1.940)	(-2.390)
CAR [1; 30]	-3.45%	-2.00%	(-0.730)	(-0.650)	-6.12%	**-4.71%** **	(-1.000)	(-2.475)
CAR [1; 60]	-6.96%	-0.41%	(-1.420)	(-0.912)	-7.97%	**-8.98%** **	(-1.510)	(-2.137)

Table 2: The table reports the mean cumulative abnormal returns for the two subsamples of repurchase announcements (n=46) and SEO announcements (n=51). Panel A shows the intervals around the event data, Panel B shows the intervals prior to the event, in Panel C the intervals after the event data are presented when the event is included in the calculation of the CAR, and Panel D represents the intervals after the event when the event is excluded. The values in the columns "t-stat" and "z-score" indicate the t-statistic of the bootstrapped skewness adjusted t-test and the z-score of the Wilcoxon (1945) signed-rank median test, respectively. *, **, *** represent the 10%, 5%, and 1% significance level, respectively.

	Repurchase min. number of obs. n=39				**SEO min. number of obs. n=39**			
	BHAR		t-stat	z-score	BHAR		t-stat	z-score
interval	Mean	Median	skew-adj	signed-rank	Mean	Median	skew-adj	signed-rank
Panel A: Intervals around the event								
BHAR [-30; 125]	-2.36%	-5.76%	(-0.220)	(-1.164)	**-18.65%****	**-24.39%*****	(-2.340)	(-3.018)
BHAR [-125; 125]	-18.68%	**-28.14%*****	(-0.800)	(-3.502)	-29.13%	**-35.95%*****	(-1.300)	(-4.083)
BHAR [-250; 250]	-15.52%	**-38.31%****	(-0.910)	(-2.526)	-23.88%	**-44.56%*****	(-0.360)	(-3.600)
Panel B: Intervals before the event, excluding the event								
BHAR [-30; -1]	-5.79%	**-9.24%****	(-1.310)	(-2.147)	6.17%	0.43%	(1.460)	(1.040)
BHAR [-125; -1]	**-24.46%*****	**-29.79*****	(-4.740)	(-4.275)	-8.93%	**-15.51%****	(-0.800)	(-2.134)
BHAR [-250; -1]	**-21.73%*****	**-34.33%*****	(-2.740)	(-2.931)	-11.55%	-41.46%	(-0.830)	(-1.340)
Panel C: Intervals after the event, excluding the event								
BHAR [1; 125]	-3.22%	-8.72%	(-0.530)	(-0.683)	**-26.39%*****	**-29.45%*****	(-3.550)	(-4.667)
BHAR [1; 250]	-12.03%	**-26.42%****	(-1.000)	(-2.507)	-30.20%	**-39.00%*****	(-1.230)	(-4.199)
Panel D: Intervals after the event, including the event								
BHAR [-1; 125]	4.47%	5.57%	(0.710)	(0.486)	**-24.79%*****	**-24.39%*****	(-3.160)	(-4.481)
BHAR [-1; 250]	-5.31%	**-18.78%***	(-0.430)	(-1.677)	-29.70%	**-40.19%*****	(-1.370)	(-4.171)

Table 3: The table reports the mean buy-and-hold abnormal returns for the two subsamples of repurchase announcements and SEO announcements. The sample size diminishes to a minimum number n=39 repurchase announcements and n=39 SEO announcements due to missing returns history. Panel A reports the BHAR around the event, in Panel B the intervals before the event are presented, excluding the event, Panel C and D represent the BHAR after the event. While in Panel C the event is excluded, in Panel D the event is included. The values in the columns "t-stat" and "z-score" indicate the t-statistic of the bootstrapped skewness adjusted t-test and the z-score of the Wilcoxon (1945) signed-rank median test, respectively. *, **, *** represent the 10%, 5%, and 1% significance level, respectively.

Dependent Variable: CAR [-1; 1] of Repurchase announcements					
indep. var.	Model I	const	adj. R^2	F-Test	N
Hot-Event	**-0.0511*** (-1.7804)	**0.0928***** (5.5225)	0.73%	3.1697	46
VC	-0.0220 (-0.6784)	**0.0933***** (5.1179)	-1.20%	0.4602	46
Patent	0.0201 (0.6746)	**0.0837***** (4.4834)	-1.56%	0.4551	45
Size	-0.0094 (-0.4577)	0.1223 (1.5803)	-1.28%	0.2095	46
Tangibility	0.149 (1.3982)	**0.0714***** (3.4457)	-0.02%	1.9550	46
R&D	**0.4887*** (1.7091)	**0.0725***** (4.2494)	4.05%	2.9209	46
CAPEX	0.1002 (0.5405)	**0.0812***** (3.3529)	-1.86%	0.2921	44
Cash Flow	**-0.2184***** (-3.6134)	**0.0913***** (6.7109)	15.92%	13.0568	45
Cash	0.0635 (1.1694)	**0.0604**** (2.5118)	0.38%	1.3675	46
Pre-Market	-0.0725 (-0.5715)	0.1559 (1.2626)	-1.92%	0.3266	46
Run-Up	-0.0739 (-1.1109)	**0.0816***** (6.2288)	0.81%	1.2341	46
Dividend	-0.0354 (-1.4505)	**0.0969***** (5.0309)	-0.13%	2.1038	44

Table 4a: The table reports the results for the OLS cross-sectional regressions with White (1980) standard errors depending on one single explanatory variable. The cumulative abnormal returns of repurchase announcements for the days [-1; 1] is the dependent variable. The explanatory variables are whether the event took place in an hot market environment or not (Hot-Event), whether the IPO was venture backed (VC), held at least one patent at the IPO (Patent), the natural logarithm of total assets (Size), the ratio of tangible assets to total assets (Tangibility), the ratio of R&D to assets (R&D), the ratio of capital expenditures to total assets (CAPEX), the ratio of cash flow to assets (Cash Flow), the ratio of cash accounts to assets (Cash), the market and the firm performance in the interval [-30; -2] relative to the event day (Pre-Market and Run-Up, respectively) and whether the IPO paid a dividend in the year prior to the announcement (Dividend). Accounting variables are evaluated for the last fiscal year prior to the announcement. The sample size varies due to missing values for some of the variables. Accounting variables are evaluated for the last fiscal year prior to the announcement. The sample size varies slightly due to missing values for some of the variables. *, **, *** represent the 10%, 5%, and 1% significance level, respectively. Values in parentheses indicate t-statistics.

Dependent Variable: CAR [-1; 1] of Repurchase announcements						
	Model II		Model III		Model IV	
indep. var.	coefficient	t-statistic	coefficient	t-statistic	coefficient	t-statistic
Hot-Event	**-0.0951*** **	(-2.9954)			**-0.0622***	(-1.9998)
VC	-0.0212	(-0.7214)			-0.0202	(-0.7168)
Patent	-0.0013	(-0.0462)			0.0065	(0.1924)
Size	-0.0184	(-0.8600)			-0.0138	(-0.6098)
Tangibility	0.0752	(0.4495)			0.1321	(0.8809)
R&D	**0.5073***	(1.9700)			0.0157	(0.0627)
CAPEX	0.1261	(0.6916)			0.1002	(0.5551)
Cash Flow			**-0.2446*** **	(-3.1405)	**-0.2415*** **	(-3.1149)
Cash			-0.0176	(-0.2827)	-0.0153	(-0.1698)
Pre-Market			-0.0771	(-0.4337)	-0.0298	(-0.1258)
Run-Up			**-0.1058***	(-1.9379)	-0.0834	(-1.3523)
Dividend			-0.0038	(-0.1420)	0.0094	(0.2310)
const	**0.1493***	(1.8760)	0.1669	(1.0235)	0.1663	(0.6706)
adj. R^2	3.09%		14.94%		7.03%	
F-Test	2.7012		4.4178		3.8523	
N	43		44		43	

Table 4b: The table reports the results for the OLS cross-sectional regressions with White (1980) standard errors depending on different model specifications. The cumulative abnormal returns of repurchase announcements for the days [-1; 1] is the dependent variable. The explanatory variables are whether the event took place in an hot market environment or not (Hot-Event), whether the IPO was venture backed (VC), held at least one patent at the IPO (Patent), the natural logarithm of total assets (Size), the ratio of tangible assets to total assets (Tangibility), the ratio of R&D to assets (R&D), the ratio of capital expenditures to total assets (CAPEX), the ratio of cash flow to assets (Cash Flow), the ratio of cash accounts to assets (Cash), the market and the firm performance in the interval [-30; -2] relative to the event day (Pre-Market and Run-Up, respectively) and whether the IPO paid a dividend in the year prior to the announcement (Dividend). Accounting variables are evaluated for the last fiscal year prior to the announcement. The sample size varies due to missing values for some of the variables. Accounting variables are evaluated for the last fiscal year prior to the announcement. The sample size varies slightly due to missing values for some of the variables. *, **, *** represent the 10%, 5%, and 1% significance level, respectively. Values in parentheses indicate t-statistics.

Dependent Variable: CAR [-1; 1] of SEO announcements					
indep. var.	Model I	const	adj. R^2	F-Test	N
Hot-Event	-0.0294 (-0.9296)	**0.0438*** (1.6870)	-1.69%	0.8642	51
VC	-0.0231 (-0.554)	0.0499 (1.3674)	-1.54%	0.3069	51
Patent	0.0927 (1.4125)	0.0119 (0.8375)	5.12%	1.9953	50
Size	-0.016 (-1.2387)	**0.1000**** (2.1653)	-1.18%	1.5345	51
Tangibility	0.2176 (0.6937)	0.0128 (0.4671)	1.30%	0.4812	51
R&D	0.0015 (0.0125)	0.0403 (1.4936)	-2.04%	0.0002	51
CAPEX	-0.1835 (-1.1193)	0.0676 (1.6687)	0.02%	1.2528	46
Cash Flow	-0.1145 (-1.2237)	0.0293 (1.6678)	1.69%	1.4974	51
Cash	0.0320 (0.3061)	0.0348 (1.0208)	-1.90%	0.0937	51
Pre-Market	0.3611 (1.5074)	-0.3250 (-1.3425)	1.79%	2.2722	51
Run-Up	0.0056 (0.1325)	**0.0401*** (1.6780)	-2.03%	0.0175	51
Dividend	-0.0340 (-0.9317)	**0.0470*** (1.7068)	-1.59%	0.8680	49

Table 5a: The table reports the results for the OLS cross-sectional regressions with White (1980) standard errors depending on one single explanatory variable. The cumulative abnormal returns of SEO announcements for the days [-1; 1] is the dependent variable. The explanatory variables are whether the event took place in an hot market environment or not (Hot-Event), whether the IPO was venture backed (VC), held at least one patent at the IPO (Patent), the natural logarithm of total assets (Size), the ratio of tangible assets to total assets (Tangibility), the ratio of R&D to assets (R&D), the ratio of capital expenditures to total assets (CAPEX), the ratio of cash flow to assets (Cash Flow), the ratio of cash accounts to assets (Cash), the market and the firm performance in the interval [-30; -2] relative to the event day (Pre-Market and Run-Up, respectively) and whether the IPO paid a dividend in the year prior to the announcement (Dividend). Accounting variables are evaluated for the last fiscal year prior to the announcement. The sample size varies due to missing values for some of the variables. Accounting variables are evaluated for the last fiscal year prior to the announcement. The sample size varies slightly due to missing values for some of the variables. *, **, *** represent the 10%, 5%, and 1% significance level, respectively. Values in parentheses indicate t-statistics.

Dependent Variable: CAR [-1; 1] of SEO announcements						
	Model II		Model III		Model IV	
indep. var.	coefficient	t-statistic	coefficient	t-statistic	coefficient	t-statistic
Hot-Event	-0.0292	(-0.7637)			0.0080	(0.1716)
VC	-0.0479	(-0.7111)			-0.0625	(-0.8877)
Patent	0.1137	(1.4723)			0.1742	(1.6620)
Size	-0.0128	(-0.5075)			-0.0159	(-0.5624)
Tangibility	0.2669	(0.7419)			0.2094	(0.6237)
R&D	-0.1895	(-1.0851)			-0.2412	(-0.9467)
CAPEX	-0.2140	(-0.9583)			-0.1750	(-0.9473)
Cash Flow			-0.1105	(-0.9068)	-0.0950	(-0.6540)
Cash			-0.0447	(-0.2936)	-0.1891	(-0.7737)
Pre-Market			0.3522	(1.3953)	**0.5851****	(2.3705)
Run-Up			0.0001	(0.0033)	-0.0330	(-0.5484)
Dividend			-0.0189	(-0.6421)	-0.0492	(-0.7464)
const	0.0804	(0.9172)	-0.3156	(-1.2266)	-0.4810	(-1.6741)
adj. R^2	2.74%		-3.53%		2.95%	
F-Test	0.5923		0.7902		1.1969	
N	45		49		45	

Table 5b: The table reports the results for the OLS cross-sectional regressions with White (1980) standard errors depending on different model specifications. The cumulative abnormal returns of SEO announcements for the days [-1; 1] is the dependent variable. The explanatory variables are whether the event took place in an hot market environment or not (Hot-Event), whether the IPO was venture backed (VC), held at least one patent at the IPO (Patent), the natural logarithm of total assets (Size), the ratio of tangible assets to total assets (Tangibility), the ratio of R&D to assets (R&D), the ratio of capital expenditures to total assets (CAPEX), the ratio of cash flow to assets (Cash Flow), the ratio of cash accounts to assets (Cash), the market and the firm performance in the interval [-30; -2] relative to the event day (Pre-Market and Run-Up, respectively) and whether the IPO paid a dividend in the year prior to the announcement (Dividend). Accounting variables are evaluated for the last fiscal year prior to the announcement. The sample size varies due to missing values for some of the variables. Accounting variables are evaluated for the last fiscal year prior to the announcement. The sample size varies slightly due to missing values for some of the variables. *, **, *** represent the 10%, 5%, and 1% significance level, respectively. Values in parentheses indicate t-statistics.

Dependent Variable: Binary Variable 1 for Repurchase Announcement, zero otherwise					
indep. var.	Model I	const	Pseudo R^2	Chi^2	N
VC	0.0047 (0.0223)	**-0.7171***** (-5.9575)	0.00%	0.0005	194
Patent	-0.2223 (-0.9952)	**-0.6568***** (-5.5835)	0.48%	1.0053	191
Hot-IPO	0.0985 (0.4977)	**-0.7647***** (-5.4503)	0.12%	0.2478	194
Participation	**2.1647**** (1.9864)	**-0.9061***** (-6.5047)	1.89%	4.0153	194
Dilution	**1.1089*** (1.7609)	**-1.1217***** (-4.5388)	2.34%	4.9725	194
Size	-0.0246 (-0.2573)	-0.5727 (-1.4052)	0.03%	0.0663	184
Tangibility	-0.9145 (-0.9263)	**-0.5761***** (-3.9783)	0.43%	0.8866	184
R&D	-1.3617 (-0.7783)	**-0.6350***** (-5.686)	0.31%	0.6499	184
CAPEX	-0.989 (-0.7755)	**-0.5905***** (-4.3813)	0.31%	0.6433	181
Cash Flow	**0.8295*** (1.8763)	**-0.6019***** (-5.7253)	2.33%	4.8018	182
Cash	0.625 (1.3523)	**-0.8707***** (-4.8824)	0.89%	1.8326	184
M/B	-0.0100 (-0.4833)	**-0.6491***** (-5.7296)	0.15%	0.2937	180
Dividend	**0.4680*** (1.8349)	**-0.7549***** (-6.6631)	1.61%	3.3232	182

Table 6a: The table reports the results for the probit model estimation whether a German IPO from the Neuer Markt is more likely to announce a repurchase depending on one single explanatory variable. The explanatory variables are whether the IPO was venture backed (VC), held at least one patent at the IPO (Patent), whether the IPO took place in a hot market environment (Hot-IPO), the participation ratio (Participation) and the dilution factor (Dilution) at IPO, the natural logarithm of total assets (Size), the ratio of tangible assets to total assets (Tangibility), the ratio of R&D to assets (R&D), the ratio of capital expenditures to total assets (CAPEX), the ratio of cash flow to assets (Cash Flow), the ratio of cash accounts to assets (Cash), the market-to-book ratio (M/B), and whether the IPO paid a dividend in the year prior to the announcement (Dividend). Accounting variables are evaluated for the last fiscal year prior to the announcement. The sample size varies due to missing values for some of the variables. *, **, *** represent the 10%, 5%, and 1% significance level, respectively. Values in parentheses indicate t-statistics.

Dependent Variable: Binary Variable 1 for Repurchase Announcement, zero otherwise						
	Model II		Model III		Model IV	
indep. var.	coefficient	t-statistic	coefficient	t-statistic	coefficient	t-statistic
VC	-0.1745	(-0.7392)			-0.0461	(-0.1830)
Patent	-0.2917	(-1.2251)			-0.2156	(-0.8084)
Hot-IPO	0.0750	(0.3484)			0.1649	(0.6588)
Participation	1.9891	(1.5961)			1.3773	(1.0321)
Dilution	1.1168	(1.5552)			**1.4040***	(1.6874)
Size	-0.0429	(-0.4249)			-0.1076	(-0.8785)
Tangibility			-0.0140	(-0.0121)	-0.1237	(-0.0994)
R&D			-1.1392	(-0.5524)	-0.8090	(-0.3451)
CAPEX			-0.3359	(-0.2452)	-0.7719	(-0.5212)
Cash Flow			0.7895	(1.5673)	0.8693	(1.6130)
Cash			**0.8736***	(1.6754)	0.8070	(1.4302)
M/B			-0.0109	(-0.4209)	-0.0119	(-0.4269)
Dividend			0.3911	(1.4518)	0.4184	(1.3655)
const	**-0.9839***	(-1.8466)	**-0.8714*****	(-3.1043)	-0.9964	(-1.3808)
Pseudo R^2	4.80%		5.43%		9.92%	
Chi^2	9.7387		10.8617		19.7354	
N	181		176		174	

Table 6b: The table reports the results for the probit model estimation whether a German IPO from the Neuer Markt is more likely to announce a repurchase depending on different model specifications. The explanatory variables are whether the IPO was venture backed (VC), held at least one patent at the IPO (Patent), whether the IPO took place in a hot market environment (Hot-IPO), the participation ratio (Participation) and the dilution factor (Dilution) at IPO, the natural logarithm of total assets (Size), the ratio of tangible assets to total assets (Tangibility), the ratio of R&D to assets (R&D), the ratio of capital expenditures to total assets (CAPEX), the ratio of cash flow to assets (Cash Flow), the ratio of cash accounts to assets (Cash), the market-to-book ratio (M/B), and whether the IPO paid a dividend in the year prior to the announcement (Dividend). Accounting variables are evaluated for the last fiscal year prior to the announcement. The sample size varies due to missing values for some of the variables. *, **, *** represent the 10%, 5%, and 1% significance level, respectively. Values in parentheses indicate t-statistics.

Dependent Variable: Binary Variable 1 for SEO Announcement, zero otherwise					
indep. var.	Model I	const	Pseudo R^2	Chi^2	N
VC	0.2244 (1.1246)	**-0.7363***** (-6.0618)	0.01%	1.2597	199
Patent	-0.0052 (-0.0251)	**-0.6568***** (-5.5835)	0.00%	0.0006	196
Hot-IPO	**0.4551**** (2.3072)	**-0.9121***** (-6.0469)	2.39%	5.4115	199
Participation	**2.4399**** (2.2722)	**-0.8729***** (-6.3509)	2.33%	5.2709	199
Dilution	0.7257 (1.1716)	**-0.9113***** (-3.8157)	0.66%	1.5036	199
Size	**-0.2740***** (-2.5921)	0.4676 (1.1036)	3.29%	7.2422	189
Tangibility	0.4489 (0.5645)	**-0.6674***** (-4.8601)	0.14%	0.3171	189
R&D	1.0087 (0.8588)	**-0.6517***** (-6.0467)	0.33%	0.7347	189
CAPEX	**1.6922**** (2.0047)	**-0.8208***** (-6.3093)	1.93%	3.9679	181
Cash Flow	0.2310 (0.7790)	**-0.5767***** (-5.5588)	0.30%	0.6660	187
Cash	**-1.7369***** (-3.3513)	-0.2022 (-1.3209)	5.51%	12.1344	189
M/B	0.0052 (0.3666)	**-0.7035***** (-6.3234)	0.06%	0.1270	179
Dividend	0.0155 (0.0544)	**-0.6306***** (-5.8978)	0.00%	0.0030	185

Table 7a: The table reports the results for the probit model estimation whether a German IPO from the Neuer Markt is more likely to announce an SEO depending on one single explanatory variable. The explanatory variables are whether the IPO was venture backed (VC), held at least one patent at the IPO (Patent), whether the IPO took place in a hot market environment (Hot-IPO), the participation ratio (Participation) and the dilution factor (Dilution) at IPO, the natural logarithm of total assets (Size), the ratio of tangible assets to total assets (Tangibility), the ratio of R&D to assets (R&D), the ratio of capital expenditures to total assets (CAPEX), the ratio of cash flow to assets (Cash Flow), the ratio of cash accounts to assets (Cash), the market-to-book ratio (M/B), and whether the IPO paid a dividend in the year prior to the announcement (Dividend). Accounting variables are evaluated for the last fiscal year prior to the announcement. The sample size varies due to missing values for some of the variables. *, **, *** represent the 10%, 5%, and 1% significance level, respectively. Values in parentheses indicate t-statistics.

Dependent Variable: Binary Variable 1 for SEO Announcement, zero otherwise						
	Model II		Model III		Model IV	
indep. var.	coefficient	t-statistic	coefficient	t-statistic	coefficient	t-statistic
VC	0.0234	(0.1039)			0.2004	(0.7679)
Patent	0.0609	(0.2628)			0.2288	(0.8734)
Hot-IPO	**0.5505****	(2.4453)			0.2008	(0.7226)
Participation	1.8636	(1.5004)			0.3507	(0.2326)
Dilution	0.9397	(1.3256)			1.2290	(1.3448)
Size	**-0.3167*****	(-2.8108)			**-0.5139*****	(-3.2680)
Tangibility			0.2609	(0.2765)	0.0069	(0.0067)
R&D			**3.5708*****	(2.6014)	**4.0048****	(2.4378)
CAPEX			0.9969	(1.0174)	1.4063	(1.2817)
Cash Flow			0.1478	(0.4673)	**0.7112***	(1.6973)
Cash			**-1.9784*****	(-3.1753)	**-2.1931*****	(-2.9715)
M/B			-0.0039	(-0.2375)	-0.0020	(-0.1186)
Dividend			-0.1399	(-0.4209)	-0.0106	(-0.0285)
const	-0.2135	(-0.4030)	**-0.4649***	(-1.8939)	0.8878	(1.0863)
Pseudo R^2	9.07%		8.88%		18.96%	
Chi^2	19.6441		16.528		34.5153	
N	186		171		168	

Table 7b: The table reports the results for the probit model estimation whether a German IPO from the Neuer Markt is more likely to announce an SEO depending on different model specifications. The explanatory variables are whether the IPO was venture backed (VC), held at least one patent at the IPO (Patent), whether the IPO took place in a hot market environment (Hot-IPO), the participation ratio (Participation) and the dilution factor (Dilution) at IPO, the natural logarithm of total assets (Size), the ratio of tangible assets to total assets (Tangibility), the ratio of R&D to assets (R&D), the ratio of capital expenditures to total assets (CAPEX), the ratio of cash flow to assets (Cash Flow), the ratio of cash accounts to assets (Cash), the market-to-book ratio (M/B), and whether the IPO paid a dividend in the year prior to the announcement (Dividend). Accounting variables are evaluated for the last fiscal year prior to the announcement. The sample size varies due to missing values for some of the variables. *, **, *** represent the 10%, 5%, and 1% significance level, respectively. Values in parentheses indicate t-statistics.

Dependent Variable: Binary Variable 1 for Repurchase Announcement, zero for SEO Announcement					
indep. var.	Model I	const	Pseudo R^2	Chi^2	N
VC	-0.2310 (-0.8724)	0.0205 (0.1280)	0.57%	0.7632	97
Patent	-0.2342 (-0.8157)	0.0000 (0.0000)	0.51%	0.6680	95
Hot-IPO	-0.3792 (-1.4518)	0.1614 (0.8003)	1.58%	2.1177	97
Participation	-0.1347 (-0.1210)	-0.0500 (-0.2852)	0.01%	0.0146	97
Dilution	0.3311 (0.8059)	-0.1968 (-0.9527)	0.52%	0.6942	97
Size	0.0799 (0.6179)	-0.3664 (-0.7260)	0.29%	0.3834	97
Tangibility	-1.2828 (-1.1626)	0.0789 (0.4465)	1.03%	1.3890	97
R&D	-1.8827 (-1.0431)	0.0013 (0.0095)	0.89%	1.1968	97
CAPEX	**-2.3653*** (-1.7816)	0.1936 (1.0810)	2.77%	3.4587	90
Cash Flow	**1.2073**** (2.1186)	-0.0297 (-0.2260)	3.58%	4.7448	96
Cash	**2.6555***** (4.3994)	**-0.8064***** (-3.7987)	16.54%	22.2009	97
M/B	-0.0225 (-0.5383)	-0.0392 (-0.2066)	0.26%	0.2905	81
Dividend	0.3553 (1.0483)	-0.1323 (-0.9174)	0.86%	1.1069	93

Table 8a: The table reports the results for the probit model estimation whether a German IPO from the Neuer Markt is more likely to announce a repurchase (value 1) or an SEO (value 0) depending on one single explanatory variable. The explanatory variables are whether the IPO was venture backed (VC), held at least one patent at the IPO (Patent), whether the IPO took place in a hot market environment (Hot-IPO), the participation ratio (Participation) and the dilution factor (Dilution) at IPO, the natural logarithm of total assets (Size), the ratio of tangible assets to total assets (Tangibility), the ratio of R&D to assets (R&D), the ratio of capital expenditures to total assets (CAPEX), the ratio of cash flow to assets (Cash Flow), the ratio of cash accounts to assets (Cash), the market-to-book ratio (M/B), and whether the IPO paid a dividend in the year prior to the announcement (Dividend). Accounting variables are evaluated for the last fiscal year prior to the announcement. The sample size varies due to missing values for some of the variables. *, **, *** represent the 10%, 5%, and 1% significance level, respectively. Values in parentheses indicate t-statistics.

Dependent Variable: Binary Variable 1 for Repurchase Ann., zero for SEO Ann.						
	Model II		Model III		Model IV	
indep. var.	coefficient	t-statistic	coefficient	t-statistic	coefficient	t-statistic
VC	-0.2490	(-0.8566)			-0.4808	(-1.0372)
Patent	-0.3246	(-1.0464)			**-0.8303***	(-1.6464)
Hot-IPO	**-0.5255***	(-1.7262)			-0.3435	(-0.6357)
Participation	0.8598	(0.6388)			**3.5636***	(1.6681)
Dilution	0.3265	(0.7698)			-1.1744	(-0.8409)
Size	0.0779	(0.5829)			0.1248	(0.4757)
Tangibility			-0.0653	(-0.0403)	0.7151	(0.3976)
R&D			-1.5330	(-0.5616)	-0.0091	(-0.0026)
CAPEX			-2.2640	(-1.0094)	-2.3771	(-0.9271)
Cash Flow			**2.4603****	(2.4691)	**2.3143***	(1.9087)
Cash			**4.2470*****	(4.4970)	**4.9420*****	(4.1592)
M/B			-0.0118	(-0.2305)	0.0476	(0.7676)
Dividend			0.6037	(1.2634)	0.2690	(0.4822)
const	-0.0772	(-0.1407)	**-1.0018****	(-2.1648)	-1.2475	(-0.9592)
Pseudo R^2	4.35%		38.50%		44.49%	
Chi^2	5.7137		41.0557		46.8496	
N	95		77		76	

Table 8b: The table reports the results for the probit model estimation whether a German IPO from the Neuer Markt is more likely to announce a repurchase (value 1) or an SEO (value 0) depending on different model specifications. The explanatory variables are whether the IPO was venture backed (VC), held at least one patent at the IPO (Patent), whether the IPO took place in a hot market environment (Hot-IPO), the participation ratio (Participation) and the dilution factor (Dilution) at IPO, the natural logarithm of total assets (Size), the ratio of tangible assets to total assets (Tangibility), the ratio of R&D to assets (R&D), the ratio of capital expenditures to total assets (CAPEX), the ratio of cash flow to assets (Cash Flow), the ratio of cash accounts to assets (Cash), the market-to-book ratio (M/B), and whether the IPO paid a dividend in the year prior to the announcement (Dividend). Accounting variables are evaluated for the last fiscal year prior to the announcement. The sample size varies due to missing values for some of the variables. *, **, *** represent the 10%, 5%, and 1% significance level, respectively. Values in parentheses indicate t-statistics.

Multinomial Probit Model: SEO Ann., Repurchase Ann., No Financing Activity						
indep. var.	Base: No Activity = 0		Base: Repurchase = 1		Base: SEO = 2	
	Repurchase = 1	SEO = 2	No Activity = 0	SEO = 2	No Activity = 0	Repurchase = 1
VC	-0.2186 (-0.5756)	0.2565 (0.7327)	0.2186 (0.5756)	0.4750 (1.0812)	-0.2565 (-0.7327)	-0.4750 (-1.0812)
Patent	-0.4070 (-1.0532)	0.2119 (0.6108)	0.4070 (1.0532)	0.6189 (1.4043)	-0.2119 (-0.6108)	-0.6189 (-1.4043)
Hot-IPO	0.1874 (0.5150)	0.2658 (0.7249)	-0.1874 (-0.5150)	0.0784 (0.1761)	-0.2658 (-0.7249)	-0.0784 (-0.1761)
Participation	**3.4611*** (1.8447)	0.6746 (0.3627)	**-3.4611*** (-1.8447)	-2.7865 (-1.3401)	-0.6746 (-0.3627)	2.7865 (1.3401)
Dilution	1.3554 (1.1892)	**1.9147*** (1.6768)	-1.3554 (-1.1892)	0.5593 (0.4778)	**-1.9147*** (-1.6768)	-0.5593 (-0.4778)
Size	-0.2430 (-1.2170)	**-0.6339***** (-3.1443)	0.2430 (1.2170)	-0.3909 (-1.5742)	**0.6339***** (3.1443)	0.3909 (1.5742)
Tangibility	0.1085 (0.0613)	-0.2257 (-0.1618)	-0.1085 (-0.0613)	-0.3342 (-0.1744)	0.2257 (0.1618)	0.3342 (0.1744)
R&D	1.9667 (0.6086)	**5.1265**** (2.3182)	-1.9667 (-0.6086)	3.1599 (0.9077)	**-5.1265**** (-2.3182)	-3.1599 (-0.9077)
CAPEX	-0.7092 (-0.3330)	1.9023 (1.2562)	0.7092 (0.3330)	2.6115 (1.1414)	-1.9023 (-1.2562)	-2.6115 (-1.1414)
Cash Flow	**2.6152**** (2.5750)	0.8738 (1.5941)	**-2.6152**** (-2.5750)	-1.7414 (-1.6219)	-0.8738 (-1.5941)	1.7414 (1.6219)
Cash	**2.7824***** (3.4143)	**-2.6228***** (-2.8028)	**-2.7824***** (-3.4143)	**-5.4053***** (-4.9458)	**2.6228***** (2.8028)	**5.4053***** (4.9458)
M/B	0.0045 (0.1821)	-0.0078 (-0.2963)	-0.0045 (-0.1821)	-0.0123 (-0.3913)	0.0078 (0.2963)	0.0123 (0.3913)
Dividend	0.2209 (0.4815)	0.0162 (0.0331)	-0.2209 (-0.4815)	-0.2047 (-0.3596)	-0.0162 (-0.0331)	0.2047 (0.3596)
const	-1.6736 (-1.4996)	0.8634 (0.8381)	1.6736 (1.4996)	**2.5370**** (2.0025)	-0.8634 (-0.8381)	**-2.5370**** (-2.0025)
Prob	0.0024		0.0024		0.0024	
Chi^2	50.99		50.99		50.99	
N	205		205		205	

Table 9: The table reports the results for a multinomial probit model whether a German IPO from the Neuer Markt is more likely to announce a repurchase (value 1), an SEO (value 2) or neither of them (value 0). The explanatory variables are whether the IPO was venture backed (VC), held at least one patent at the IPO (Patent), whether the IPO took place in a hot market environment (Hot-IPO), the participation ratio (Participation) and the dilution factor (Dilution) at IPO, the natural logarithm of total assets (Size), the ratio of tangible assets to total assets (Tangibility), the ratio of R&D to assets (R&D), the ratio of capital expenditures to total assets (CAPEX), the ratio of cash flow to assets (Cash Flow), the ratio of cash accounts to assets (Cash), the market-to-book ratio (M/B), and whether the IPO paid a dividend in the year prior to the announcement (Dividend). Accounting variables are evaluated for the last fiscal year prior to the announcement. *, **, *** represent the 10%, 5%, and 1% significance level, respectively. Values in parentheses indicate t-statistics.

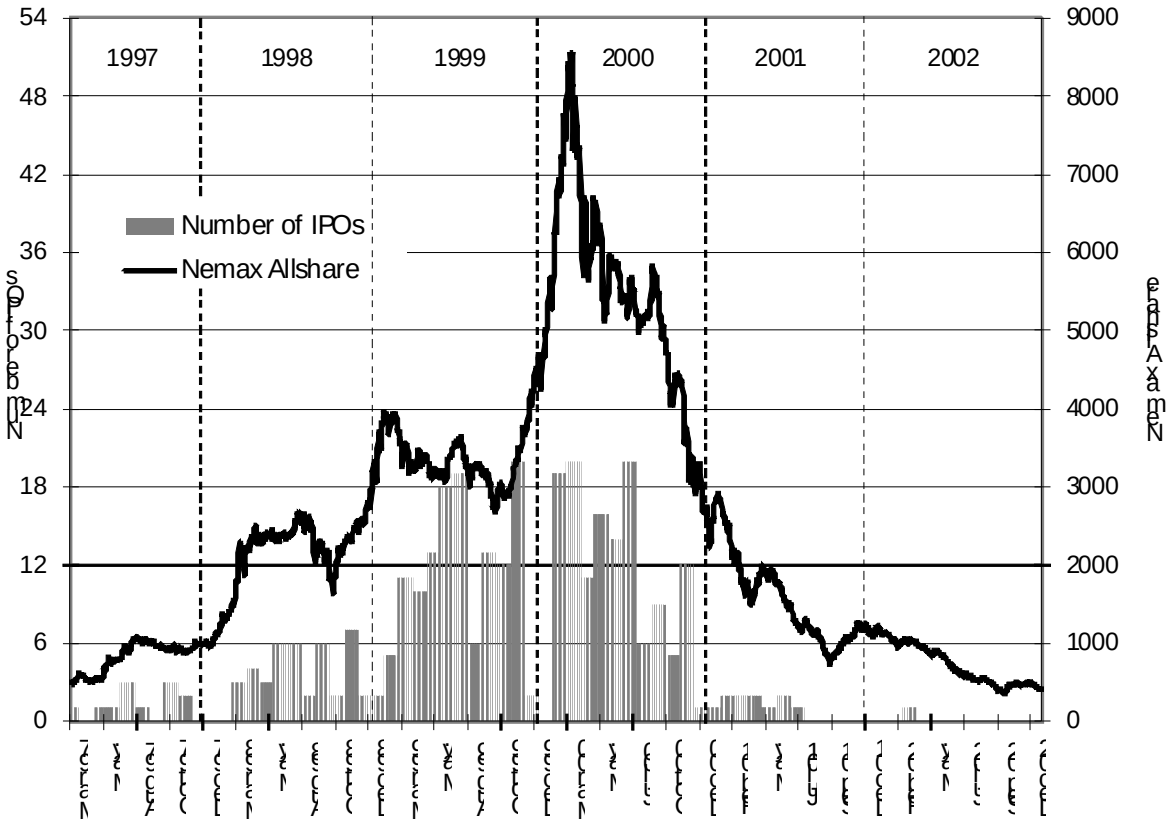

Figure 1a shows the NEMAX Allshare Index and the number of IPOs that went public on the German Neuer Markt between 1997 and 2002.

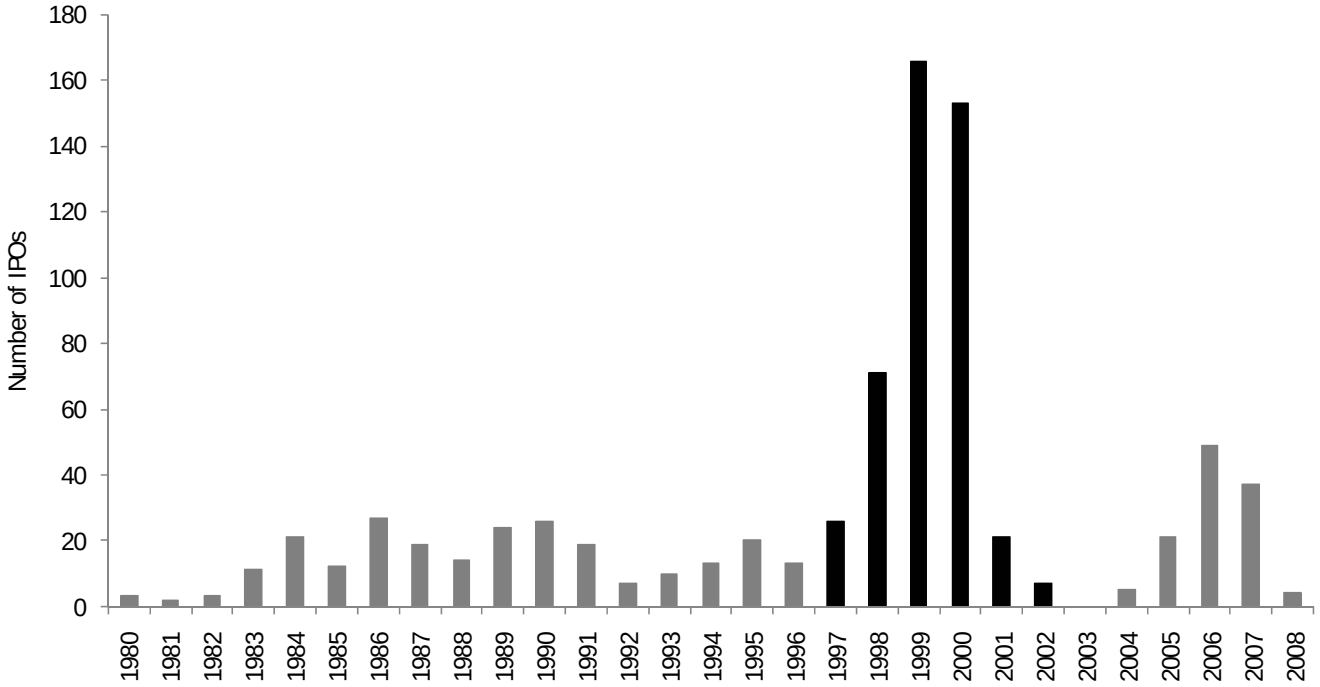

Figure 1b shows the number of firms that went public on the German stock market between 1980 and 2008. The dark bar (1997-2002) are IPOs at the “Neuer Markt”.

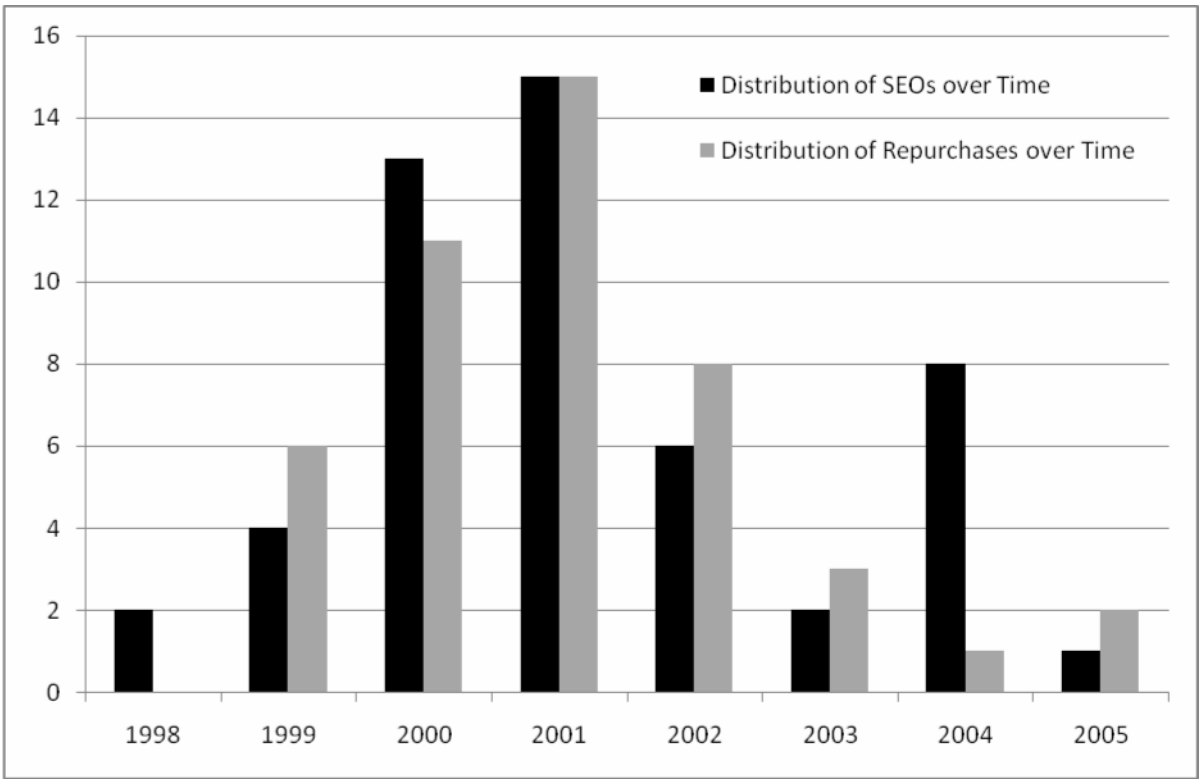

Figure 2 shows the distribution of Repurchases and SEOs over time.

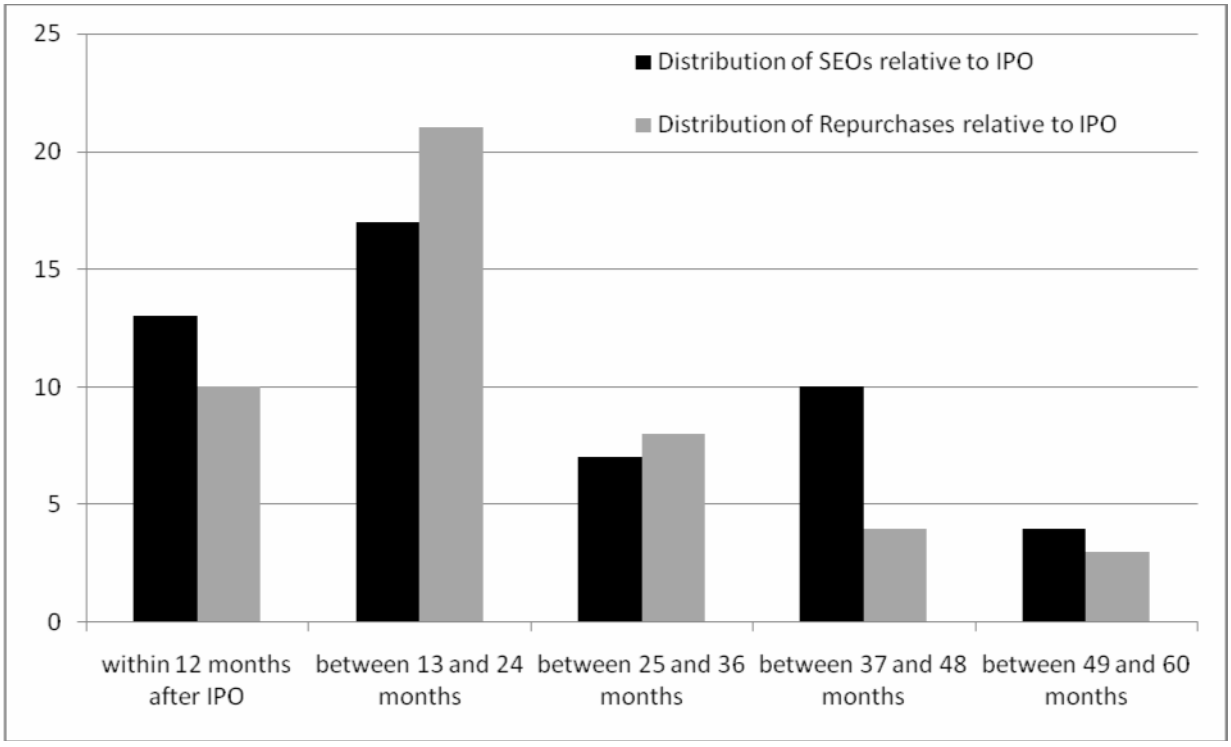

Figure 3 shows the distribution of Repurchases and SEOs relative the time of the IPO.

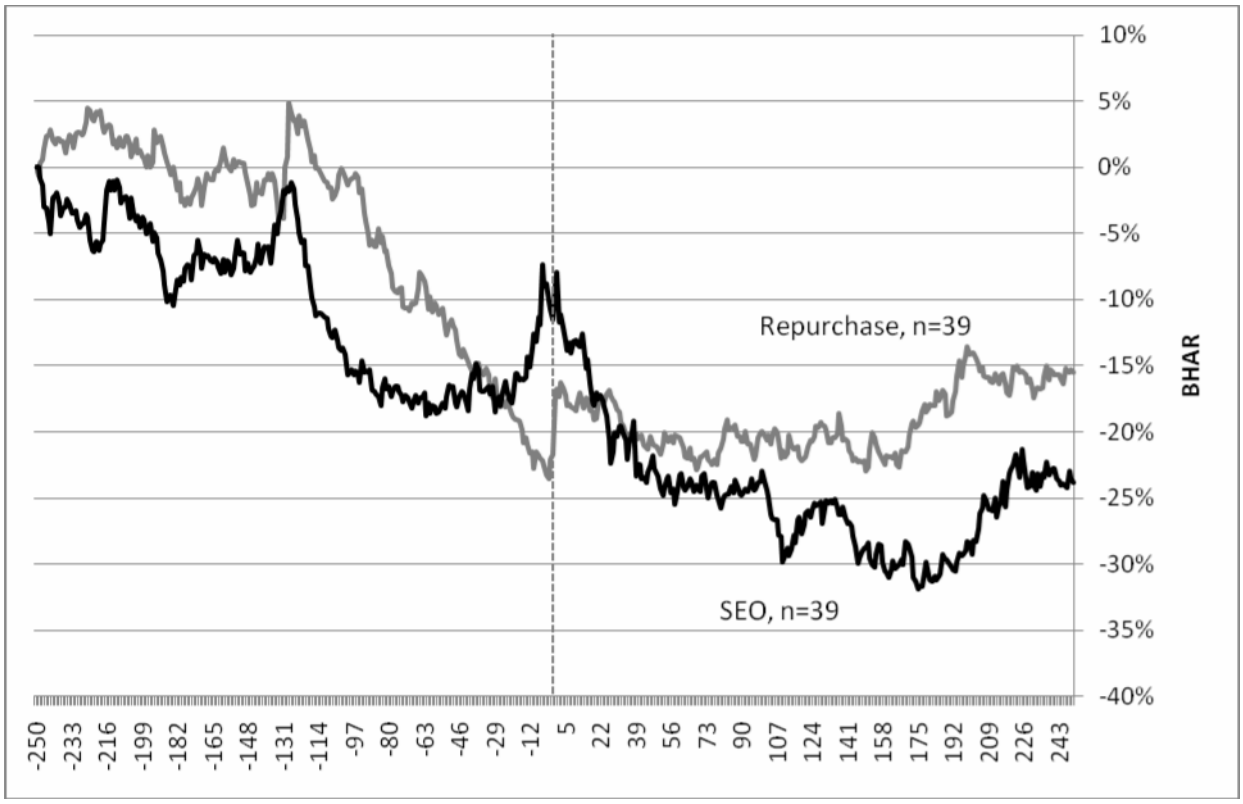

Figure 4a plots the buy-and-hold abnormal returns for the interval [-250; 250] for the subsamples of repurchase and SEO announcements, respectively. The CDAX was used as a benchmark.

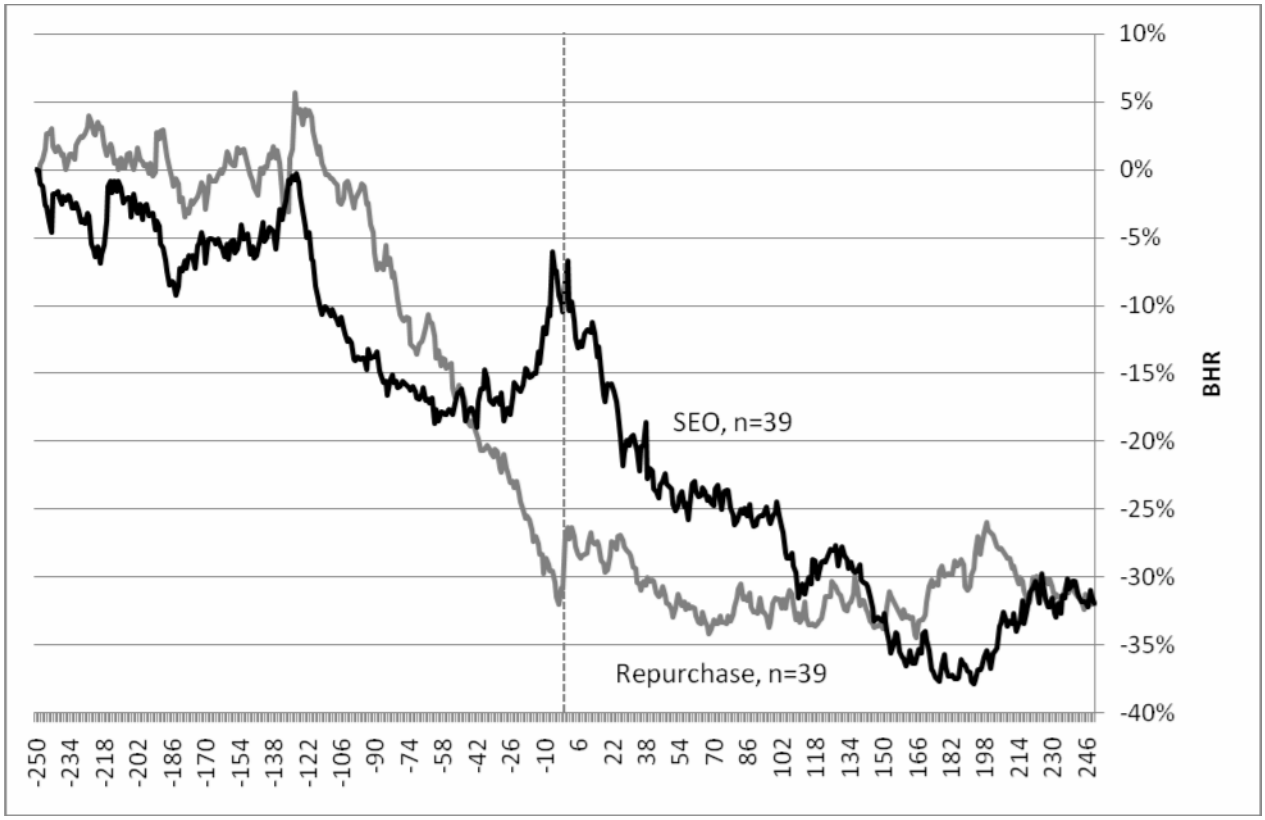

Figure 4b plots the buy-and-hold returns for the interval [-250; 250] for the subsamples of repurchase and SEO announcements, respectively.

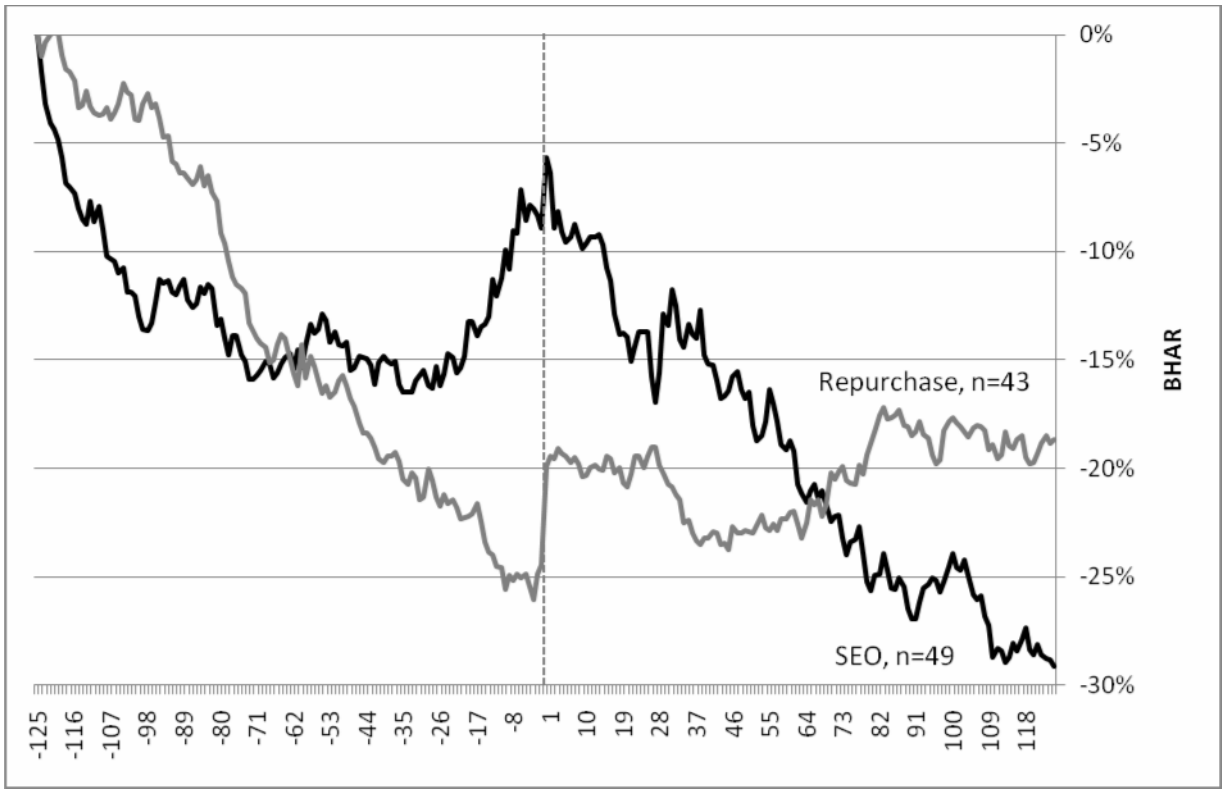

Figure 5 plots the buy-and-hold abnormal returns for the interval [-125; 125] for the subsamples of repurchase and SEO announcements, respectively. The CDAX was used as a benchmark.

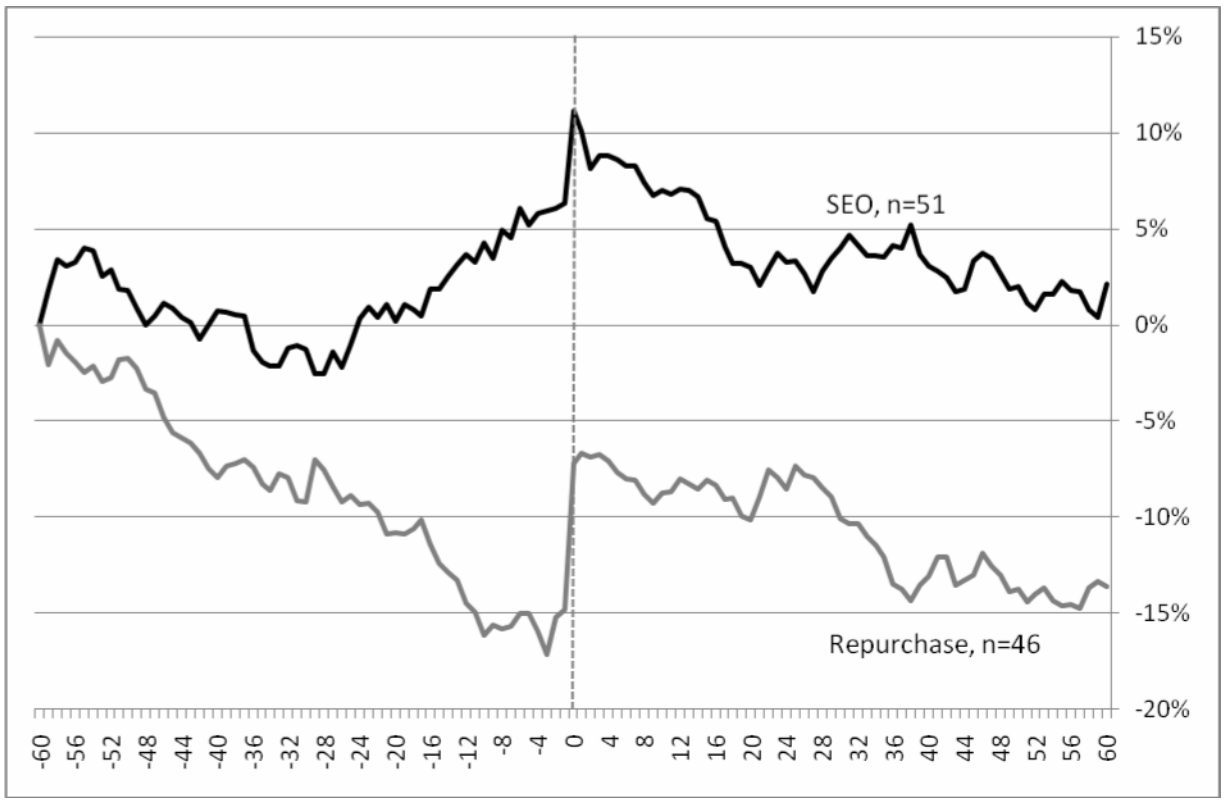

Figure 6 plots the cumulative abnormal returns for the interval [-60; 60] for the subsamples of repurchase and SEO announcements, respectively. The CDAX was used as a benchmark.

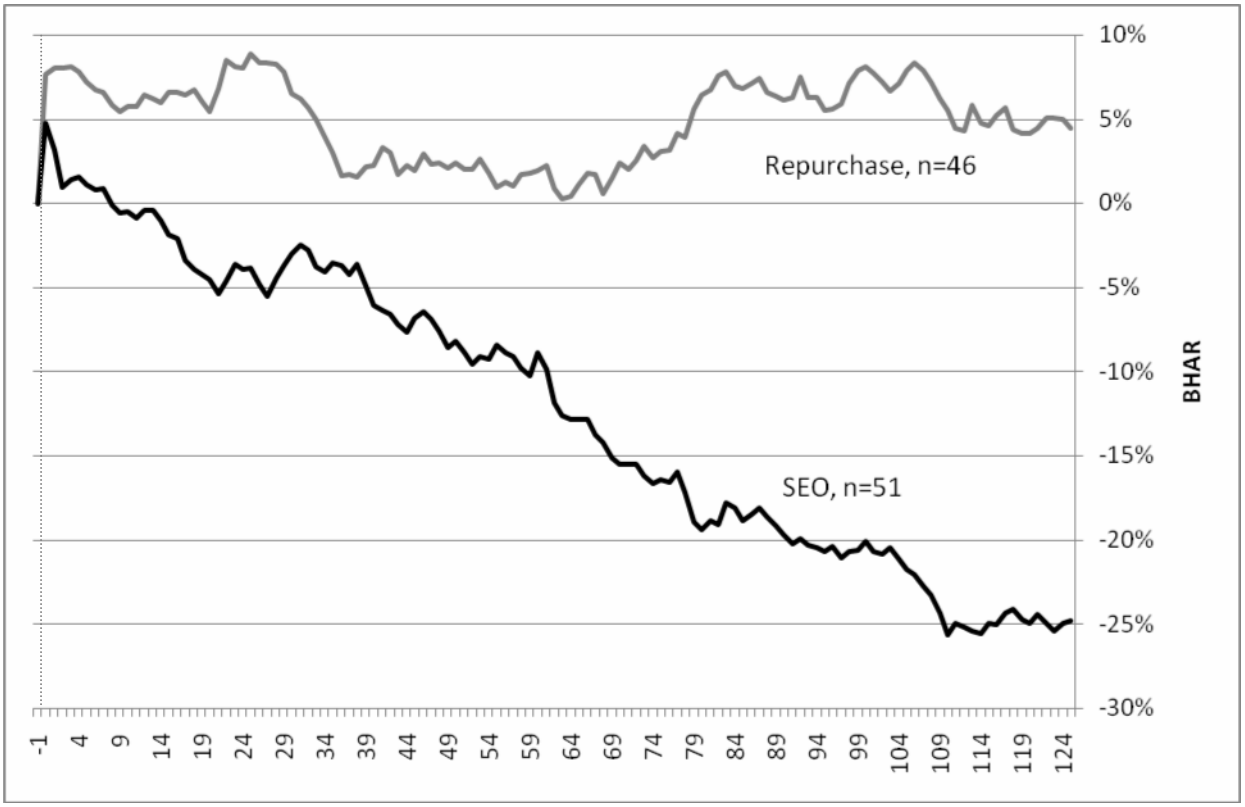

Figure 7 plots the buy-and-hold abnormal returns for the interval [-1; 125] for the subsamples of repurchase and SEO announcements, respectively. The CDAX was used as a benchmark.

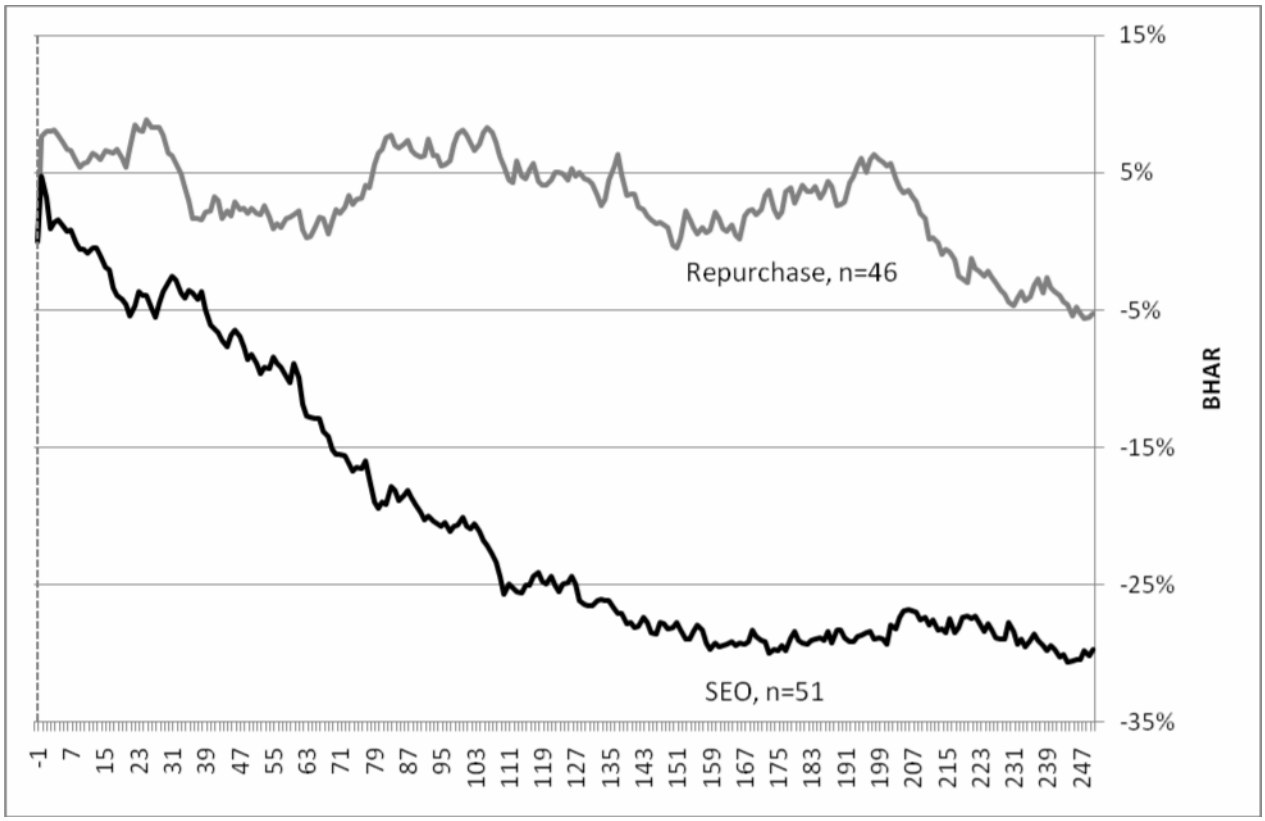

Figure 8 plots the buy-and-hold abnormal returns for the interval [-1; 250] for the subsamples of repurchase and SEO announcements, respectively. The CDAX was used as a benchmark.