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**Article**

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# **Initial Public Offerings, Subsequent Seasoned Equity Offerings, and Long-Run Performance: Evidence from IPOs in Germany**

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The objective of this study is to investigate the long-run performance of initial public offerings (IPO) in Germany for the period from 1977 to 1995. Of particular interest is to examine whether underpricing and the timing of subsequent seasoned equity offerings (SEO) may help to explain why some firms have substantial positive and others have substantial negative long-run abnormal holding period returns after going public. We find significant empirical evidence that firms that raised additional funds after an IPO through a seasoned equity offering outperformed the market. There is a significant difference in returns relative to the firms that

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had no subsequent equity offering. A comparison of seasoned equity offerings of IPOs and of established firms suggests that the information asymmetry is more pronounced for IPO firms.

## **I. Introduction**

The decision of many companies to go public and the short- and long-run performance of newly issued equities have been of significant interest to investors and academics alike. This interest may be related to the importance of Initial Public Offerings (IPO) for economic growth and employment. More importantly, however, the specific return behavior or “market anomalies” of IPOs created, on the one hand, immense profit opportunities for investors and, on the other hand, tremendous risks. Consequently, a large number of theoretical explanations have been developed and many empirical studies conducted to explain this phenomenon. In particular, empirical research has investigated the underpricing and long-run performance of Initial Public Offerings (IPOs) in the United States and in other countries (Loughran and Ritter, 1995). As a result, a relatively consistent pattern of underpricing, initial returns, and long-run performance of IPOs has emerged. For most countries these studies find significant underpricing in the primary market and consequently substantial initial returns in the secondary market. In contrast to the almost certain short-run outperformance of IPOs there is, on average, a substantial underperformance over longer periods.

For the German capital market there have been a number of empirical studies that analyze the underpricing and long-run performance of initial public offerings (Stehle and Ehrhardt, 1999; Ljungqvist, 1997; Stehle et al., 2000; Thies, 2000; Kurth, 2005; Bessler and Kurth 2007; Bessler and Thies, 2007). These studies, however, provide some conflicting results such as huge spreads in underpricing within analyzed periods as well as long-run underperformance and neutral performance dependent on the benchmark used so that a number of open issues remain and await empirical explanations. The objective of this study is to add to our understanding of the return behavior of initial public offerings by investigating the long-run performance of IPOs in Germany for the period from 1977 to 1995. The focus of this study is on the impact that seasoned equity offering (SEOs) have on the long-run performance of IPOs.

The IPO market in Germany is of special interest for a number of reasons. First of all, the banking system, the legal system, as well as the corporate governance structure are viewed as different from that of the United States so that some different results may be expected. In fact, some earlier empirical studies for seasoned equity offerings report opposite empirical results for Germany than usually found in studies for the United States. Smith (1986), for example, documents positive abnormal returns for the announcement period of SEOs in the U.S., while Brakmann (1993) and Padberg (1995) report positive announcement returns for SEOs in Germany. Secondly, the number of companies that went public in Germany and the amount of equity that was raised through an initial public offering was relatively minor compared to that of the United States and some other countries despite the size of the German economy. Hence, we may expect some different results. Moreover, most of the firms that went public up to 1995 were not high-tech start-up companies but often were already established firms with an average age well above 20 years (Ljungqvist, 1997). These firms may be easier to value, again resulting in different empirical findings.

The rest of the paper is organized as follows. In the next section the literature for IPOs is reviewed with an emphasis on underpricing and long-run performance. The methodology and data are explained in section 3. The empirical results are presented in section 4. These results are separated into sensitivity to the benchmark, influence of the underpricing, performance of

IPOs, impact of seasoned equity offerings as well as a comparison of subsequent financing decisions of IPOs and established firms. The last section concludes the paper.

## **II. Literature Review**

Beginning with the seminal paper of Modigliani and Miller (1958) there is an enormous amount 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 base their arguments on information asymmetry and agency problems. In these models it is assumed 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 at the announcement date (short-run). Miller and Rock (1985) argue that management has an information advantage with respect to the firm's expected cash flows. 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 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.

### **A. Underpricing of IPOs**

When firms raise equity in the public market with an IPO for the first time the issues become even more complex. It is necessary to develop extended models in order to explain the financing behavior and valuation effects when firms go public because IPOs differ from publicly traded firms. With respect to IPOs three predominant phenomena have been observed empirically and are extensively discussed in the literature: "underpricing" (Ibbotson et al., 1988), "hot issue markets" (Ritter, 1984), and "long-run underperformance" (Ritter, 1991).

Most of the earlier models developed and tested are related to underpricing. In addition to the equilibrium models that are based on information asymmetry there is although a number of models that are either based on institutional factors or that can be classified as ad-hoc-approaches (Ritter, 1991). Especially the ad-hoc-models are suited to explain market behavior such as overreaction that should be corrected in the long-run. The empirical evidence of the long-run underperformance underscores the relevance of models that explain the relationship between financing decisions and information effects (Myers and Majluf, 1984; Jensen, 1986). These models are discussed in the next section.

In equilibrium models that are based on information asymmetry underpricing is explained in different ways. In the adverse-selection-models there exists information asymmetry within the group of investors (Rock, 1986; Beatty and Ritter, 1986; Carter and Manaster, 1990). In principal-agent-models the investment bank possesses superior information relative to the issuing firm or the investor (Baron, 1982). In contrast, the signaling-models assume that the issuing firm has better information than the investment bank or the investor (Allen and Faulhaber, 1989; Grinblatt and Hwang, 1989; Welch, 1989; Schenone, 2004; Brau

and Fawcett, 2006). In order to reduce the information risk of being less informed, all these models suggest that underpricing is one solution to this information asymmetry problem.

The models that focus on institutional factors can be classified according to the hypotheses that they raise. This yields the legal insurance or monopoly hypothesis (Logue, 1973), the lawsuit-avoidance- or legal-liability-hypothesis (Tinic, 1988), the pre-sale-information-gathering-hypothesis (Benveniste and Spindt, 1989), the incomplete-spanning-hypothesis (Mauer and Senbet, 1992) as well as the cascade model (Welch, 1992) and models that explain price support (Ruud, 1993). Although these are important approaches to offer explanations of underpricing, they are not well suited to explain long-run underperformance.

Thus, these models are less important for the problems discussed in this research.

The general idea of the ad hoc approaches is that they explain underpricing with the behavior and expectations of the investor. Among the most dominant theories is the divergence-of-opinion-hypothesis, which explains long-run underperformance as a reduction of heterogeneous expectations and information uncertainty (Miller, 1977; Michael and Shaw, 1994), the impresario-hypothesis that explains overreaction and fads (Shiller, 1990; Aggarwal and Rivoli, 1990), as well as the windows-of-opportunity-hypothesis, which proposes that the higher ex-ante-uncertainty in hot- issue-periods justifies a higher underpricing (Ritter, 1991; Bayless and Chaplinsky, 1996).

These models are intuitively appealing but often they are not in accordance with the assumed rational behavior of investors. Nevertheless, testable hypotheses can be derived to investigate the long-run performance of IPOs. One of the testable features of the impresario-hypothesis, for example, is that the IPOs with the highest underpricing will have a long-run underperformance after going public. This issue is addressed in our empirical analysis later on. After reviewing the various approaches documented in the literature, it appears that signaling models are best suited for the objective of this study. These models assume that managers have information advantages with respect to the fair value of the firm. They strive to maximize their own utility, for example, by maximizing the cash flows from issuing equity. Moreover, managers of high quality firms have an incentive to reveal the fair value of the firm to the market through signaling, because investors usually do not have the ability to discriminate between good and bad firms. Obviously, the quality has to be signaled before the transaction take place. In these explanations underpricing is viewed as one signal together with the retention of shares (Grinblatt and Hwang, 1989), earnings and dividend policy after the IPO (Allen and Faulhaber, 1989) as well as the volume and timing of subsequent financing decisions (Welch, 1989; Welch, 1996).

Welch (1989), for example, argues that the higher quality firms can signal their quality to the market through the magnitude of the underpricing and through the retention of shares by the owners. A separating equilibrium is attainable because only the higher quality firms will achieve a higher market value over time and therefore have an incentive to signal. The higher issuing costs, due to the underpricing at the time of the IPO, should be compensated for by the higher issuing price that seems to be obtainable in the first (FSEO) and in subsequent seasoned equity offerings (SSEO). Welch (1989) observes that the issuing prices at the first seasoned equity offering after the IPO are three times higher than the initial offering price at the time of the IPO. Moreover, there are apparently clusters of FSEOs within the first three years after going public (Welch 1989).

In contrast, Gale and Stiglitz (1989) argue that in a pooling equilibrium the investor cannot distinguish ex ante between good and bad IPOs. They agree, however, that the

percentage of shares retained by the owner could signal the quality of the firm. This implies that there is no relationship between characteristics of the IPO such as percentage of “secondary shares” and the stock price reaction at the time of the FSEO. Slovin et al. (1991, p. 637) point out that “the firm’s return to the equity market is a prima facie signal of unfavorable private information about project quality.” Summarizing this research leads to the following conclusions: It can be expected that firms with a higher underpricing have higher earnings and will start to pay dividends sooner. There is also a higher probability that these IPOs will have a seasoned equity offering, that they will issue a larger amount of equity and that the stock price reaction at the time of a SEO will be smaller (Michaely and Shaw, 1994).

Such a complex decision making environment and such a complex financing behavior should be difficult to disentangle. The approach taken in this study is to gain additional insights into the financing and valuation effects by analyzing the long-run performance of IPOs and the impact of subsequent financing decisions after the IPO. If a firm, for example, plans to return to the equity market to raise additional funds it is most likely in the best interest of that firm to signal reliably the quality of the firm as early as possible (Slovin et al., 1991). Jegadeesh et al. (1993) and Garfinkel (1993) assume in their studies that there exists a relationship between the stock price performance of the first days after the IPO and the amount and timing of the FSEO. When the time period between the IPO and the FSEO is extended, then the probability increases that more positive or negative information about the firm will become available. Thus, it can be expected that managers view the prospects of the firm in general more unfavorably the earlier they decide to return to the capital market. Consequently, the negative signal of the announcement is more pronounced the sooner the firm returns to the market for a first seasoned equity offering.

Empirical studies for the U.S. market find some 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 FSEOs in Germany is much higher with about 50% for the period from 1977 to 1995. The relatively much smaller number for the U.S. supports the observations that for some U.S. firms the IPO is the only time in the firm’s history at which they issue equity publicly. 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 of the firms excludes them from raising additional equity. Welch (1989) supports this view in that he also finds for the first 10 years after the IPO that the public financing activities of these firms diminish over time. Welch (1989) 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 offer additional equity as soon as possible after the going public.

#### **A. Long-run Underperformance**

In addition to the intensively studied issue of IPO underpricing and the positive first day initial returns there exist a large number of studies that empirically investigate the long-run performance of initial public offerings. Following the earlier work of Ritter (1991) for the United States there have been numerous empirical studies for other countries that support the view that, on average, IPOs underperform an appropriate benchmark in the long-run

(Loughran, Ritter and Rydqvist, 1994). Interestingly, the magnitude of these return patterns is very similar to that of seasoned equity offerings (SEOs).

An earlier study of the long-run performance of initial public offerings for the United States by Ritter (1991) revealed first positive but then evenly increasing negative abnormal returns for the first three years following an 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 one for the long-run performance (36 months) of seasoned equity offerings (SEOs). These empirical results for IPOs were confirmed in a number of studies for the United States and are summarized in Table Ia and Table Ib. With the exception of Chalk and Peavy (1987), all other studies find negative abnormal returns independent of the calculation method (CARs, WR). This predominantly negative long-run return pattern may suggest that investors are too optimistic about the long-run prospect of the firms and are getting more realistic through time. 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. This would mean that when taking the offer price as a starting point the IPOs are overpriced in the secondary market and are correctly valued in the long-run. Thus, the explanation of the 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 information asymmetry or agency problems. Because these are average results we need to be aware that some firms outperform an appropriate benchmark substantially but that some other firms significantly underperform. One of the interesting issues for empirical research is to determine the factors that may explain which firms will underperform and which ones will overperform.

Although the time period available to study IPOs in Germany is limited and the number of IPOs is relatively small there have been a number of recent studies that analyze the long-run performance of IPOs. A detailed review of these studies confirms that the results are very sensitive to both the methodology and the benchmark employed. The results of these studies are summarized in Table II. Most of these studies find negative long-run abnormal returns. The magnitude ranges from -28.0% (Schuster, 1995) and -12.1% (Ljungqvist, 1997) to numbers that are close to zero or positive (Stehle et al., 2000), and even yielding only positive returns of 16.1% (Stehle et al., 2000) for the very early time period from 1960 to 1987. The significant differences in Stehle et al. (2000) are due to employing either a value-weighted or equally-weighted index. Some other differences are due to the time period investigated and the methodology used. It is not surprising that the largest negative returns are found when CARs are used (Schuster, 1995).

Although there is not sufficient evidence yet in the literature to conclude that the subsequent financing decisions are the main explanatory factor for the performance, there is some empirical evidence that suggests some measurable impact on the long-run performance (see for the U.S. Kale and Payne, 2000; Michaely and Shaw, 1994 and for Germany Ljungqvist, 1997; Thies, 2000). Overall these empirical findings leave some interesting research questions unanswered. Hence, the objective of this study is to investigate the long-run abnormal return behavior for the German capital market in greater detail, especially to analyze the importance of the subsequent financing decisions. Thus, this research extends the current literature in various dimensions.

Some important and interesting research issues that cannot be addressed in this study on German IPOs are the difference in performance of venture-backed versus non-venture backed IPOs (Brav and Gompers, 1997), the impact of the ownership structure with respect to the first SEOs after an IPO, as well as the relationship between operating performance and stock price performance for IPOs (Loughran and Ritter, 1997). The major reason for these difficulties is that the necessary data is either not available or not reliable for the German firms investigated in this study for the period 1977-1995. Because there was no appropriate exit route for early stage private equity investors, venture capital did not play a major role before the opening of the “Neuer Markt” in 1997. Moreover, some of the firms that went public in this period cannot be considered as start-up companies. Giving the traditional German accounting standards, the information content of balance sheet and income statement information has to be carefully interpreted and moreover is not readily available. However, the relationship between the magnitude of the underpricing and subsequent seasoned equity offerings is addressed in this empirical study as much as possible.

### **III. Methodology and Data**

The two most important aspects in determining whether a stock underperformed or outperformed are first to select the appropriate methodology to calculate abnormal returns and second to compare these results to an appropriate benchmark for that firm. Thus, differences in empirical findings can often be explained either by the methodological approach taken in calculating abnormal returns or by the difference in the benchmark employed for comparing returns. With respect to the methodology we calculate “buy-and-hold abnormal returns” (BHAR) and compare these to the DAX index and to a variety of other benchmarks. In a large number of empirical IPO studies BHAR are employed as the appropriate measure for the performance over longer periods (Ritter, 1991; Conrad and Kaul, 1993). For comparison reasons we also report the results of the traditional method of “cumulative abnormal returns” (CAR) in some instances. More recently, the Fama and French (1992) three factor model has become quite popular in empirical studies for the United States and other countries. The idea is that the additional factors size and book-to-market may be able to better explain stock returns. However, there is no theoretical foundation for these factors yet. Moreover, a number of studies have indicated the limitation of this approach (Barber and Lyon, 1997; Brav, 2000). In a study of IPOs at the “Neuer Markt” in Germany Bessler and Kurth (2007) find only marginal evidence for these factors. In addition, Khurshed et al. (2004) provide evidence for IPOs in the U.K. that long-run returns are not that different under BHAR and the Fama and French approach. Jeanneret (2005) provides similar empirical evidence for SEOs in France. In our approach the various factors are accounted for by using different indices. Thus, in order to keep the model as simple as possible and comparable to other studies, we calculate standard buy-and-hold abnormal returns (BHAR).

The other important issue is to choose the appropriate benchmark. As Ritter (1991) remarks: “the quantitative measurement of the long-run performance of initial public offerings is very sensitive to the benchmark employed”. However, for evaluating the long-run performance of IPOs it is not clear at all what constitutes the appropriate benchmark portfolio. We therefore employ various benchmarks and present our findings for all benchmarks in graphical form. We restrict our presentation in the tables in most cases to the abnormal returns relative to the DAX, the major German stock market index, unless there are major differences in results.



**A. Methodology**

The holding period returns (BHR) for a single stock for period T are calculated as follows:

$$BHR_T = \left[ \prod_{t=1}^T (1 + R_t) \right] - 1 \quad (1)$$

where  $R_{i,t}$  is the return of stock  $i$  at time  $t$ , and  $T$  is the time period for which the BHR is determined. For an equally-weighted portfolio of stocks the returns are calculated as:

$$dBHR_{P,T} = \frac{1}{N} \sum_{i=1}^N BHR_{i,T} \quad (2)$$

where  $dBHR_{P,T}$  is the average BHR of the portfolio,  $N$  is the number of stocks in the portfolio, and  $T$  is the time period for which the BHR is calculated. In order to calculate the abnormal returns for the portfolio, the “Buy-and-Hold-Abnormal>Returns” (BHAR), the return of the benchmark is subtracted from the return of the IPO.

$$BHAR = \frac{1}{N} \sum_{i=1}^N \left[ \left( \prod_{t=1}^T (1 + R_{i,t}) \right) - \left( \prod_{t=1}^T (1 + R_{M,t}) \right) \right] \quad (3)$$

The advantage of this method is that the terminal values of the two strategies, i.e., investing in an IPO or investing in the benchmark, are directly comparable. This number is equal to the measure of “Wealth Relative” (WR) as proposed by Ritter (1991). The Wealth Relative (WR) of a stock is defined as

$$WR = \frac{\frac{1}{N} \sum_{i=1}^N \left( \prod_{t=1}^T (1 + R_{i,t}) \right)}{\frac{1}{N} \sum_{i=1}^N \left( \prod_{t=1}^T (1 + R_{M,t}) \right)} \quad (4)$$

where  $R_{i,t}$  and  $R_{M,t}$  are the holding-period-returns for the time period  $T$  for the stock  $i$  and for the market (benchmark), respectively. A WR larger than 1 means overperformance, i.e., the performance of the IPO is superior to that of the benchmark, and a WR smaller than 1 suggests underperformance of the IPO. For a portfolio of IPOs the appropriate measure is calculated as the sum of the performance of the individual firms. Since both approaches provide similar results we calculate and report BHAR in this paper.

To further underscore the statistical significance of our results we alternatively check whether the number of firms with positive excess returns is larger than the number of firms with negative excess returns. We conduct a sign test as follows:

$$z - stat = \left[ \frac{(x + 0,5) - (p \times N)}{\sqrt{p(1 - p) \times \sqrt{N}}} \right] \quad (5)$$

where x is the % positive abnormal returns divided by 100 and N is the number of analyzed events. We test  $p=0.5$ .

## **B. Data**

Over the period from 1977 to 1995 there were 257 companies that went public in the German market and were listed on one of the German stock exchanges. The beginning date is determined by the fact that there were hardly any IPOs in Germany before that date. The ending date of the sample period is determined by the restricting nature of long-term studies with subsequent financing activities. To be included in the sample the firms needed to be traded in the secondary market for at least 12 months. The sample includes private and public offerings, privatizations, spin-offs, and mergers. Overall we have a sample of 218 IPOs that meet our selection criteria, which therefore form the sample for our empirical study. The number of Initial Public Offerings for each year in the sample is shown in Figure 1.

The BHAR are usually calculated for a period of 36 months (M [1, 36]). As the main benchmark we employ the DAX, which is a value-weighted blue chip index including 30 German firms. The other indices employed are the DAFOX-VW, a value-weighted research index, the DAFOX-SC-EW, an equally-weighted small cap research index, and the DAFOX-SC-VW, a value-weighted small cap research index. Firms that went public after 1997 on the “Neuer Markt”, the new market for growth firms, had to be excluded from this study because this is a different market segment and therefore not directly comparable. In addition it was closed in 2003 due to some problems. A detailed analysis of the “Neuer Markt” is provided in Kurth (2005) and Bessler and Kurth (2007). The impact of hot and cold issue markets is studied in Bessler and Kurth (2005) in this journal.

Our empirical results are presented in table-form showing the abnormal returns over certain time periods and for specific sub-groups of the sample. Moreover, we present the median and the percentages of positive and negative abnormal returns as well as the t- and z-statistics. In addition, we graphically present the abnormal returns through time so that the return pattern of initial public offerings can be analyzed in greater detail. In these graphs it becomes especially evident during which time periods the BHAR are positive or negative and when the various time series move together or start to diverge. This is especially important for the typical return pattern for financing decisions. For example, for IPOs the abnormal returns are usually first positive and then turn negative. It is especially important to observe for which periods these returns move together and when their performances diverge.

## **IV. Empirical Results**

The primary objective of the empirical analysis is to provide additional insights into the factors that determine the long-run stock price performance of IPOs in Germany. In particular, we investigate whether subsequent financing activities in the equity market may help to explain which firms are likely either to outperform or to underperform the benchmark in the long run. Thus, we want to determine whether financing decisions after the IPO are a significant factor in explaining why some firms have positive and others have negative abnormal returns. In addition it is of interest to control for the effects that may arise from the benchmark employed

as well as the importance of the underpricing at the time of the IPO. We approach these problems by differentiating the abnormal return patterns by the following five criteria:

- 1) impact of the benchmark,
- 2) importance of initial returns, i.e., magnitude of the underpricing,
- 3) subsequent first seasoned equity offering (FSEO) and long-run performance,
- 4) additional financing activities of former IPOs (e.g., FSEOs, SSEOs) and long-run performance, and
- 5) comparison of the long-run performance of FSEOs of former IPOs and SEOs of established firms.

In short, we first investigate the raw returns with respect to various benchmarks and with respect to the magnitude of the underpricing. Most importantly, however, we examine the performance of those IPOs that had a seasoned equity offering within the first five years after the IPO (FSEO) and compare the performance relative to those firms that had no subsequent equity offering. In addition, the performance of IPOs is compared to the long-run performance of established firms that had SEOs. We are especially interested in the performance during the pre- and post-announcement period of the FSEO and SEO. Before we investigate each of these aspects separately in the rest of this section we will first present and analyze the return structure of the IPOs.

#### **A. Return Structure of IPOs**

The starting point of our empirical study of IPO stock returns is the analysis of raw returns, cumulative abnormal returns (CAR), and buy-and-hold abnormal returns (BHAR) for the full sample of 218 IPOs over a 36-months period. As is documented in Figure 2a, the raw returns are positive and sum up to about 20% over the 3-year period. Adjusting for the market performance as proxied by the DAX-Index for the market portfolio, however, results in a long-run negative abnormal performance as is indicated by both measures (CAR and BHAR). It is also evident that the cumulative abnormal returns are first positive and then turn negative later on. Specifically, the average abnormal returns are positive for up to 15 months after the IPO but then turn negative resulting in negative BHAR of -12.7% after 36 months (vs. DAX). This outcome for German IPOs is consistent with most findings for other countries (Loughran et al., 1994).

In order to gain additional insights into the IPO performance we conduct additional statistical tests. The results are presented in Table III. The number of firms that underperform the benchmark is always larger than the ones that outperform the index independent of the length of the time interval studied. The percentages increase from 56% to a significant 60% and 61% for the time periods of 12, 24, and 36 months, respectively. It appears that after 36 months the returns of the extreme positive (272%) and negative (-223%) performers relative to the benchmark are about at equal distance from the statistical significant mean of -12.7%. In addition, about 2/3 (one standard deviation) of the firms in the sample have 36-months returns in the range between -88% and 62%. This indicates that a focus on the average return and performance needs to be supplemented by additional measures. Moreover, the wide range of positive and negative outcomes increases the standard deviation drastically and consequently may lead to insignificant results from a statistical point of view. Nevertheless, there is sufficient

evidence from the analysis of this sample so far to conclude that the average performance over the first three-year-period after going public is increasingly negative relative to the market or benchmark.

### **B. Benchmark**

Raw returns are usually not sufficient for measuring over- or underperformance of an IPO. Any comparison with respect to risk and return usually requires an appropriate benchmark. Adjusting the returns of an individual security to the returns of similar firms with respect to size, industry, timing of an IPO, etc. is critical. However, for practical purposes and especially for an empirical study it is not immediately obvious what constitutes the appropriate benchmark for a particular IPO. Nevertheless, adjusting with an appropriate benchmark is crucial in that it often determines whether there are positive or negative abnormal returns. In order to obtain a better understanding of the magnitude of the problem for our sample we use various market indices or benchmarks for adjusting the raw returns. It should be noted, however, that we use either one or the other index for the entire sample and do not make a judgment on an individual firm level which index is the appropriate benchmark for that particular firm. The indices were already described in section 3.2. The empirical results are presented in Figure 2b.

The BHAR adjusted by the DAX, DAFOX-VW and the DAFOX-SC-EW lead to relatively similar results except for the DAFOX-SC-VW. During the first month this latter index provides positive abnormal returns and then fluctuates around zero. These findings are in line with the results of other studies (Stehle et al., 2000), whereas all other indices show a negative performance. One possible explanation for this result is that a small number of larger firms in the sample have positive abnormal returns, thus heavily biasing the BHAR of the value-weighted index upwards. In contrast, the DAX provides eventually the most negative outcome, indicating that a large firm value-weighted index may introduce some problems when valuing IPOs. For the following analysis we have employed all different indices. However, we will report only the results of the DAX, DAFOX-SC-EW, and DAFOX-SC-VW index, unless the results are different and offer additional insights.

### **C. Magnitude of Initial Returns or Underpricing**

It is quite plausible that the long-run performance of an IPO is influenced by the magnitude of the first day return or initial return, i.e. by the underpricing of the IPO. It could be argued that the firms with the highest first day returns may have a more negative performance afterwards if the price on the first trading day was, for whatever reason, too high relative to the offer price. In contrast, firms with low initial returns, i.e., a relatively low price on the first day of trading in relation to the offer price, may experience smaller negative abnormal returns thereafter. This behavior may be due to the “hot issue” phenomenon that was observed for the United States (Ritter, 1984) and other countries. In a hot issue market the stock prices and the number of IPOs increase simultaneously and dramatically. A hot issue period was clearly observable for the “Neuer Markt” in Germany from 1998 to 2000 (Bessler and Kurth 2006). Nevertheless, for the duration of our observation period, this phenomenon could not be confirmed in previous studies (Schuster, 1995).

Our empirical results are to some extent mixed. On the one hand, they indicate that firms with smaller initial returns have subsequently more negative returns, i.e., the smaller first day returns may have been a signal of the poor quality of the IPO. As

indicated in Table IV, IPOs with an initial return lower than 1% show a statistically significant BHAR of -14.8%, with a median of -35.8%. On the other hand, the results for the IPOs with the highest initial return of greater than 12% indicate a subsequent negative performance of -13.3%. This suggests that these firms may have been overpriced on the first day of trading in the secondary market, supporting the “hot issue” argument. The return pattern is graphed in Figure 3. It is important to note that firms with the highest initial return ( $> 12\%$ ) and run-up in the first 15 months of trading show a sharp decline over the next 15 months. Within this group, however, more than 55% of firms return to the market to raise additional equity (FSEOs) as shown in Table V.

This observation could indicate that companies use the initial return, i.e. the larger underpricing, as a signal for the firm’s quality. There exists empirical evidence that firms with a larger underpricing or run-up over the following months return to the market more often to raise additional equity. We call such an SEO that follows an IPO a “First Seasoned Equity Offering” or FSEO. When separating the sample into IPOs with FSEOs and IPOs without subsequent equity financing the performance results become even more pronounced. The sample of firms that do not return to the equity market for additional funds show an increasingly negative performance as presented in Figure 4b. It should be noted, however, that the results are fairly stable in that at least 72% of the firms in all classes have negative abnormal returns as shown in Table VI. In addition the median is in all classes much more negative than the BHAR, which is in all classes statistically significant.

In contrast, the performance of the IPOs that have additional equity offerings (FSEO) in the secondary market is on average positive as presented in Figure 4a. Thus, they outperform the IPOs without FSEOs. Because the IPOs with the highest initial returns have the best performance for the short-run, it appears that there is a relationship between underpricing and long-run performance. Nevertheless, the IPOs with the highest initial returns have also the worst performance after one year. Therefore, the results suggest that overall the underpricing does not add much to explain the long-run performance of firms that went public in Germany. However, these results could indicate that the investors cannot distinguish between the good and bad performers at the time of the IPO. In this case the management has the opportunity to exploit their information advantage. This means that the managers of an IPO are able to exploit these “windows of opportunities” and time the subsequent equity offering successfully. Consequently, they issue equity when the firm is overvalued and before the capital market can fully assess the correct quality of the firm and re-prices the stock. The negative long-run performance can also be explained with Jensen’s free-cash-flow hypothesis, i.e., the additional cash inflow from issuing equity creates new agency problems. In this case the management does not invest the additional funds as expected by the investors. As a result, the present value of the expected cash inflows needs to be re-priced, thus leading to a lower stock price.

The differentiation between IPOs with FSEO and IPOs without FSEO is stable because the t-value for the means per group is significant, independent of the initial return in both subgroups as is presented in Table VII. However, we do not have a clear indication for a “hot issue” phenomenon in the German market for that period.

#### **D. Subsequent First Seasoned Equity Offerings (FSEO)**

One of the most important factors that may impact the long-run performance of an IPO is whether the IPO firms have the opportunity and eventually will return to the capital market to

raise additional equity. Obviously, this information is not available at the time of the IPO but only in hindsight. In fact the decision to issue more equity may depend on the performance of the IPO itself. It can be expected that successful firms have a superior chance to return to the equity market for additional funds whereas this opportunities for the below average performers may be slim. The expected operating performance should be reflected in the current stock price. It is important to note that cause and effect of this relationship needs to be carefully analyzed before any meaningful conclusion can be drawn. This is, however, beyond the scope of this paper because detailed and reliable accounting information is not available for German firms over that time period. Nevertheless, our results suggest that firms that have a seasoned equity offering within the first five years after the IPO have on average positive raw returns as well as positive market adjusted returns. This performance is documented in Figure 5a.

Analyzing the abnormal returns and the percentages of positive and negative returns also provides some interesting insights as shown in Table VIIIa. Overall the abnormal returns are positive with the highest return of 16.2% relative to the DAX (M[1, 36]). This figure is significant at the 5%-level. In contrast, for the firms that either did not plan or that did not have the opportunity to return to the equity market a substantial underperformance is documented. The values are graphed in Figure 5b. First of all, the average raw returns fluctuate around zero. Second, when adjusting with a benchmark we observe significant negative BHAR independent of the index employed. The BHAR of -37.6% (vs. DAX) for the first 36 months of trading is statistically significant at the 1% level. The median of -46.9% also supports this observation. The conclusion of extreme negative abnormal returns and underperformance is supported further by the high and significant percentage of firms with negative BHAR of at least 65% vs. DAX and DAFOX as shown with more detailed values in Table VIIIb.

In addition, the results presented in Table IX underscore the robustness of this separation of our initial sample. The difference in means of both subgroups is statistically significant independent of the benchmark used. In sum, subsequent equity financing is an important factor explaining the long-run performance of IPOs. Thus, differentiating the sample into firms for which the IPO was the only time that they raised equity in the financial markets and the ones that had a subsequent SEO yield some important insights and helps to explain the long-run performance of IPOs. This interesting aspect and important observation is further investigated in more detail in the next section.

#### **E. Performance of IPOs with Seasoned Equity Offerings**

The results so far support the notion that firms that return to the equity market after going public to raise additional equity through a “First Seasoned Equity Offering” (FSEO) show some superior performance relative to the firms that do not return to the equity market. Given the additional empirical evidence that the long-run performance of seasoned equity offerings (SEOs) is negative after the SEO, it is interesting to analyze how these IPOs perform in the time period before and after they issue additional equity. The raw returns and adjusted returns over the 12-months pre-announcement period as well as over the 36-months post-announcement period following the FSEO are presented in Figure 6a. The results suggest that firms that return to the market have on average a superior performance or run-up up to the time of the FSEO. On average, however, they do not generate higher raw returns after the FSEO. Instead the empirical results reveal the typical return behavior of underperformance against the benchmark after a SEO.

The run-up or over-performance of 16.5% for the period of twelve months before the SEO is statistically significant as presented in Table X. There is also a statistically significant underperformance of -24.8% in the 36-months period after the FSEO. The percentage of negative returns in the pre-announcement period of 31.2% and the percentage of negative returns of 77.0% in the 36-months period after the SEO are highly significant. These results suggest that the management tried to time the market and issued additional equity when the firm was overvalued. This observation and interpretation is consistent with most of the empirical findings reported in the literature. For SEOs the empirical studies usually find positive abnormal returns in the pre-announcement period and negative abnormal returns in the post-announcement period.

It appears that these firms are able to use their superior information with respect to the value of the firm to exploit “windows of opportunity”, i.e., issuing equity when the firm is overvalued. This view is supported by analyzing the abnormal returns over the entire period around the first seasoned equity offering (FSEO). The performance over the four year period (M [-12, 36]), i.e., one year before and three years after the SEO, show negative abnormal returns of -9.1%. This means that the relative firm value (share price) declined over that period. Thus, shareholder value has been destroyed. It appears that the capital market is not able to determine the fair value of the firm before the FSEO (Gale and Stiglitz, 1989). Another explanation is that the money is invested in poor projects or wasted for other reasons (Jensen, 1986). Moreover, the investors appear to be too optimistic when investing in these shares and consequently realize negative returns in the long-run.

The importance of subsequent equity financing is further investigated by separating this sample of IPOs with FSEOs into those firms that did raise only once equity in the secondary market (FSEO) and those firms that returned to the equity market at least a second time for raising additional funds (SSEO). This separation yields additional insights as presented in Figure 6b. The portfolio of firms that did not raise more equity after the “First Seasoned Equity Offering” (FSEO) show on average an underperformance of -31.0% over the four year time interval (M [-12, 36]) surrounding the event. The negative abnormal return is significant at the 5% level. This result is in contrast to those firms that issue additional shares (SSEO). The abnormal returns of the portfolio of firms that have a “Second Seasoned Equity Offering” (SSEO) after the IPO outperform the benchmarks and have on average positive abnormal returns of 11.7% over the four year time interval (M [-12, 36]). The difference of means between these two groups of firms is significant at the 5% level ( $t = 2.24$ ).

It appears that there exists a substantial difference in performance between these two portfolios. The interesting question is, however, whether the investor can distinguish between these two groups beforehand. The performance of the two groups is such that the issuing firms have a run-up in the period before the SSEO (M [-12, 0]) of 17.5%, whereas the non-issuing group has a run-up of 15.4%. These results suggest that the investor can hardly predict the future performance of firms after the first seasoned equity offering (FSEO) and therefore cannot successfully distinguish between the high and low quality firms. This finding is consistent with the empirical evidence in previous studies. However, it is possible that the underperformance of the issuing firms is not related to the past performance or that it is not a possible miss-pricing of the market. Instead, the poor performance following the SSEO is the result of agency problems in the sense of the free-cash-flow hypothesis (Jensen, 1986) that becomes evident only after the SSEO. For example, the equity raised may have been invested in poor projects that do not generate the cost of capital or were wasted otherwise. In this case

the realized return was below the investors' expected rate of return. Consequently, it is no surprise that the stock price underperforms after the SSEO.

The empirical evidence so far suggests that firms return to the market as long as they are perceived by the investors as successful, but that the market is not interested in those firms that did not generate a superior performance on the funds raised in the IPO or the last SEO. Thus, it is of no surprise that the average long-run performance for both IPOs and FSEOs without further equity financing is negative when compared to the appropriate benchmark.

The abnormal returns over the three year time interval (M [1, 36]) for the firms with additional equity financing after the FSEO, i.e. SSEO, and the firms with no additional SEO after the FSEO are presented and compared in Table XI. Although the performance of firms with a second seasoned equity offering (SSEO) is on average negative (-11.3%) in the post issuing period, the results are not significantly different from zero. In contrast, the firms that did not raise additional equity after the FSEO have a negative performance of -39.1%, which is significant at the 1% level. In this case the performance of the portfolio relative to each other may offer additional insights. When comparing the average performance of both portfolios it is evident that the mean returns are significantly different at the 5% level ( $t = 2.0$ ). Moreover, the substantial difference between these two portfolios is further supported in that nearly 90% of the firms with SSEOs have a negative performance afterwards. This is significant at the 1% level. In sum, the equity financing opportunity of firms after the IPO is a factor that helps to explain the long-run outperformance and underperformance of IPOs.

#### **F. Performance of First Seasoned Equity Offerings of former IPOs compared to SEOs of established firms**

The portfolio of IPOs that raised additional equity at least one more time after the IPO yields on average a negative return of -9.1% over the time interval M [-12, 36] (see table X). The empirical result so far supports the view that information asymmetry and agency problems are important aspects in financing decisions. It could also be interpreted as evidence that the information asymmetry of firms that went public is more pronounced relative to established firms. In order to investigate this preposition that there is more uncertainty in valuing IPOs than in valuing established firms, i.e. there is more information asymmetry, we compare the performance of IPOs and established firms around the time when they issue additional equity through a "Seasoned Equity Offering" (SEO). The long-run performance of established firms with SEOs that have at least one additional equity offering (SSEO) over the next five years and the performance of IPOs with FSEOs and additional equity offerings (SSEO) are presented in Figure 7a.

In contrast, Figure 7b shows the performance of IPOs and established firms that issued equity in the secondary market (FSEO and SEO, respectively) only once but then had no additional SEO. The portfolios of former IPOs (FSEO) have a stronger run-up in the period before the SSEO than the portfolio of established firms. This observation holds for both cases, i.e., whether or not the IPOs and the established firms have further SEOs within the next five years. After the second seasoned equity offering (SSEO), however, the IPOs have the inferior abnormal performance. In other words, the established firms outperform the IPOs in both cases after adjusting with the appropriate benchmarks. The empirical results for the run-up period (M [-12, 0]), the long-run performance after the SSEO (M [1, 36]), and the performance for the entire 4 year time interval (M [-12, 36]) are summarized in Table XII.



The empirical findings seem to indicate that the information asymmetry is more pronounced for IPOs than for established firms because the run-up (15.4% vs. 9.1%), the long-run performance (-31.0% vs. -19.4%) as well as the percentage of negative returns (80.0% vs. 62.0%) suggest less risk for the established firms. It is also possible that agency problems in the form of the free cash flow hypothesis (Jensen, 1986) or a change in the ownership structure are more important valuation factors for IPOs than for established firms. It is important to note that the difference in means for the long-run performance ( $M[1, 36]$ ) between the portfolio of IPOs with subsequent equity offerings and the portfolio of established firms with subsequent equity offerings is statistically significant at the 5% level ( $t = 2.32$ ). In contrast, the difference in the means for the portfolios without subsequent equity financing is insignificant.

The observation and conclusion of this study that the management of IPO firms tends to exploit the investors' uncertainty or information disadvantage seem to be supported by the more recent observations for the "Neuer Markt", the former German market for start-up companies. Although these firms are not directly comparable with the firms in this study, it appears that a number of firms tried to exploit the information advantage and overvaluation (hot issue market of 1998 - 2000) by issuing additional equity (FSEO) as soon as possible after the IPO. This could be explained with a different financing behavior through time (stage-financing). However, it is more likely that firms are able to time the market, that the long-run performance is negative because the predictions of the expected growth rates are usually too optimistic, and that in the long-run only the high quality firms will be able to raise additional equity. It could be expected that the results of a similar study for the IPOs of the "Neuer Markt" will even be more dramatic because the information asymmetry should be more pronounced for these firms due to the shorter company history.

## **V. Conclusions**

The objective of this study was to investigate the importance of the subsequent financing decisions for the long-run performance of initial public offerings in Germany for the period from 1977 to 1995. It was of particular interest to examine whether underpricing and subsequent financing decisions can help to explain why some firms have substantial positive and others substantial negative long-run abnormal holding period returns after they go public. The subsequent financing activity in the equity market, i.e., whether the firm that went public had one (FSEO) or more seasoned equity offering (SSEO) after the IPO, appears to be the criterion that eventually separates the outperformers from the underperformers. Thus, the empirical findings of this research suggest that one of the most important factors that determine the direction and the magnitude of the abnormal returns or performance are the financing opportunities in subsequent years.

The empirical evidence, however, does not imply any cause-and-effect-relationship of this phenomenon yet. At a first glance these results suggest that firms with a better stock price performance have the opportunity to raise additional equity whereas the poor performers do not get an immediate second chance to sell equity to the public. Management usually exploits this opportunity as soon as possible. Obviously, this insight from hindsight does not offer any guidance beforehand which firms will have the superior performance. It is also an interesting question whether the run-up before the SEO is the reason for the equity offering or whether the planned SEO is the reason for the run-up. The results also indicate that in general firms seem to be in a position to optimally time their financing activities. Management appears to use their information advantage with respect to the fair value of the firm to exploit "windows of

opportunities”. These findings are robust with respect to the benchmark employed. Moreover, the information asymmetry appears to be more pronounced for IPOs than for established firms in that they have a stronger stock price reaction in both the pre- and post-announcement periods of a seasoned equity offering.

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**Table I a/b**  
**Short-Run and Long-Run Performance of IPOs in the U.S.**

**a) Cumulative Abnormal Returns (CAR)**

Study	N	CAR	Interval	Period	Adjustment
Chalk/Peavy (1987)	649	18.0%	D [1, 190]	1975 – 1982	Market
Aggarwal/Rivoli (1990)	1,598	-13.7%	D [1, 250]	1977 – 1987	NASDAQ, D/M
Ritter (1991)	1,254	-29.1%	M [1, 36]	1975 – 1984	“Matching Firm”
Affleck-Graves et al. (1996)	2,096	-7.6%	D [1, 504]	1975 – 1991	“Size-Matched”
Carter et al. (1998)	2,292	-19.9%	D [6, 765]	1979 – 1984	VW-CRSP-Index

D: Days, M: Month, D/M: Dimson/Marsh (1986), VW-CRSP-Index: value-weighted-Index

Source: Chalk/Peavy (1987, Table 1, p. 66), Aggarwal/Rivoli (1990, Exhibit 2, p. 49), Ritter (1991, Table II, p. 10), Affleck-Graves et al. (1996, Table 3, p. 32), Carter et al. (1998, p. 288).

**b) Wealth Relatives (WR)**

Study	N	WR	Interval	Period	Adjustment
Ritter (1991)	1,526	0.83 (34.5/61.9)	D [1, 756]	1975 – 1984	„Size Adjusted“
Loughran (1993)	3,656	0.67 (17.3/76.2)	M [0, 72]	1967 – 1987	NASDAQ-EW
Loughran/Ritter (1995)	4,753	0.80 (8.4/35.3) 0.70 (15.7/66.4)	D [1, 756] D [1, 1260]	1970 – 1990	BHAR, EW-PF

EW-PF: equally-weighted Portfolio

Source: Ritter (1991, Table 3, p. 14), Loughran (1993, Table 3, p. 250), Loughran/Ritter (1995, Table II, p. 31 and p. 37 f.).



**Table II**  
**Long-Run Performance of IPOs in Germany**

Study	N	AR	Period	Interval	Adjustment
Schuster (1995)	59	-28.0%	1988 – 1992	M [0, 60]	FAZ, CAR
Ljungqvist (1997)	154 145	-19.9% -12.1%	1970 – 1990	D [1, 750]	DAFOX, WR DAFOX, WR, o. PFM
Ljungqvist (1997)	88	-1.8%	1970 – 1987	D [1, 750]	DAFOX, WR, o. PFM
Stehle et al. (2000)	95 92	16.1% -13.5%	1960 – 1987 1988 – 1992	M [0, 36]	EW-MP, WD
Stehle et al. (2000)	95 92	-1.1% -9.0%	1960 – 1987 1988 – 1992	M [0, 36]	VW-MP, WD
Stehle et al. (2000)	95 92	-5.4% -7.9%	1960 – 1987 1988 – 1992	M [0, 36]	GG-PF by size, WD
Thies (2000)	218	-12.7%	1977 – 1995	M [1, 36]	VW-MP, BHAR

D: Days, M: Month, Index StBundesamt: Index of the Statistisches Bundesamtes, D/M = Dimson/ Marsh (1986), FFJR = Fama et al. (1969), WR = „Wealth Relative“, WD = „Wealth Difference“, o. PFM: without IPOs underwritten by Portfolio Management GmbH.

Source: Schuster (1995, Table 3, p. 11), Ljungqvist (1997, Table 1, p. 1312), Stehle et al. (2000, p. 178), Thies (2000, p. 376).

**Table III**  
**Long-Run Performance of IPOs in Germany (N = 218, DAX)**

Interval	BHAR	t-stat.	Median	STD	MIN	MAX	% Neg.	z-stat.
M [1, 12]	2.1%	0.90	-2.9%	35.2%	-67%	68%	56%	-1.70*
M [1, 24]	-3.1%	-0.79	-8.4%	57.5%	-129%	179%	60%	-2.89**
M [1, 36]	-12.7%	-2.50**	-17.2%	75.0%	-223%	272%	61%	-3.18***

\*\*\*/\*\*/\* denotes significance at the 1%/5%/10% level.

**Table IV**  
**Initial Return (IR) and Long-Run Performance M [1, 36]**

Initial Return in %	N	BHAR	t-stat.	Median	STD	% Neg.	z-stat.
Total group	203	-10.6%	-1.98**	-15.9%	75.9%	59.6%	-2.67***
IR < 1%	47	-14.8%	-1.04	-35.8%	96.7%	65.6%	-2.04**
1% < IR < 4,9%	55	-9.5%	-1.03	-10.8%	67.5%	58.2%	-1.08
5% < IR < 11,9%	45	-4.2%	-0.38	-11.7%	73.8%	53.3%	-0.30
IR > 12%	56	-13.3%	-1.49	-15.2%	66.6%	60.7%	-1.47

\*\*\*/\*\*/\* denotes significance at the 1%/5%/10% level.

**Table V**  
**Initial Return and Percentage of IPOs with FSEOs**

Criteria	Initial Return in %			
	IR < 1%	1% < IR < 4,9%	5% < IR < 11,9%	IR > 12%
without FSEOs (%)	27 (57.4%)	36 (65.5%)	25 (55.6%)	25 (44.6%)
with FSEOs (%)	20 (42.6%)	19 (34.5%)	20 (44.4%)	31 (55.4%)

**Table VI**  
**Initial Return and Long-Run Performance of IPOs**  
**with/without FSEOs (Benchmark: DAX)**

Initial return in %	N	BHAR	t-stat.	Median	STD	% Neg.	z-stat.
<b>with FSEOs</b>							
IR < 1%	20	31.3%	1.36	-12.4%	102.1%	55.0%	-0.22
1% < IR < 4,9%	19	20.3%	1.45	29.6%	56.5%	31.6%	1.83*
5% < IR < 11,9%	20	42.3%	2.70***	33.5%	70.3%	30.0%	2.01*
IR > 12%	31	6.1%	0.59	-2.6%	56.5%	51.6%	0.00
<b>without FSEOs</b>							
IR < 1%	27	-48.9%	-3.27***	-65.5%	77.6%	74.1%	-2.31**
1% < IR < 4,9%	36	-26.3%	-2.31**	-40.1%	68.4%	72.2%	-2.50**
5% < IR < 11,9%	25	-41.4%	-3.88***	-46.0%	53.2%	72.0%	-2.00**
IR > 12%	25	-37.3%	-2.62***	-52.2%	72.0%	72.0%	-2.00**

\*\*\*/\*\*/\* denotes significance at the 1%/5%/10% level.

**Table VII**  
**Test of Significance for Mean of IPOs with/without FSEO**

Criteria	IR < 1%	1% < IR < 4,9%	5% < IR < 11,9%	IR > 12%
Sample				
without FSEO	-48.9%	-26.3%	-41.4%	-37.3%
with FSEO	31.3%	20.3%	42.3%	6.1%
t-value	2.93***	2.69***	4.19***	2.46**

\*\*\*/\*\*/\* denotes significance at the 1%/5%/10% level.

**Table VIII a/b**  
**Long-Run Performance of IPOs**  
**with/without First Seasoned Equity Offerings (FSEOs)**

**a) with First Seasoned Equity Offerings**

Interval	N	BHAR	t-stat.	STD	MIN	MAX	% Neg.	z-stat.
<b>DAFOX-SC-EW</b>								
M [1, 12]	101	7.3%	2.07**	35.5%	-58%	158%	48.5%	0.40
M [1, 24]	101	6.6%	1.24	53.5%	-129%	202%	49.5%	0.20
M [1, 36]	101	8.1%	1.21	67.7%	-127%	240%	57.5%	-1.41
<b>DAX</b>								
M [1, 12]	101	11.3%	3.04***	37.1%	-66%	168%	43.6%	1.39
M [1, 24]	101	13.1%	2.41**	54.6%	-96%	207%	44.6%	1.18
M [1, 36]	101	16.2%	2.23**	72.4%	-119%	272%	47.5%	0.60

\*\*\*/\*\*/\* denotes significance at the 1%/ 5% /10% level.

**b) without First Seasoned Equity Offerings**

Interval	N	BHAR	t-stat.	STD	MIN	MAX	% Neg.	z-stat.
<b>DAFOX-SC-EW</b>								
M [1, 12]	117	-4.3%	-1.45	32.1%	-58%	158%	65.0%	-3.15***
M [1, 24]	117	-9.8%	-1.81	58.5%	-129%	202%	70.1%	-4.26***
M [1, 36]	117	-19.5%	-3.61***	58.4%	-127%	240%	75.4%	-5.19***
<b>DAX</b>								
M [1, 12]	117	-5.7%	-1.96**	31.5%	-67%	138%	67.5%	-3.69***
M [1, 24]	117	-17.0%	-3.25***	56.5%	-129%	279%	71.8%	-4.62***
M [1, 36]	117	-37.6%	-5.96***	68.2%	-223%	257%	71.8%	-4.62***

\*\*\*/\*\*/\* denotes significance at the 1%/5%/10% level.

**Table IX**  
**Long-Run Performance of IPOs**  
**with/without FSEO and various Benchmarks**

Benchmark	DAX	DAFOX-SC-VW	DAFOX-SC-EW
Sample			
IPOs without FSEO	-37.6%***	-11.8%**	-19.7%***
Full Sample	-12.4%**	4.1% <sup>NS</sup>	-7.8%*
IPOs with FSEO	16.2%**	22.5%***	8.1% <sup>NS</sup>
Significance of Difference in Means (t-value)	5.83***	3.81***	4.37***

\*\*\*/\*\*/\* denotes significance at the 1%/5%/10% level, NS denotes non-significant.

**Table X**  
**Long-Run Performance of First Seasoned**  
**Equity Offerings (FSEO) of former IPOs vs. DAX**

Interval	N	BHAR	t-stat.	MIN	MAX	STD	% Neg.	z-stat.
M [-12, 1]	113	16.5%	5.33***	-62%	130%	32.9%	31.2%	4.14***
M [1, 12]	113	-3.3%	-1.06	-75%	190%	32.9%	64.6%	-3.01***
M [1, 24]	113	-11.4%	-2.63***	-104%	217%	46.1%	71.7%	-4.52***
M [1, 36]	113	-24.8%	-3.56***	-171%	407%	74.1%	77.0%	-5.64***
M [-12, 36]	113	-9.1%	-0.94	-201%	539%	102.2%	64.6%	-3.01***
<b>For Comparison: Full Sample of SEOs from 1974 - 1995 (N = 877)</b>								
M [-12, 36]	877	3.2%	0.71	-223%	617%	80.9%	35.3%	-8.67***

\*\*\*/\*\*/\* denotes significance at the 1%/ 5% /10% level.

**Table XI**  
**Long-Run Performance of FSEO with/without further SSEO for M [1, 36]**

Criteria	N	BHAR	t-stat.	STD	MIN.	MAX	% Neg.	z-stat.
FSEOs without further SSEO	55	-39.1%	3.47***	83.6%	-170%	407%	89.1%	-5.66***
FSEO with further SSEO	58	-11.3%	-1.39	61.5%	-150%	212%	65.5%	-2.23*

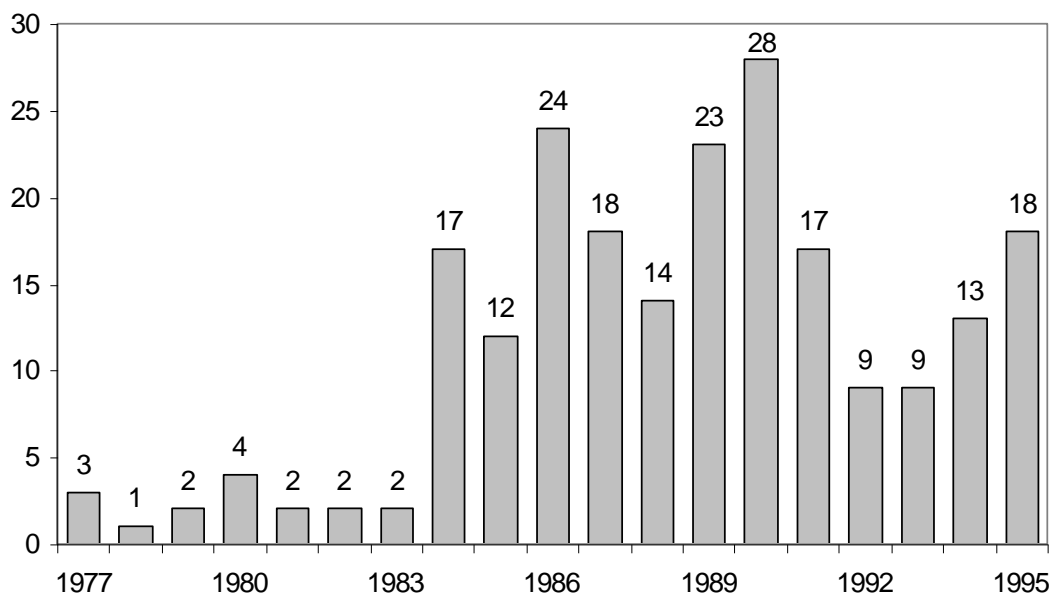
\*\*\*/\*\*/\* denotes significance at the 1%/ 5% /10% level.

**Table XII**  
**Long-Run Performance of FSEO of former IPOs and SEO of established firms (respectively with/without further SSEO)**

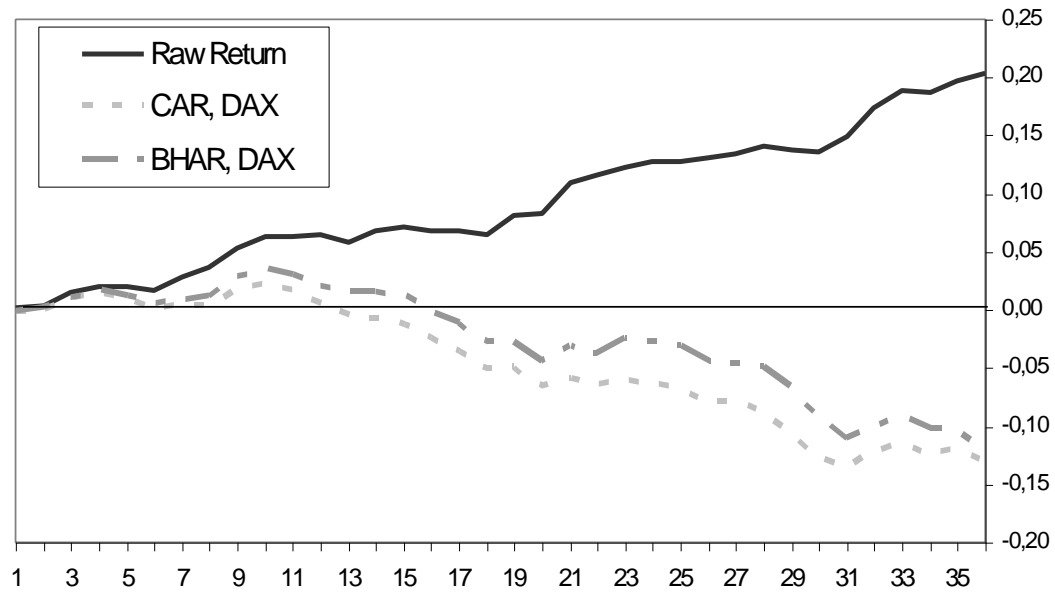
Criteria	Interval	N	BHAR	t-stat	STD	% Neg.
FSEO of former IPOs, no further SSEO	M [-12, -1]	55	15.4%	3.61***	31.7%	32.7%
	M [1, 36]		-39.1%	-3.47***	83.6%	89.1%
	M [-12, 36]		-31.0%	-2.02**	113.7%	80.0%
SEO of established firms, no further SSEO	M [-12, -1]	265	9.1%	4.29***	34.6%	37.8%
	M [1, 36]		-26.2%	-6.94***	61.4%	70.1%
	M [-12, 36]		-19.4%	-3.48***	90.6%	62.0%
FSEO of former IPOs, further SSEO	M [-12, -1]	58	17.5%	3.91***	34.2%	29.8%
	M [1, 36]		-11.3%	-0.98	61.5%	65.5%
	M [-12, 36]		11.7%	1.04	85.9%	50.0%
SEO of established firms, further SSEO	M [-12, -1]	356	15.2%	6.51***	45.1%	33.0%
	M [1, 36]		10.2%	2.26**	85.2%	50.2%
	M [-12, 36]		34.3%	4.03***	160.2%	52.5%

\*\*\*/\*\*/\* denotes significance at the 1%/5%/10% level.

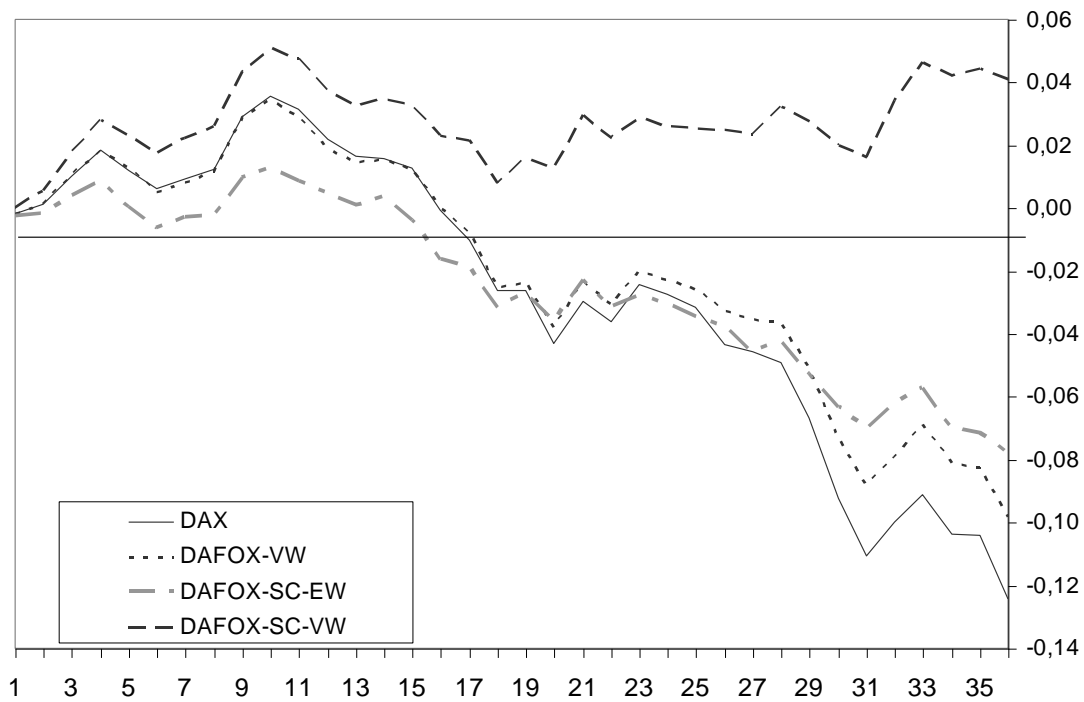
**Figure 1:**  
**Number of IPOs in Germany in the Sample from 1977 – 1995 (N = 218)**



**Figure 2a:**  
**Long-Run Performance of IPOs in Germany 1977 - 1995**

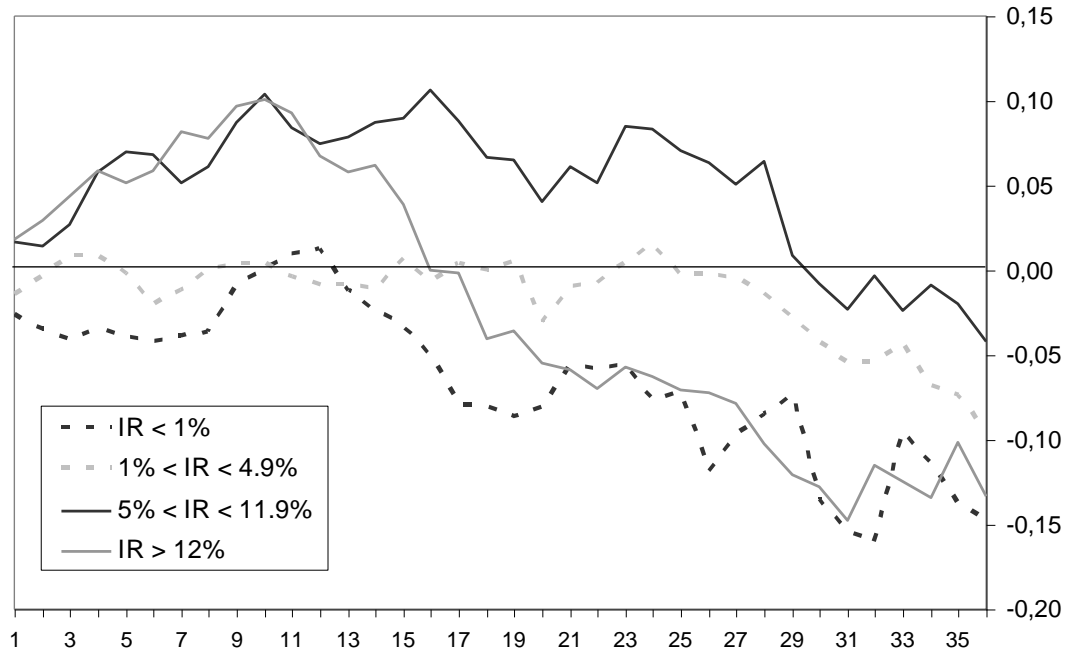


**Figure 2b**  
**Long-Run Performance (BHAR) of IPOs for various Benchmarks**

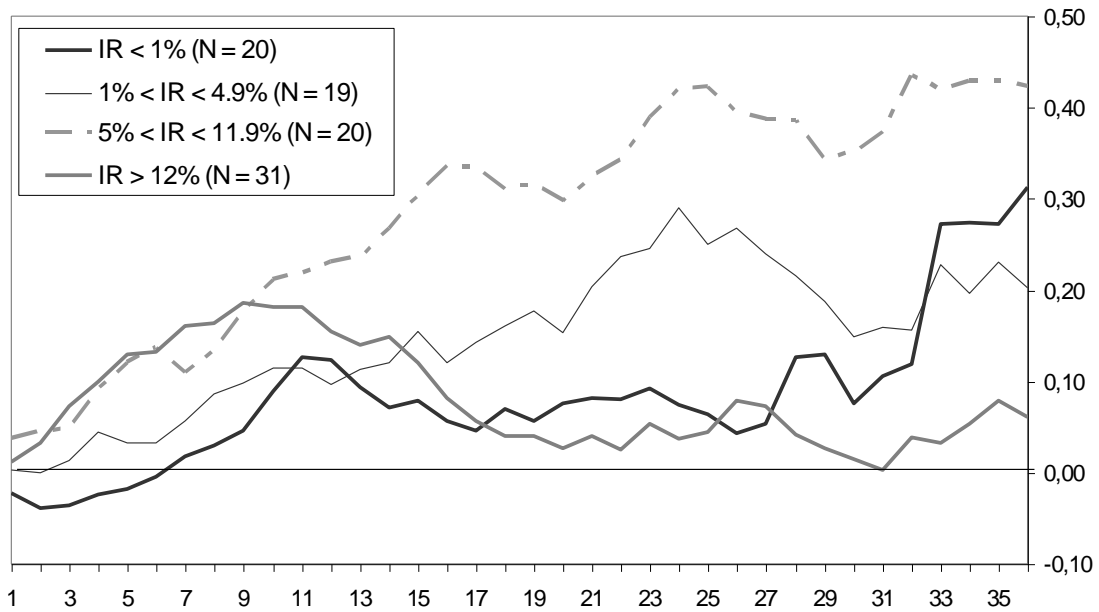




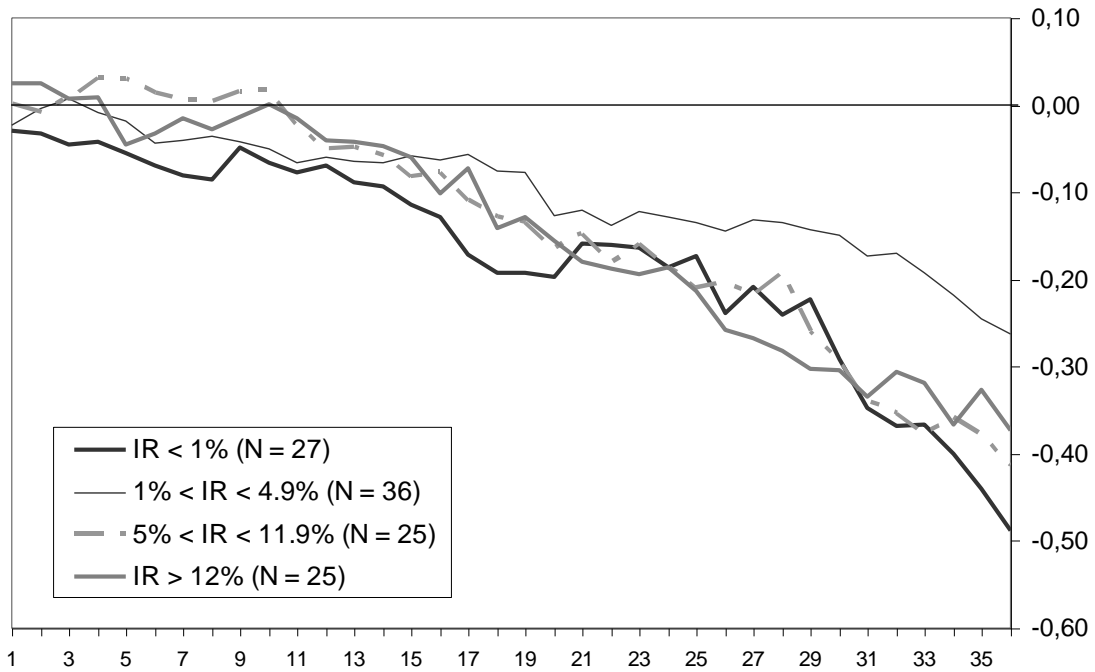
**Figure 3**  
**Initial Returns (IR) and Long-Run Performance of IPOs (DAX)**



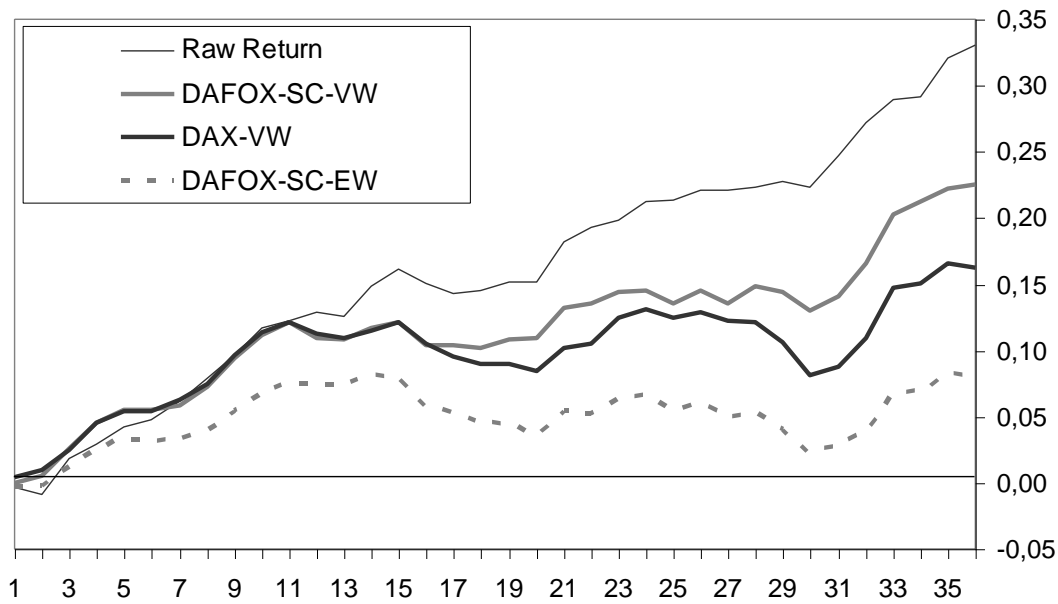
**Figure 4a**  
**Initial Return and Long-Run Performance of IPOs with FSEO (DAX)**



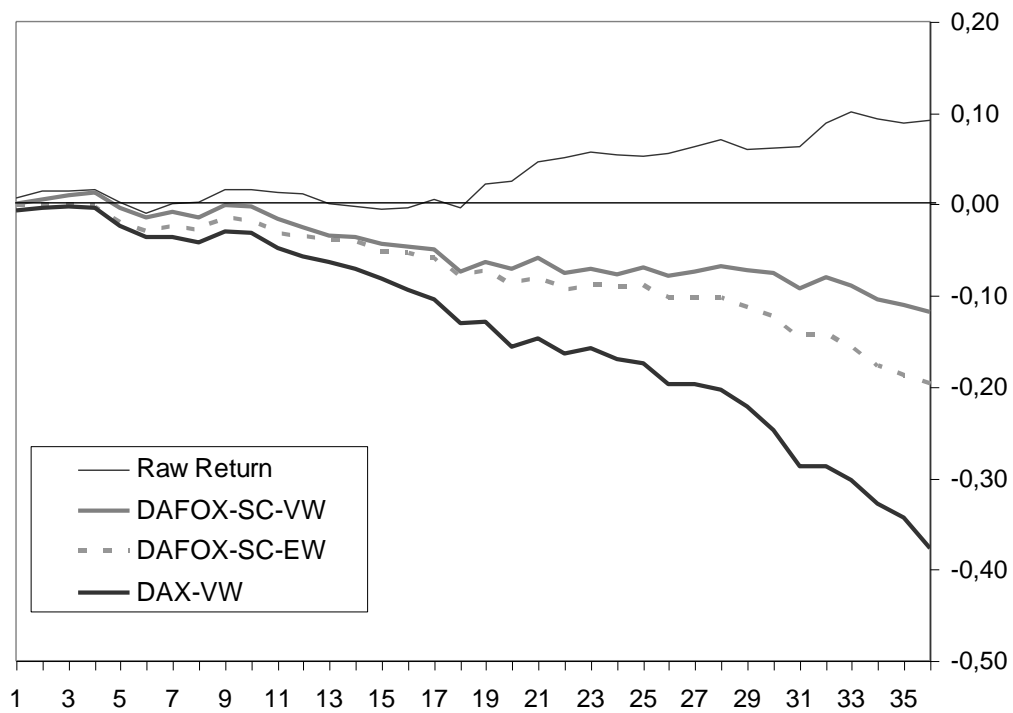
**Figure 4b**  
**Initial Return and Long-Run Performance of IPOs without FSEO (DAX)**



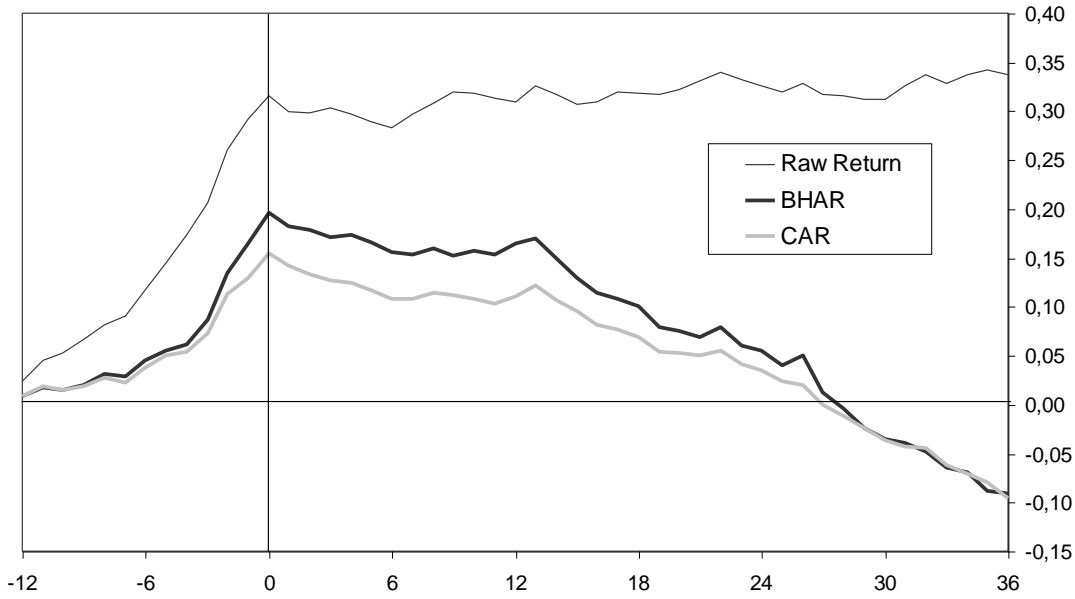
**Figure 5a**  
**Long-Run Performance of IPOs in Germany with FSEO**



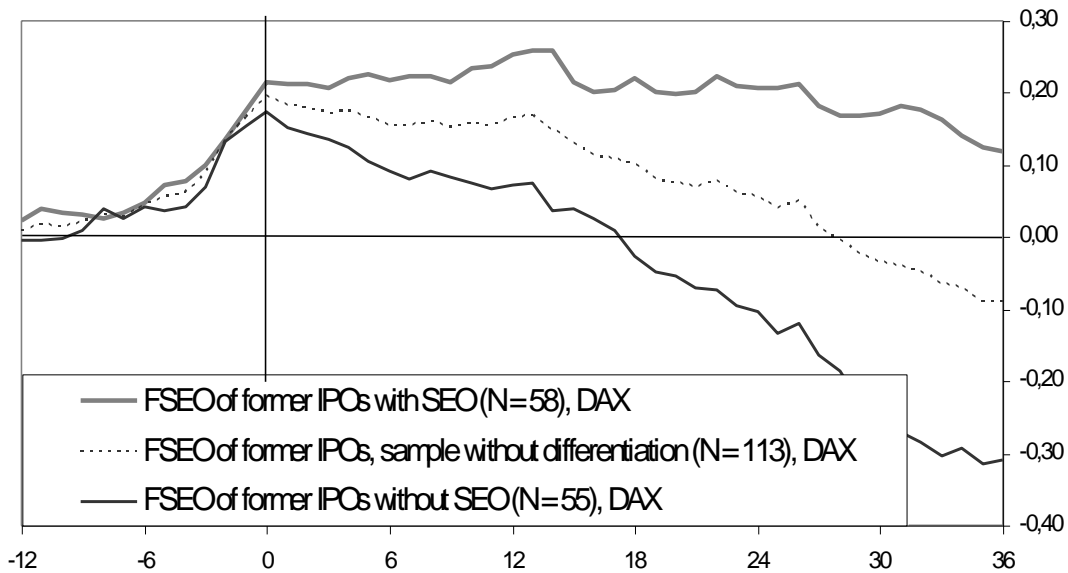
**Figure 5b**  
**Long-Run Performance of IPOs in Germany without FSEO**



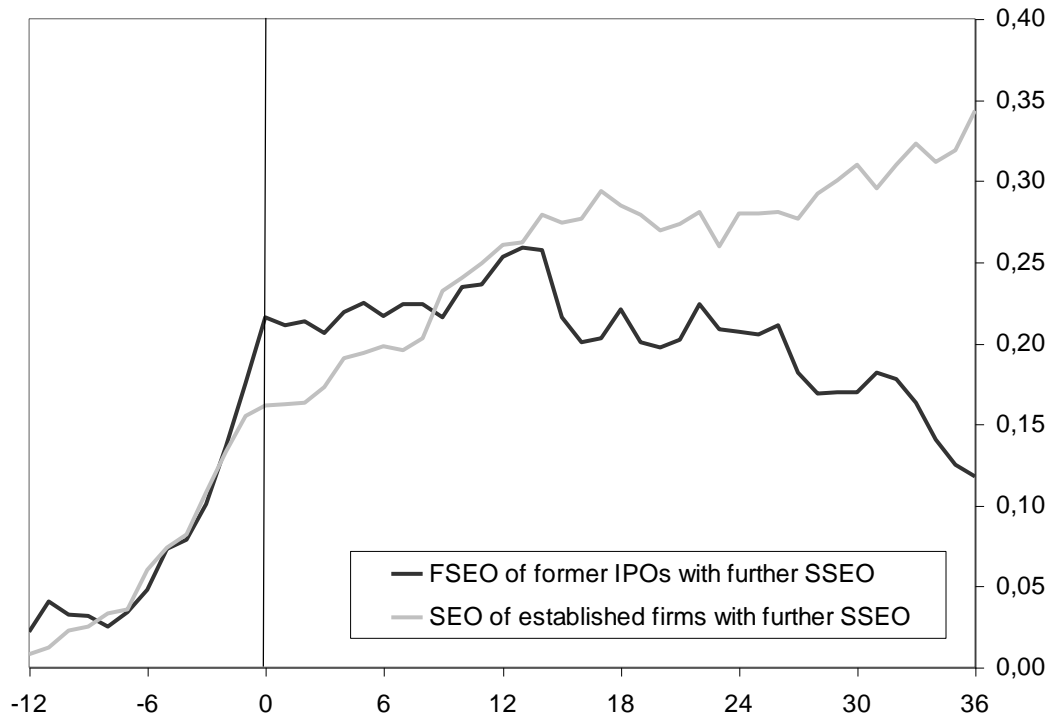
**Figure 6a**  
**Long-Run Performance of FSEO of former IPOs (DAX)**



**Figure 6b**  
**Long-Run Performance of FSEO of former IPOs**  
**(with and without SEOs within next 5 years)**



**Figure 7a**  
**Long-Run Performance of FSEO of former IPOs and SEO of established firms (respectively with further SSEO) vs. DAX**



**Figure 7b**  
**Long-Run Performance of FSEO of former IPOs and SEOs of established firms (respectively without further SSEO) vs. DAX**

